

Teachers' Use of Technology: Lessons Learned from the Teacher Education Program to the Classroom

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This paper describes 10 teachers' perceptions of technology integration and technology use in their classrooms, five years after their graduation from a teacher education program which encouraged technology use in teaching and learning. The researchers used Hooper and Rieber's (1999) five phases of technology use (familiarization, utilization, integration, reorientation, evolution) to categorize the teachers' efforts. The researchers found that the five teachers who were at Hooper and Rieber's reorientation or evolution phases were teachers who had continued professional development, had engaged students in using technology, and had support from their school community. Implications and recommendations for teacher educators are proposed.

Technology integration is generally promoted as a method to enhance teaching and learning. State departments of education have set forth standards requiring use of technology in the classroom and assessment of such use. National accrediting agencies include statements of technology use (e.g. NCATE) and federal dollars through initiatives such as Preparing Tomorrow's Teachers to Use Technology (PT3) grant programs have supported teacher training and capacity building efforts to encourage technology integration (Koehler & Mishra, 2005). Such efforts promote and encourage student-centered uses of technology as well as instructor-led uses (Fletcher, 2006). Further, teachers may use technology to "accommodate student needs, promote student learning, and better prepare students for the digital society" (Zhao, 2007, p. 312). However, in their own classrooms, teachers continue to experience multiple barriers when trying to integrate technology in their teaching

(or perhaps, the barriers keep them from trying). These barriers include deficiencies in training (Fletcher, 2006), time to learn technology (Butler & Sellbom, 2002), planning time (Bauer & Kenton, 2005), reliability (Butler & Sellbom, 2002), and technology support and access (Fletcher, 2006).

Challenges in Teacher Preparation

Bauer and Kenton (2005), in their qualitative study of 30 teachers, noted that technology integration is difficult due to common obstacles such as problems with equipment, scheduling difficulties (e.g. computer labs), and software availability. Due to such obstacles, teachers may believe that technology integration is not worthwhile (Hsu, 2010; Swain, 2006), worth the time and effort, and can be exhausting to use (Hofer & Swan, 2006). The pressure to meet a "standards-driven, text-based, chronologically-

sequenced curriculum” (Hofer & Swan, ¶40) presents additional limitations in using technology and limits time to do so (Franklin & Molebash, 2007). In Cuban’s 2001 work, he noted that teachers do not always use technology to transform teaching and learning and may rely on traditional methods (such as lecturing and homework reviews). Dawson (2006), in a four-year study of “technology enhanced” experiences for teacher candidates, found that “technology use did not bring about fundamental changes in instruction but instead either replaced, improved, or extended traditional instruction” (p. 285). Frequent use of educational technologies to some may just be using a PowerPoint presentation as an elaborate overhead (Swain, 2006). While using PowerPoint as an overhead projector is being recognized in the literature as a traditional, teacher-centered use of technology (Hofer & Swan, 2006) and is often not considered as true technology integration, the primary premise of using technology should be to use technology as added value for the presentation of content (Crocco & Cramer, 2005) regardless of the method.

Researchers (e.g. Russell, Bebell, O’Dwyer, & O’Connor, 2003) have pointed to the need for teacher education and professional development programs to provide the time to implement the technology to allow for more ownership of how to teach with the technology. Modeling technology integration to preservice teachers can be and probably is complex (Koehler & Mishra, 2007).

Teacher educators should provide preservice teachers with opportunities to see technology integration and to be mentored by teachers implementing appropriate technology practices (Wilson, 2003). Later, these teachers can apply what they have learned in their own classrooms. Koehler and Mishra (2005) advocate a Learning by Design model in which teachers “focus on a problem of practices, and seek ways to use technology (and thereby learn about technology) to address the problem” (p. 95). In doing so,

Koehler and Mishra say teachers become designers versus users or simply consumers of technology. Teacher educators must continue to encourage teachers and students to “think outside the box” (Wright & Wilson, 2005) and to understand that technology has constraints, has breakdowns, and is context sensitive (Koehler & Mishra, 2005).

