From Preservice to Inservice Teaching: A Study of Technology Integration

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Abstract

This study examines how social studies preservice teachers use pedagogical and technological applications and skills employed during their teacher education program, specifically the methods block. Data were collected from the methods course experience through student teaching and then through case study research with first-year teachers. Results indicate that technology skills and processes learned were transferred through time; however, expectations for teaching with technology and perceived challenges of doing so were complex. Participants in the study were more likely to emulate what "they were taught" than to apply individual creative technology integration plans. Common barriers to using technology in the classroom identified in the literature (Berson, 1996; Whitworth & Berson, 2003; Butler & Sellborn, 2002) were present; however, the researchers believe there is a need to enhance teacher education programs and teacher induction programs to include diverse technology integration experiences, and specifically, creative ideas to address barriers of using technology in the classroom and increasing the ability to think outside the box.

The ever-growing and evolving role of technology in teacher education and actual technology integration into classroom teaching is documented and supported by various accrediting agencies such as the National Council for Accreditation of Teacher Education (NCATE) and national technology standards such as those initiated by the International Society for Technology in Education (ISTE). ISTE's (2002) National Educational Technology Standards (NETS), written for students, teachers, and administrators, were later adapted and/or adopted by numerous states and further used to write or re-write technology course of studies. Despite this, it has been asserted that technology has not had an effect on social studies instruction during the last twenty years (Berson & Balyta, 2004). Berson (1996), in a report that examined a variety of studies, described potential barriers to social studies teachers' use of technology. These included: (a) insufficient training, (b) inadequate resources (e.g., software), (c) limited awareness, (d) content coverage, and (e) preparation time. Whitworth and Berson (2003) analyzed more recent research and issues involved with technology in the social studies and concluded that similar barriers continue to exist, particularly regarding limited resources and preparation time. Butler and Sellborn (2002) identified similar barriers: lack of hardware/software and institutional support, reliability of technology, time to learn, and uncertainty of technology's worth.

Teacher educators can initiate change and address these barriers through implementation of technology integration requirements in teaching and learning. It has been suggested that for change to take place regarding technology integration, change must begin with preservice teachers (Diem, 2000). White (1999) asserted that preservice teachers in social studies education must be given numerous opportunities to interact with K–12 students in field settings in a variety of ways and there should

be technology links between the university and schools for sharing and reflection. Otero et al. (2005) challenged university teacher education faculty to become "proficient in technology use and . . . understand pedagogical uses of technology" (p. 8). The importance of faculty modeling technology integration was supported by Crowe's (2004) study in which preservice teachers noted that observing the university faculty member teaching with technology encouraged them to do so.

In a study of faculty integrating technology, Strehle, Whatley, Kurz, and Hausfather (2001) found four common themes affecting faculty members' efforts in technology integration across a curriculum: (1) commitment toward change, (2) obstacles such as time and lack of proper hardware and software, (3) struggles implementing technology use in instruction, and, (4) attitudes toward technology use. However, teacher educators must also overcome challenges and barriers and practice effective modeling efforts (Hornung & Bronack, 2000). Preservice teachers should have opportunities to observe, receive support (Wilson, 2003), and participate in appropriate technology practices in their field experiences, later applying what they have learned in their own classroom (Wang, 2000). Grove, Strudler, and Odell (2004) suggested that field experiences should ensure student teachers' placement with mentors who support lessons with technology. They stated that student teachers "need knowledgeable mentor teachers and adequate access to technology to practice and develop those lessons" (p. 102).

Perhaps teacher preparation programs are "painting too optimistic a picture of technology's role in the classroom" and subsequently, teacher educators should "infuse a dose of reality into the preparation of new teachers" (Pierson & Cozart, 2004–2005, p. 61). Another dose of reality may be related to methods of empowering teachers to use technology. Beyerbach, Walsh, and Vannatta (2001), in their evaluation study of a preservice teacher technology infusion project noted the perception that teachers "had no choice" but to use technology in their classroom and often did so because they "had to" (p. 125). Otero et al. (2005) further noted the need for teacher education faculty and prospective teachers to understand the *why, when, and how* of using technology, developing critical dispositions that help generate meaningful uses of technology.