This Study

Few studies in educational technology and teacher education have examined teacher use of technology over a period of time following initial certification and completion of teacher education programs. Ertmer, Ross, & Gopalakrishnan (2000) challenged educators to continue to reflect and to “grow new and even more powerful visions” (p. 1524) of exemplary technology use. Wenglinsky (2005) maintains that training teachers does not solve the problem of not using technology wisely.

Hooper and Rieber (1999) described five phases of teachers’ use of technology: familiarization, utilization, integration, reorientation, and evolution. The five stages are defined as: 1) Familiarization, learning the “how-tos” of using technology, 2) Utilization, trying the technology, but will not miss it if taken away, 3) Integration, using technology for certain tasks; designated uses, 4) Reorientation, using technology for more than delivery of content; focus is more on student learning and, 5) Evolution, continuing to evolve, adapting and integrating technology. Typically, teachers do not progress past the utilization stage to the evolution stage, where they use technology seamlessly in their instruction. Examining what occurs during the time of a student’s initial teacher education preparation and their teacher induction can potentially advance how teacher educators further use technology as a “partner” both in context and in fostering development and opportunities for the students.

In a prior study (Wright & Wilson, 2005), the researchers challenged teacher education faculty and preservice teachers to “think outside the box” and to create innovative techniques of using technology in content teaching and learning. An overarching goal of the current study was to investigate how the teachers had developed their technology practices over a period of time. Specifically, in this study, the researchers sought to determine what led teachers, prepared in a teacher education program which encouraged technology use, to (a) continue and/or build upon using technology in their content field, or (b) continue using only pedagogical plans they were comfortable with using, or (c) use limited technology, if any.

Methods

Participants and Setting

The participants in the study were purposively identified, as they were teachers who the researchers followed from their teacher preparation program and student teaching experience into their in-service teaching years. The majority was in their fifth year of teaching when the researchers concluded data collection. All of the participants were enrolled in the secondary social studies methods course in the fall, 2001. Initially, the researchers sought to interview and observe the population of the social studies methods group of 21 members. However, five had chosen not to pursue teaching as a career, three could not be located, two were unavailable to participate for personal reasons, and one had entered teaching as an art teacher at a later date.

For this study, the researchers interviewed and observed eight male and two female teachers who had been in the fall 2001 methods group and were currently teaching five years later. The researchers assigned pseudonyms for each teacher participant (Doug, Jim, Steve, Ross, Ted, Bob, Antonio, Tameka, Michael, and Cindy). The 10 participants were teaching in a middle or high school in the

southeastern portion of the United States; half were teaching at schools with 40% or more of the students classified as low socio-economic status.

These preservice teachers participated in a teacher education program in which technology was seen as a foundation; they had many opportunities to see and learn from technology best practices. The university program integrated technology across the curriculum in lieu of requiring a computer applications class. The preservice teachers were exposed to multiple, interactive and emerging technologies at the time (e.g. online discussions, interactive whiteboards, and online portfolios). During the participants’ methods block, several teacher education faculty members were participating in a state consortium PT3 grant, in which faculty received additional training in emerging technologies. The technology faculty member was also active in helping to develop the state’s technology standards and had initiated a Master Technology Teacher partnership with local middle and high school teachers. Several faculty members were providing leadership on campus in using technologies to enhance teaching and learning, with the social studies faculty member conducting information sessions on electronic portfolio development.

Many of the technology skills required of the preservice teachers were demonstrated through their individual electronic portfolios showcasing products (such as presentations, resource databases, multimedia projects, and electronic field trips and webquests) they had developed. They were also required to develop and implement technology in their student teaching experience. Supervisors of student teachers assessed technology integration as a major category on an assessment adapted from the state’s teacher evaluation program. In situations where the students did not have access to technologies in order to do presentations and online assignments, they could use the program’s Technology on Wheels (TOW) bundles. Each

bundle consisted of a laptop, productivity software, projector, and network cable.

Data sources and analysis

Qualitative data sources consisted of surveys and reflections, completed by the participants during their teaching methods class and their internship. Additionally, five years into their teacher induction, the researchers conducted at least one interview and at least one classroom observation with each participant. The interviews occurred during each teacher's class preparation time or before/after school hours; typically the interview lasted one hour. Observations occurred and field notes were taken during an entire class period of the teacher's choice. The teachers were instructed to select a class that indicated a typical, teaching day. The researchers recorded and noted teaching methods, student interactions, and any uses of technology by the teacher and the students.

To further inform the data, the researchers examined surveys and reflections the participants had completed during their teaching methods class and during their student teaching experience. Data were triangulated across the data sources and analyzed for emerging patterns and trends using constant comparative analysis (Miles & Huberman, 1984). The two researchers read and reread recorded interview transcriptions and notes written by the researchers from the observations. Coding involved looking for patterns and emerging categories (Patton, 1990). To further frame and inform our specific research of why and how the teachers use technology, the researchers used Hooper and Rieber's (1999) five stages of technology use by teachers as our guide.

Results

Summary of Methods and Internship

While the researchers' primary focus for this study was to determine participants' technology

use five years after their methods experience in the teacher education program, it is important to note the context of their technology use at the conclusion of their teacher education program. The program at this institution gathers survey data at the beginning and at the end of the teaching methods semester. In addition, reflections are gathered during each phase of the preservice teaching experience. In examining these surveys and reflections, the researchers noted that the entire group could, and should, be considered at the utilization stage (phase 2 of Hooper and Reiber's description of teacher technology use) based on their experiences and use of technology while in the teacher education program. For example, the participants learned multiple technology applications and skills in developing their electronic portfolio and the products contained in their portfolio. They were placed in field experiences and expected to integrate technology and they were evaluated on their use of technology. Further, the preservice teachers had a social studies mentor who actively used and modeled technology throughout her instruction (e.g. webquests, digital stories, online resources, digital pictures).

Based on these experiences, the researchers concluded that the participants in this study had learned (and were evaluated on) the "how to" (familiarization stage) and had experienced "trying it" (utilization) in the classroom, as both were required and assessed during their teacher education program. The researchers did not find data to support technology integration (using for designated tasks) as the participants were required to use technology to meet methods block and internship requirements. The researchers could not determine whether or not the decision to employ technology was on their own accord or to meet predetermined requirements.

Some participants did indicate that, during their internship, they did not always have easy access to technology; therefore, in some cases, they only applied what they could in one

lesson after checking out the TOW bundle. For example, Cindy wrote in a reflection, "If it were readily available with little or no effort, I would use it." Interestingly, on their methods survey of experiences, all participants indicated comfort and excitement about using technology in their classroom and believed it was worthwhile to do so. The following participants' statements reflect these beliefs:

"Technology is a useful tool." (Cindy)

"I believe technology should be used whenever possible in the classroom."
(Ross)

". . . technology is a vital part of educating today's students." (Ted)

"I enjoy using technology and think it improves the overall learning environment." (Antonio)

"Technology will be incorporated in my classroom." (Chris)

"Students will also need to see technology because they will need to use it in the future." (Jim)

Five Years Later

Individual profiles of each participant are presented next to illustrate the 10 teachers' uses of technology five years after their graduation from the teacher education program, and any trends or barriers the researchers noted in their interviews and observations with the participants. Suppositions based on these trends, interviews, and observations are reflected for how each participant is characterized by the researchers' interpretations into one of Hooper and Rieber's five stages: familiarization (learning the "how-tos"), utilization (trying the technology, but will not miss it if taken away), integration (using for certain tasks), reorientation (using for more than

delivery of content; focus is more on student learning), and evolution (continuing to evolve and to adapt).