Keiper, Harwood, and Larson (2000) stress the importance of preservice teachers' understanding of how to integrate technology into daily lessons. Teacher educators are providing opportunities to experience technology infusion in university classrooms and field experiences instead of taking a technology-specific course (Bielefeldt, 2001; Pope, Hare, & Howard, 2002). Partnering efforts such as the Master Technology Teacher program provide opportunities for college faculty, preservice teachers, and inservice teachers to work collaboratively on technology integration plans, encouraging teachers to integrate technology appropriately, even when faced with common barriers (Wright, Wilson, Gordon, & Stallworth, 2002). Examples of such collaborations may be critical to

moving beyond technology that simply supports current social studies instruction to technology used as a tool for authentic inquiry in social studies instruction (Hicks, Potter, Snider, & Holmes, 2004).

Teacher educators should also focus on improving the preservice teacher's attitudes toward technology's benefits in teaching and learning (Abbott & Faris, 2001). Mason et al. (2000) assert that the teacher educator must be at the forefront of integrating technology into pedagogical practices if true education reform is going to occur in classrooms. Pierson and Cozart (2004–2005) further challenge teacher educators to "more actively assist students in brainstorming appropriate technology integration strategies" (p. 62). In order to provide multiple opportunities to acquire new technology skills and to meet these many challenges, teacher education programs are utilizing electronic portfolios (EP). Such experiences may help provide preservice teachers "focused experiences" in removing barriers of using technology to ensure meaningful integration (Pierson & Cozart, 2004–2005).

Skills Learned Through Electronic Portfolio Development

A portfolio, whether electronic or paper, is a *collection* or showcase of work and artifacts, and typically demonstrates a variety of skills learned (Barrett, 1998; Hewett, 2004). In producing an electronic portfolio (EP), students (a) collect, save, and store information and artifacts in an electronic format (Barrett, 1998); (b) exhibit their progress (Lankes, 1998); (c) develop their multimedia skills (Barrett, 2000); and (d) demonstrate growth (MacDonald, Liu, Lowell, Tsai, & Lohr, 2004). As the electronic portfolio is created, "students learn purposes of technology and the necessary technological skills" (Hewett, 2004, p. 5) needed to complete the portfolio, including Web page design. Depending on what artifacts are required for inclusion, students can learn skills from basic desktop publishing to digital video editing and multimedia design.

Wilson (2003) concluded that the preservice social studies teachers participating in her study believed the electronic portfolio process helped them to be more creative in using technology in their field experiences. In her study, developing electronic portfolios gave the preservice teachers various opportunities (and potential skills) for technology integration, but the question remained as to how these preservice teachers would integrate technology into their future instruction as beginning teachers. Transferring technology skills and applications into one's own teaching practices may prove challenging to novice teachers. The challenge to teacher educators is to ensure preservice teachers learn technology skills, see a need and benefit in using technology in the classroom, and demonstrate creative technology integration methods to enhance instruction during and beyond their teacher education program.

Purpose of Study

The purpose of this study was to examine a group of secondary social studies teachers' transfer of technology skills and processes learned during the methods classes (primarily through development of their electronic portfolios) into the student teaching experience, and later into their first year of teaching. The research questions which guided this study included:

- Were the pedagogical and technological applications and skills employed during teacher preparation used during the social studies preservice teachers' teaching experiences and later in their first year of teaching?
- What factors influenced them as they utilized (or did not utilize) technology applications and skills learned in the methods class from development of the electronic portfolio to the process of technology integration during the student teaching experience and later, in their first year of teaching?