Utilization. Based on the interview and observations, the researchers categorized only one of the participants as remaining at the level of utilization (see Table 1) Doug taught at a rural k-12 school. He commented that he had hoped to pursue the "whole new world" of technology that he learned about at the university. However, Doug had problems with access to technology. For example, Doug did obtain a projector from the school, but had to build his own mount for the projector. There were not funds to purchase a computer dedicated to his classroom, so his father purchased one for him to use. He explained his problems: "I had that projector but didn't have a laptop and this school was built in the 60s and you only have two outlets and that's it."

Doug rarely took his students to the one computer lab in the school due to lab availability. He mentioned the desire to employ webquests and other strategies learned during his teacher education program: "I would like to do a lot of stuff like that but it's just that (I do) not have the technologies available." For Doug, his technology use seemed to be more difficult for him to employ into his instruction due to his school climate and resources. While both the methods and student teaching experiences gave him opportunities to employ different forms of technology, he was unaware of current possibilities as he spent his time trying to gain access to technologies he employed during his teacher preparation program.

Integration. Of the group, five of the participants were categorized at the integration stage. For all five participants, technology was integral to the instructional process; without it, the teacher would have difficulty teaching. However, there were differences among this group; as the data were evaluated, two teachers emerged as teacher-centered while three participants

Table 1 Teachers' Use of Technology Using Hooper and Rieber's Five Phases

Familiarization <i>learning how-tos</i>	Utilization <i>trying, but won't miss it</i>	Integration <i>using for designated tasks</i>	Reorientation <i>focus is more on student learning</i>	Evolution <i>continues to evolve and adapt</i>	Additional Notes
Doug	Doug				problems with lack of access and support
Jim	Jim	Jim			used technology to disseminate; dial-up at home
Steve	Steve	Steve			used to disseminate; pressures of testing
Ross	Ross	Ross			students used multiple technologies, had support/training
Ted	Ted	Ted			many opportunities for support/training from district and university
Bob	Bob	Bob			students used technology outside of class; he was increasing his use
Antonio	Antonio		Antonio		used technology as a guide; in contact with mentor, students had need for technology
Tameka	Tameka		Tameka		multiple technology experiences post teacher education program
Michael	Michael		Michael		Provided many ways for students to use technology
Cindy	Cindy			Cindy	multiple technology experiences post teacher education program; access to resources

were student-centered in the ways they used technology.

Jim and Steve were similar in their use of technology in that they were the disseminators of knowledge and were authoritarian in their integration of technology into their social studies instruction (teacher-centered). Both teachers used technology to present the knowledge they found to be important. Jim and Steve learned PowerPoint at the university and built their class delivery process around it; if the computer or projector was not available, they would have great difficulty in teaching since the task of delivery had been designated to PowerPoint presentations.

Jim had every lecture placed in binders with the PowerPoint presentations and felt that this mode of delivery allowed him to “talk to them (the students) more.” It is important to note that while he was at the integration stage he did not seem to be growing in his knowledge of new technologies in his small rural school district; he did not have Internet at home and indicated that it was “hard to keep up” with the changes in technology over the years.

Steve explained that he was limited in his social studies class “by the tests” and felt pressured to meet the requirements of state end-of-year tests. Steve decided that presenting the key test objectives in daily PowerPoint allowed for some interaction because he tried not to “. . . lecture all period everyday” and tried “to make it fun.” Steve noted: “I try to make it as active as possible. I’m the leader.” He felt that this mode of delivery made the material easier for the students. As the center of the instructional process, he decided what was taught and how it was taught (“I am the best resource they have”). Both Jim and Steve had a rigid structure to their teaching and used technology to guide their dissemination of the content.

Like Jim and Steve, Ross, Ted, and Bob demonstrated that they were in the integration

stage as they used technology for certain tasks, yet they also differed from Jim and Steve. Their reasons and intentions to use technology were different and their technology uses were more student-centered, however, technology was used primarily for content delivery.

Ross, who had completed his MA degree in history education and was beginning his Educational Specialist degree during the last phase of this study, incorporated technology into many aspects of his teaching. He was teaching middle school social studies at a small town school which “expected” technology to be used. USB removable drives were available for purchase in the school store. Ross told us that professional development for technology was regularly provided by the district. As an advisor for the technology team, Ross had become involved with technical and instructional aspects of technology. He felt confident in using technology because of his university preparation: “It’s just not as hard; I am more familiar with it. I am not stressed out about using it.”

Ross’s middle school students used technology for their presentations, word processing, and researching (Internet); he hoped to add video conferencing when the capability became available. Ross felt that the students “enjoy technology” and expected its use in the social studies classroom because they use different forms of technology (Xbox, cell phones) in everyday activities. He believed that: “They started out not interested in history, but now they make straight A’s with anything that had to do with computer stuff. After a while, they started doing better in everything else.”

Ted taught at a low socioeconomic school (SES) with the majority of students on free or reduced lunch. He explained that “we are in a unique situation because we have a lot of opportunities.” Teachers at his school have greater access to programs and professional development activities through his district and the university

than most of the other participants. These opportunities gave him many pedagogical ideas to implement into his classroom.

Ted's lessons employed a variety of technologies on a daily basis (multimedia presentations, digital primary sources, video clips). Ted was student centered in his teaching and said he was "willing to stretch and take on different things" to meet the needs of his diverse students. Ted's goal was to find ways to motivate his students to learn; he hoped that using technology the students did not have access to outside of school would stimulate their desire to learn.

Bob taught at one of the highest-rated schools in the state (e.g., test scores, local funding, 90% of the students attend college). Bob did not quickly implement the technology presented in the teacher education program during the methods or student teaching experiences. However, in his own classroom, he recognized that his students used technology heavily outside of class. Subsequently, Bob used technology for communication outside of class (e.g., email assignments and assessments, the writing process/draft attachments). He explained that "dialoguing through email is so much more time efficient to me." While Bob used technology as a foundation of his communication with the students outside of class, he was very selective in his integration of technology during his lesson delivery noting that he had "increased systematically (his technology integration) every year." He believed that his teaching should be centered on ". . . the kids (taking) an active role in their learning process. So I'm not talking at them, they are seeing as we go along." If technology facilitated and supported that effort, he would use it. He explained that "technology opens up an entire new world of teaching."

Reorientation. The three teachers in the reorientation stage seemed to scaffold the content for their students by using technology as the bridge; the teacher and the technology facilitated

the students' construction of their own knowledge. Of the three participants in this category, Antonio seemed to have the strongest grasp of mediating content and technology for his students.

Antonio felt technology was a tool to lead his students in learning social studies content. Throughout the five years of the study, Antonio communicated frequently with his university mentor. During the methods course, the mentor facilitated his use of technology by helping him outside of class when he prepared his lessons. He purchased software to use during student teaching and continued to refine his teaching during the in-service phase. During this phase, he was open to new ideas in which he would not use technology for "technology sake"; instead, he only used the technology if he believed it was the best way to facilitate his students' learning. Today, Antonio believes that technology affords the conduit for students to better understand and grasp the content because technology is already such a dominant part of their daily lives. Antonio recognized that the students enjoyed using technology and he routinely created lesson plans that allowed students to use the technology (e.g. digital movies, presentations using Publisher) versus only using technology to deliver content.

Tamika, the second teacher in the reorientation phase, after graduating, she received her MA degree in secondary social studies education from the same undergraduate program. During her undergraduate program she was placed with one teacher who was a Master Technology Teacher and another teacher who did not discourage technology use, but disliked the use of PowerPoint. As a MA student, she was involved in a grant project which established a website to study the Civil Rights Movement.

Tamika had only been teaching two years during the last portion of the study. She was struggling with many issues related to novice teachers (e.g., management, testing). She noted that she was "finding it very difficult to make

social studies a kind of discourse between the kids and getting them to think critically about it . . . I have got to figure out how to put it into proper perspective.” To do this, Tamika used a variety of technologies in her classroom. For example, students created Civil War newspapers by using Internet research and Publisher software and digital stories depicting American Revolution histories and profiles of Multiple Intelligences for psychology. Technology to her was valuable “because it opens up areas that you would never have access to without it.”