Background of Preservice Teachers' Experiences

At the institution where this study took place, preservice teachers are encouraged to learn multiple technology skills and methods of technology integration, specifically while developing their personal electronic portfolios during the secondary education program's methods block of courses. State technology standards are integrated across the secondary curriculum at this institution (therefore, secondary students are not required to take a technology-specific class), with many of the standards being implemented in this methods block. The methods block consists of four courses (secondary social studies methods, content area literacy, clinical experiences, and tests and measurements). Instructors for these courses collaborate to coordinate coursework to ensure technology integration across the four courses also meets the state technology standards and the college's technology infusion goals, including a primary goal to introduce students to strategies for effectively integrating technology in the classroom to enhance teaching and learning. In large measure, this is accomplished through assigned products, artifacts, reflections (with majority being content specific) for the preservice teacher's EP, posted online and written to a CD-RW. Products for the EP include lesson plans, resource databases, WebQuests, PowerPoints, photo galleries of clinical experiences, reflections of teaching, philosophy statement, digital videos, and presentations. Common software is selected for all assignments. Barrett (2002) indicated software selection can "enhance" or "constrain" technology use. Efforts to ensure hardware and software used in the teacher education program is also available at most of the clinical sites was an important consideration. Preservice teachers may also check out equipment from the college (e.g. laptops, projectors, digital cameras).

Preservice teachers are required to write lessons that integrate technology and in varying assignments, reflect upon the success of such integration in actual classroom instruction. Throughout the methods block, the preservice teachers are introduced (and hopefully obtain) multiple technology skills that can enhance their ability to integrate technology for teaching and learning in the methods block, their student teaching experience, and later in their own classrooms.

Methodology

Data were collected in three stages using multiple methods. The three stages included collection of data during the methods block, the student teaching experience, and the first year of teaching.

Stage One

During the methods block, all 22 preservice social studies teachers enrolled in the block completed pre- and post-surveys, which queried perceptions of technology use both at the beginning of the semester (before EP development) and at the end of the semester (upon EP completion). Data from these surveys provided descriptive statistics, which were used to further inform our research and to guide our development of the survey instrument used in stage two. Additionally, in stage one, the preservice teachers' electronic portfolios were evaluated and received scores of unsatisfactory, satisfactory, or superior. These scores were based on rubric assessments of categories in communication, organization, content, and technology application. Of the 22 electronic portfolios, one received unsatisfactory, 15 received satisfactory, and six received superior scores. We selected three social studies preservice teachers to participate in subsequent research based on diverse placements in their methods block and upcoming student teaching placements. These three had EP scores of superior (one) and satisfactory (two), and agreed to be interviewed and observed in stages two and three of our research.

Stage Two

Stage two data collection occurred during the semester immediately following the methods block and included those preservice teachers who were student teaching in social studies. Of the 22 social studies methods students, 11 were student teaching this particular semester, and were asked to complete a researcher-created survey during the last three weeks of their internship. In the survey, the 11 preservice teachers were queried on their uses of technology in the classroom, specifically relating to skills/competencies (e.g. development of Web pages, use of online resources, PowerPoint, digital camera use) they were exposed to during their methods courses and during their electronic portfolio development. The survey also asked for the preservice teachers' perceptions of the importance of technology in the classroom and whether their cooperating teacher was supportive of technology integration and if the teacher encouraged the use of technology. Eight preservice teachers completed and returned the surveys.

In addition, during stage two, we conducted classroom observations and interviews with the three preservice teachers who had agreed to participate in our case study research. We conducted interviews using guiding questions based on Berson's 1996 work. Additionally, both researchers, on two separate occasions, conducted classroom observations in the three student teachers' classrooms to observe how and when they were using technology.

Stage Three

In stage three of the study, our intent was to again interview and observe the three participants involved in our case studies (Stake, 1995; Yin, 2003). We were hoping to complete this stage while the three were in their first year of teaching. However, of the three, only one had accepted a social studies teaching position and was in his first year of teaching. The other two had decided to pursue graduate degrees, one in a computer-related field, and the other in special education. The researchers did choose to interview them, as we believed insight on how they were currently using the technologies and skills they learned might further inform our current and future research. The interview protocol was adjusted where deemed necessary and several questions were added. For example, in this stage we queried the three regarding their perceptions of *what is the reality* of using technology in the classroom. Participants were queried on those barriers identified by Berson (1996) as well as Whitworth and Berson (2003).

Data Analysis

Descriptive statistics were used to analyze the survey data collected during stages one and two of the study. All observations and interviews in stages two and three were analyzed and coded promptly after they occurred. Data were triangulated across the data sources and analyzed for emerging patterns and trends using constant comparative analysis (Miles & Huberman, 1984). This analysis included coding transcripts and observation notes, careful reading and rereading of all data by the researchers (and two independently chosen graduate students), and noting recurring themes, all techniques used in qualitative research to help ensure trustworthiness (Lincoln & Guba, 1985). Further, this ongoing analysis allowed the researchers to clarify issues and make adjustments, as necessary, throughout this longitudinal study. All data results are reported anonymously and participants are given fictitious names.

Results

The preservice teachers in this study were introduced to multiple technology skills and applications during their methods block of classes as they developed an electronic portfolio. Were these multiple methods and skills later applied in their student teaching and, then, in their first year of teaching? What influenced them to integrate (or not integrate) technology into their social studies instruction?

Methods Block

The importance of technology in the classroom was a theme in the preservice teachers' answers to the "worth" of technology in their pre/post survey responses during the methods block. All (22) of the social studies preservice teachers had answered "yes" to technology's worth both at the beginning (pre-survey) and at the end (post survey) of methods.

In order to delve into the preservice teachers' perceptions of *importance* and *worth* of technology, we also asked the preservice teachers to articulate their philosophies regarding the importance of technology integration. Their self-reported perceptions indicated a belief that technology was *very* important in today's classroom. Although the words changed, all of the preservice teachers had positive comments at both points in time except two. Common for the positive comments was what one preservice teacher wrote at pre-survey, "Technology in the classroom should be used to broaden students' ability with education." At the post-survey, the same preservice teacher wrote, "Technology needs to be incorporated into the classroom because there are far greater advantages to technology than anything else." The two preservice teachers who did not have positive comments at both pre and post-survey both articulated on the post-survey concerns about the technology "not working," being "available," or technology receiving "too much attention." One preservice teacher wrote, "I feel that the teacher should be the focal point, not technology."

Student Teaching

We queried the 11 preservice teachers, now student teaching, on whether they were using the software/skills they learned in methods. As noted previously, assignments and artifacts required in the electronic portfolios included multiple skills and examples of the preservice teachers' work (from PowerPoint presentations to digital photo galleries, WebQuests, and integrated lesson plans). Of the eight preservice teachers who responded, five or more indicated positively that they used, or planned to use, online resources, presentation software, laptop and overhead projector, and use of a digital camera. Although only two indicated they were using Web page development, seven noted they would want to use such tools in their own future classroom. Overwhelmingly, PowerPoint was the most popular software of choice and was used by the preservice teachers for lectures, notes review, and visual aides. One noted: "I have made wonderful PowerPoints. This is about all I have done. PowerPoints are wonderful, they enhance a poor teacher, while giving an organization of information and pictures." All but one respondent frequently used the Internet and some wrote they used the Internet for inquiry-based projects, including WebQuests and activities with primary resources.

Support at school. All eight preservice teachers indicated on the survey that their classroom teacher encouraged them to use technology. However, four respondents indicated that technology access in the classroom was *inadequate*, while four indicated *adequate*. Seven indicated they had access to computers in their classroom, with connectivity, and all eight respondents had access to productivity software. All respondents had access to a TV/VCR, with five indicating access to a data projector and six to a classroom lab that could be used for instruction.