Michael, the third teacher in this phase, was an Alternative Masters student at the start of the study, having returned to the university after another career. During his teacher education preparation program, he became excited about incorporating technology into his instruction, but learned he was confronted with barriers such as the students’ lack of background in using some computer software efficiently. During his inservice teaching Michael’s work took new directions stimulated by his assistantship assignment which focused on technology for the department. His positions that followed were either teacher training or computer teaching at a middle school. At the conclusion of the study he was a computer lab teacher at a middle school and worked with various content fields.

Michael explained his use of technology which can be categorized as reorientation: “Compared to the first semester, I use technology a ton more to accomplish some of the more simple tasks that I would have done in the beginning in a more manual way.” He noted that since beginning his teaching career, he had started using United Streaming video and blogging tools, both having become available since he graduated from the teacher education program. He recognized that he must be “selective” in what technologies he used in his classroom. While the class observed was a technology applications class, Michael used social studies (his content major) to underpin his technology teaching. For

Michael, his teaching centered on providing the students at his low SES school “support” for the students through his teaching with technology. His students were exposed to and were using a variety of technologies from creating web pages to using blogging tools.

Evolution. Based on the data analyzed, the researchers concluded that only one of the ten participants had truly reached the evolution stage of evolving with and adapting to technology. Cindy, who during her teacher education program categorized her technology level as expert, had indicated during the internship that she wanted technology to be accessible, stating, “if it were readily available with little or no effort, I would use it.” After graduation, Cindy started teaching social studies at an affluent high school where she had multiple resources and was able to use technology routinely. Cindy continued teaching, but switched schools in order to take a position where she was the instructional technology liaison for an elementary school. In this position, she was the primary teacher and facilitator for multiple classes when the teacher chose to utilize technology. During this time, she completed a technology Masters program and enrolled in a doctoral program, with an emphasis in instructional technology.

When Cindy was observed at this school, she worked with all content areas and utilized many different technologies, from multimedia and digital video editing programs to use of portable technologies and interactive white boards. Her philosophy of teaching was student centered and she noted:

I think that one of the things about technology that I think is so great is that a lot of traditional teaching methods do not offer is the fact that the kids can pose their own questions and answer their own questions independent of a teacher or with minimal teacher guidance.

Although her current school was affluent and one which had accessibility to many technologies, Cindy noted that the teachers at the school had previously experienced multiple problems with technology “not working” and that there “was a very big deterrent for the use of technology.” In her job, she helped teachers integrate technology and also worked with students on their projects using technologies (e.g. digital videos, online searches, WebQuests). Cindy indicated the teachers were getting more comfortable, adding that two classes she helped recently had teachers who were “active and modeling” the technology.

At this point in her career, Cindy seemed very comfortable about being able to adapt and evolve in her use. She was also eager to allow the students to take control. She talked about handheld use in one classroom and said, “The first day we showed them how to use it and the second day they were pros.” This was evident during the observation when she gave one class an assignment, using a drawing program, to create an image of their class invention. Several of the 5th grade students created complex animations, and eagerly shared their creations, in addition to sharing how they created them.

Conclusions

Results indicated that the participants continued to be familiar with ways to use technology and also continued to utilize the basic technology skills and processes learned in their teacher education program (familiarization and utilization phases). As a whole, the participants remained comfortable with the technologies learned and used during their teacher education program. For those teachers who moved beyond using technology for specific tasks and for teacher-centered objectives (Antonio, Tameka, Michael, and Cindy), three themes emerged: 1) participants continued to seek professional development (e.g. continued contact with mentor, graduate programs), 2) participants used technology to engage students and felt compelled

to do so for the students, and 3) the school and community supported use of technology through availability of resources and professional development opportunities. While both Michael and Cindy were in positions that required them to use technology as part of their jobs, they were engaged in ongoing professional development and routinely helped content teachers design instructional technology integration plans.