Case Studies

At the conclusion of the methods block, three of the preservice teachers were chosen for in-depth classroom observations and interviews with the researchers that would take place during their student teaching experience and their first year of teaching. However, as explained earlier, only one of the participants actually entered into his first year of teaching immediately after student teaching. The narrative, presented in the next sections, uses pseudonyms of Marie, Ken, and Seth. Data are presented in a case study style, per narrative, and summarizes data collected from interviews and observations during student teaching and during the postgraduation year.

Marie

Student teaching. Marie, an undergraduate student in the secondary social studies education program, was observed as a student teacher during two separate U.S. History classes. In both sessions, Marie began with warm-up activities and specific question prompts. Following this activity, Marie began her next lesson by passing out a study guide sheet. In one class, Marie showed a movie with a civil rights theme and in another used a PowerPoint presentation, with pictures and limited text depicting contributions and objectives of President Johnson's Great Society. The researcher who observed during the civil rights lesson noted the students were "off task and wandering around the room," whereas the researcher did not note lack of interest in the Great Society lesson. Text was limited on the PowerPoint slides of up to eight lines and those in the back of the room could easily read Marie's font selection. Pictures and clip art were used throughout the 10-slide presentation. Marie encouraged students to take notes and prompted the students on key words they should remember.

Interestingly, on-task behavior did not seem to be a concern or potential motivator for Marie to use technology. During her interview, she gave this credit to other preservice teachers during her methods block and her content faculty educator, as well as her cooperating teacher. Marie said her cooperating teacher was a "great mentor" when it came to using technology in the classroom and that her content faculty educator was "great." She referred to other preservice teachers' examples of electronic portfolios and noted that since her methods classroom experience was in a middle school, she "has benefited from others' ideas in her high school student teaching experience." Marie described her technology ability as average, but plans on continued use of PowerPoint, Internet activities, and WebQuests, all activities learned and implemented during her social studies methods block. Marie also commented on a technical barrier she had to overcome. In her methods block, she had used a data projector, however, in her teacher's classroom, she was using a computer to television scan converter. The first time she had used this type of presentation system, Marie quickly found she needed to re-address presentation design to enhance readability.

Postgraduation. Marie was one of our preservice teachers who decided to pursue a masters degree in special education. When we interviewed her, she was completing her first year in graduate school rather than a first year of teaching. However, Marie was involved in a special education clinical at a local elementary school. When asked about her level of technology ability, Marie now ranked herself as *above average*. Throughout her masters program, she had created Web sites and brochures as "parts of lesson plans." She still employed many of the technology skills she learned when creating her electronic portfolio and frequently used Web sites she incorporated in her electronic database. Marie said special educators use a lot of technology and she is encouraged by that and noted, "Technology has enhanced my lesson planning and teaching as well." When asked what factors or barriers would discourage her from using technology, Marie was concerned about teaching students how to find reliable information on the Internet. She noted reliability issues with software programs as well, stating "they are just bought because they are cheaper and they just look better."

Ken

Student teaching. Ken, also an undergraduate social studies teacher education major, was observed while student teaching an Advanced U.S. History class focusing on newspaper publishing and during a Government/Law class, in which he was presenting a unit on Supreme Court issues. In both classes, Ken had reserved the computer lab for student activities.

In the U.S. history lesson, students worked in teams to create a 1990s newspaper, complete with traditional sections. Students worked in teams on the computers, as well as independently to search for graphics, write text, and design their newspapers. The majority of problems encountered during the lab session dealt with storage issues.

For the Supreme Court issues lesson, students were conducting research online while developing a PowerPoint presentation they would present to the entire class in two days. Ken had developed a rubric for the PowerPoint assignment that included requirements of a minimum of 12 slides, at least seven pictures or graphics, and at least seven builds and transitions. Ken did not lecture during the computer lab session, but rather circulated throughout the room answering specific questions ranging from how to find statistics on the Internet, to how to create a build. Ken noted that the students received a brief introduction to PowerPoint the day before, but for the most part, the students knew how to use PowerPoint and he just assisted them when needed.

Ken articulated his rationale for using technology in both lesson plans as:

> Learning to harness the power of technology to research relevant information is critical for students to develop the necessary skills to succeed in this ever-increasing technologically dependent world. In addition, there are many powerful ways to use technology to present your information.

Although Ken viewed technology use as important to his instruction, he noted some concerns. Between student questions and help, Ken discussed with the researcher one frustration he had with the computer lab. He was told the machines had a CD-RW drive, but upon his first visit realized they did not, so he re-adjusted his storage plan and had to ensure the students could save their work on a network drive. In his interview he also noted that while the school he was placed in "has the technology, many don't." And even at his school, he "needs to plan ahead" (at least two weeks) if he wants to use the computer lab in order to reserve it for his class. He commented that while the library had a projector that could be checked out, a teacher had to go through a "lot of red tape to get it."

Like Marie, Ken used a lot of pictures in his lessons and used PowerPoint "almost daily" during his student teaching. Also, he used WebQuests and noted that "prior to methods had never used one, nor seen one." Ken commented that his perception of technology integration was that "technology just becomes part of the class."

Postgraduation. Ken was offered a position to teach in a middle school, an offer he considered "poor." So, when a graduate assistantship opportunity was offered in the area of Computers and Applied Technology, he chose to attend graduate school full time versus teaching his first year after graduation. Ken articulated that he would like to work in the schools in some sort of technology position, potentially teach computers, or "in the very least, use awesome technology in my content, social studies." He rated himself as *slightly above average* when asked about technology skills and also commented that he only knew the basics when he had started the methods block as an undergraduate social studies preservice teacher. He commented that now he was "not scared of anything" and that teachers just need to "get in there and play with it" when it comes to integrating technologies.

When asked how he planned to use the technology learned in methods in his future classroom, Ken answered, "I will probably drain my bank account." He sees "potential purposes in every single one" referring to the skills and technologies he learned from methods. When he started methods, he saw technology as "throwing a PowerPoint on the screen"—now he realizes it is "so much more." Ken is encouraged to use technology, as he views technology as "immediate" and that it "enhances a lesson." Ken views price and "technology glitches" as factors that might discourage his use of technology, but added that he would attempt to "get the best and minimize the glitches." Ken noted the importance of planning and that was one of the biggest lessons he had learned since his student teaching experience of trying to book a lab. Ken said he would schedule the lab earlier and would do a "rough sketch—a timetable—of what I would

need throughout the semester." Reality to Ken is that technology is not widely used or "to its full potential in the classroom" and commented, "some teachers don't want to change." Barriers such as reliability, time to learn, and knowledge do not concern Ken. "To me, it's worth spending the time learning new technologies . . . it's an investment for the learning of the student."

Seth

Student teaching. Seth returned to the university to enroll in the Alternative MA program. Previously, he had majored in criminal justice. Seth was observed during two World History classes. In both cases, he used the same sequence: warm-up activity, study time, and then quiz presentation using PowerPoint. Seth had created a separate slide for each of the quiz questions, with answers to select from on the same slide. He used white font over a blue, plain background. The text was easily read from the back of the room; however, the font size could have been larger. He used build animation to add answer choices to each slide. Seth had the students exchange papers for peer grading and he then used animation in PowerPoint to animate each correct answer. Seth had a monitor with scan converter connected to a computer and he had tested the equipment to ensure everything worked prior to the students coming into the classroom. In one of the two classes, he did experience some technical difficulties during the lesson, but was able to fix the problem quickly.