Barriers were experienced, at some level, by each of the participants. The most common barriers appeared to be scheduling conflicts and lack of equipment (Bauer & Kenton, 2005). For Doug, these barriers were constraining and kept him from using even the technologies he felt comfortable with, such as webquests. For Ross, Ted, and Bob at the integration stage, technology was used for specific tasks, and for the most part, it was replacing (Dawson, 2006) traditional teaching for those tasks. While it would appear that Ted and Bob were at the reorientation stage, a deeper analysis and rereading of the notes showed they were using technology for certain tasks relating to management and direction. Ted used technology to motivate the students to learn (but not to direct their own learning) while Bob used technology to manage his students’ questions and the writing process. However, in the cases of Steve and Jim, technology was used only as a teacher-centered instructional tool to present the content (Hofer & Swan, 2006). Steve indicated that his use of technology was limited due to pressures to meet the requirements for testing (Franklin & Molebash, 2007).

The teachers categorized at the reorientation and evolution stages appeared to have the guiding vision to encourage their students to use technology as a vehicle for their knowledge construction (Ertmer et al., 2000). In doing so, these teachers were also the ones who had remained active in professional development efforts (dialog with faculty mentor, Master Technology Teacher, additional graduate studies). For example, the three teachers at reorientation,

Antonio, Tamika, and Michael, were willing to experiment with new technologies to facilitate students' learning, improve their critical thinking, and help motivate and support student learning. At the evolution stage, Cindy used technology to motivate and support learning, as well as adopting technologies that allowed her students to take control of their own learning. Cindy also had multiple resources and was, herself, a valuable resource to other teachers, helping them become more comfortable in the integration of technology.

Implications for teacher educators

As teacher educators, this research was illuminating to us and the participants' experiences pointed to areas for improvement in our teacher education program. While we may have a "technology rich" program, this research, conducted over time, showed us that an additional emphasis should be placed on preparing teachers to think "outside the box" particularly when faced with barriers such as limited resources and lack of professional development.

While technology integration training is important (Zhao, 2007), teacher educators should also recognize that technology integration is complex (Koehler & Mishra, 2007). And, as teacher educators, we must look for ways to prepare preservice teachers to critically

and creatively adapt and evolve when using technology. In critically examining our own teaching methods, the researchers realized that perhaps we engage in too much tech parenting (e.g., providing the students with Technology on Wheels and certain technologies for certain tasks) and not enough tough love in teacher preparation toward technology integration. Instead, a solution might be to provide preservice teachers with a list of outcomes and the technologies and skills desired, model some examples, and then, practice tough love (cut them loose) to encourage them to develop and implement technology integration plans for teaching and learning.

Teacher educators must also adapt and change and be familiar with using emerging technologies that can encourage student engagement and interactions (e.g. virtual environments, gaming technologies, and Web 2.0 tools). Teacher educators must become better tech parents by giving preservice teachers the tools to solve problems, seek answers, and find new ways to incorporate existing and future technologies into their classrooms. As we reflected on these findings, we developed five thoughts for teacher educators (see Table 2) to consider. We hope these thoughts provide insight into how teacher education programs can adapt, evolve, and potentially lessen the complexity of technology integration in teaching and learning.

Table 2 Five Thoughts for Teacher Educators' Consideration in Promoting Technology Integration

1. Re-evaluate teacher education program methods for teacher induction. Initiate efforts for ongoing professional development that utilize interactive, online technologies (e.g., Ning, Blog, Wikis) and promote an ongoing dialogue and dissemination of ideas.
2. Be consistent in promoting technology as a partner and not as an add-on in teaching and learning.
3. Technology is constantly evolving; engage the teacher candidates in developing methods of using their emerging technologies of today (e.g., mp3 players, cell phones) in their instruction.
4. Develop or locate case studies that encourage outside the box thinking and discussions in how, when, and why a teacher should use technology; include challenges such as limited resources and other barriers of technology use.
5. Be aware of the changing needs and challenges in the classrooms of teacher education graduates (visit classrooms often). Ask: How can we help when we are no longer there?

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