Seth said he was comfortable using technology and wanted to "stay on the cutting edge" as technology changes so quickly. Although he indicated that his cooperating teacher was very supportive and was the "go to person" in the school for technology needs, Seth described the administration at the school as "clueless." However, that didn't seem to bother Seth. He commented, "The fact that lots of other teachers don't use it encourages me to use it more." He sees technology as a "way to present content in a way more relevant to students." He added that technology makes the material "relevant" and "student centered."

Postgraduation. Seth was the only case study participant who actually did progress from spring student teaching to first-year teaching the following fall. Seth accepted a social studies teaching position at a small school, with a low SES population, in a rural part of the state. Seth was immersed in first-year teaching activities, which included teaching history, government, and serving as head coach for the boy's basketball team. When asked to categorize his technology skills, Seth now said, "It's adequate—could be better." He indicated that once he "started teaching [he] got so busy" and resources available to him were outdated. When he arrived at the school, he quickly noted that technology was not being used and equated this to how it was affecting the students. "Seniors did not know how to type a paper," he said, further describing a school climate in which technology receives little support or interest from other teachers and the administration. Seth kept showing concern for the students and said it was they who suffered from this lack of knowledge and use and remarked, it "really bothers me; they (the students) are getting cheated." Despite this, Seth had brought in an old personal computer, DVD, and television. With part of the $300 resource money he received upon arrival, he bought a scan converter and now uses the complete set-up to present reviews and quizzes using PowerPoint approximately three times a week.

During classroom observations of two classes, Seth was using the presentation equipment to review for a test, and in his government class, his students interacted with a multimedia presentation and played *Who Wants To Be A Millionaire.* Seth believes his students "appreciate" him using technology, but admitted several factors kept him from using more. He was not able to access the school's computer lab due to "not enough computers" and the administration's fear the students will "mess them up." When asked what he thought was the reason for this belief, he credited an incident in which a group of students accessed a pornography site, and since then, open-domain computers (such as those in the library

and lab) have been off limits. Even with barriers such as these, Seth is still using "as many of the skills" he learned while in methods that he can (including using his electronic portfolio during the interview process). During his methods block, he had received copies of all the social studies preservice teachers' databases of resources, and he still uses those databases today. Additionally, when he discovered that the district technology office had digital video equipment, he was able to check out the camera and implemented a turn-of-the-century political video assignment in his history class. His students acted and shot the videos and according to Seth, "loved it" and enjoyed doing something different. As with his utilizing PowerPoint and the databases, this concept of technology integration was used in his methods class.

Discussion

The results of this study indicate some success for the efforts made by teacher education faculty who promote technology integration. The data indicated that the preservice teachers intended to employ technologies and skills learned from their electronic portfolio experiences in their classrooms, and in most cases, did and felt comfortable doing so (Barrett, 2000). The eight respondents to the written survey and the three who participated in the observations and interviews overwhelmingly tended to use the technologies (e.g. PowerPoint, WebQuests) they had been taught during the EP development or those that had been modeled (Mason et al., 2000) during their social studies methods course (Crowe, 2004). Results indicate that technology skills and processes learned were transferred through time; however, expectations for teaching with technology and perceived challenges of doing so were complex. Of the eight respondents to the written survey, all of the preservice teachers had positive attitudes about the *worth* of using technology in the classroom and all but one indicated having a supportive classroom teacher, which encouraged positive attitudes toward using technology. The three social studies teachers in our case study research also discussed how supportive and encouraging their cooperating teachers were in using technology. However, half the survey respondents noted that during their student teaching experience they did not have adequate technology access.

The results of the three case studies support the research literature (Berson, 1996; Butler & Sellborn, 2002; Whitworth & Berson, 2003) that explores the barriers confronted by educators who attempt to use technology. For instance, Ken experienced accessibility issues and Seth encountered lack of resources and support in both his student teaching and induction year experiences. During her graduate program, Marie noted a disconnect from teacher education faculty who do not model, promote, and support technology integration in the curriculum (Mason et al., 2000).

Lack of adequate resources was a common challenge (Berson, 1996; Whitworth & Berson, 2003) and in trying to meet that challenge, the preservice teachers typically had other barriers to cross. For example, Marie used a computer-to-television scan converter in lieu of a projection system and quickly found that she needed to re-address presentation design to enhance readability. Ken voiced frustration in the "red tape" it took to check out a projector. In the written surveys, several preservice teachers indicated they would have "done more" with technology had they had more access to the hardware and software they needed. Lack of adequate resources could have hampered the teachers' ability to think creatively outside what they had learned in methods. However, the preservice teachers *were* using the pedagogical and technological applications and skills they employed during electronic portfolio development in methods, therefore making "explicit links among their coursework, field experience, and their pedagogical beliefs to build effective understanding and use of portfolios" (Meyer & Tusin, 1999, p. 136). These practices by the preservice teachers seem to indicate that they believe technology does have *worth* and *importance* in the classroom. Seth, completing his

first year of teaching, described frustration in not meeting the students' needs and desires to use technology and indicated he believed the students were "getting cheated."

Although the participants were using multiple skills and products they learned during electronic portfolio development, including PowerPoint, Web design, and WebQuests, they did not appear to be adding new skills or technologies not learned in methods or during the EP development. Marie, Ken, and Seth were all using PowerPoint on a routine basis, Ken was using Web page development, and all three indicated they had used WebQuests (with Ken specifically noting he did not know about WebQuests until methods). Overall, participants in the study were more likely to emulate what "they were taught" (Mason et al., 2000) than to apply individually their own creative technology integration plans. They did appear eager and confident in using basic technologies acquired, such as those infused in methods and in portfolio development (Bielefeldt, 2001; Pope, Hare, & Howard, 2002). However, this does point to a need to enhance teacher educator programs to include diverse technology integration experiences, perhaps specific ways to "think outside the box" and to challenge preservice teachers to create innovative techniques to use hardware, software, and basic technological skills.

Despite some small successes, there are many things that teacher educators should consider in regard to the results of this study. Perhaps, as Pierson and Cozart (2004–2005) suggested, we are "painting too optimistic a picture" of technology's use in the classroom. Teacher educators should concentrate more on building "focused experiences" to help enable preservice teachers to be more prepared to "accommodate less-than-ideal conditions in order to work effectively with technology" (p. 61) when they graduate and become teachers themselves. Seth's experiences point to the need for mentor teachers and support during the induction year. Perhaps a mentor could have served as scaffold to help Seth move beyond what he had learned in the university classroom.

We believe results from this study have implications for teacher education as we continue to seek ways and methods to implement technology integration across the curriculum, to promote seamless interactions with technology, and to fulfill what Ken articulated in that technology becomes "part of the class." The challenge to teacher educators is to ensure preservice teachers learn technology skills, have multiple opportunities to enhance their attitudes about technology's benefits (Abbott & Faris, 2001), see a need and benefit in using technology (Zhao & Cziko, 2001) in the classroom, and can demonstrate creative technology integration strategies to promote social studies teaching and learning (Wilson, 2003). Teacher educators should continue to learn and model new and appropriate technologies, being aware themselves of when, how, and why technology is used to enhance teaching and learning. We should be willing to showcase beyond what we know, routinely use, and are comfortable using. Preservice and novice teachers encounter curricula, management, accessibility, and funding problems. Are we providing creative solutions in the teacher education classroom and adequately developing skills to think and act creatively outside the box? (For example, do preservice teachers have a general idea of how to pursue grant funding for specific areas of need in their future classrooms?) Could current partnering and collaborative programs, already in place at many institutions (such as the Master Technology Teacher program), be expanded to focus on specific needs of the novice teacher? It is essential that school systems, school administrators, and teacher educators collaborate to ensure preservice teachers are learning new and innovative methods for technology integration that are suited for the context of the school and subject areas in which they will teach.

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