Integrating Technology in One Literacy Course: Lessons Learned

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Teacher education has been subject to both criticism and innumerable efforts designed to reform it and to make it more relevant to teaching and learning in the diverse societies of the 21st century. A much sought after reform includes evidence of programs that utilize a more tightly holistic and integrated approach to instruction (Boyer, 1990) aimed at equipping teacher candidates with skills to teach in the information age of multiple technological literacies (Leu, Kinzer, Coiro, & Cammack, 2004). Rapid digitization of everyday practices means that we need to rethink conventional epistemology that essentially favors propositional and text-book knowledge. While today's children, otherwise known as the "digitally at home kids" (Lankshear & Knobel, 2006) or the millennials, live their lives with and through the aid of digital technologies, schools have generally remained largely print-based and lukewarm in integrating these technologies. In order to motivate these children and make learning more meaningful for them, it is imperative that teachers balance academic literacies with technological literacies (Author, 2006, 2009).

In this respect, public schools, and preservice teachers, are in danger of becoming increasingly irrelevant if they do not become technologically savvy practitioners, both helping students become technologically literate and continuously utilizing technology as an instructive tool (National Education Technology Plan, 2004). To meet the demands of teaching children in an information age, preservice and in-service teachers must acquire the 21st century skills such as participatory culture, distributed expertise, collective intelligence, sharing, experimentation, innovation and evolution (Jenkins, Clinton, Purushotma, Robinson & Weigel, 2003; Lankshear & Knobel, 2006, Partnership for the 21st Century Skills, 2004). Teacher preparatory programs therefore face increasing

challenge of providing models of authentic teaching and helping teachers develop their

knowledge of the content, discourse, and content specific pedagogy which includes skills

in technology use and application (Kinzer, Cammack, Labbo, Teale, & Sanny, 2006).

However, reports indicate that in general, teacher preparation programs do not provide

future teachers with the kinds of experiences necessary to prepare them to use

technology effectively in their classrooms (AACTE Committee on Innovation &

Technology, 2008; Kinzer et al., 2006). Effective preparation of teacher candidates

requires significant change by teacher educators not only in their individual practices but

also in their understanding of how technology can be used for legitimate purposes (Otero,

Peressini, Meymaris, & Ford, 2005).

As observed by Posner (2005), experience combined with reflection results in

professional growth. This paper focuses on my experiences and reflections in terms of my

technology integration efforts as a teacher educator and lessons I learned from it. By

reflecting on and sharing my own experiences, I hope that other educators and teachers

will be informed about issues in technology integration in teacher education. The study is

guided by the following research questions: What does one teacher educator's experience

reveal about integrating technology in teacher education? What lessons or insights do

these experiences provide teacher educators and other stakeholders in education?

Theoretical Framework

I draw from Rogoff's (1994) assertion that learning occurs as a result of

"transformation of participation" in culturally valued activities and "how people develop

is a function of their transforming roles and understanding in the activities in which they

participate" (p. 209). Through participation in culturally relevant activities, individuals

appropriate new ideas, attitudes, skills and practices or transform and reconceptualize the

old. According to Freire (1972), everyday human activity "consist of actions and

reflection: it is praxis; it is transformation of the world" (p. 96). As we use tools and

language to shape action, tool use changes us, even as we change the tools (Rogoff,

2003). Through integrating technology in one graduate literacy course, observing novice

teachers and reflecting on my actions, I worked to transform my knowledge, skills and

pedagogy as well as my students' competencies in using technology for instruction.

Transformations involve, among other things, interrogating one's beliefs and

actions. Prior studies indicate that teachers' pedagogical beliefs and knowledge (Abbott

& Faris, 2000; Niess, 2005, 2008; Otero et al., 2005; Russell, Bebell, O'Dwyer, &

O'Connor, 2003; Stolle, 2007) are important factors in their quest for technology

integration. In addition, teacher educators trying to integrate technology need to develop

a critical disposition toward technology (Otero et al., 2000). This implies that teacher

educators should be able to develop an understanding of why, when and how to use

technology for learning and the ability to model and deliver technology-infused curricula,

pedagogy and assessment (Larson & Marsh, 2005). They need to help teacher candidates

develop technological pedagogical content knowledge (TPCK) (Mishra & Koehler,

2006; Niess, 2005, 2008). TPCK involves "development of subject matter with the

development of technology and of the knowledge of teaching and learning" (Mishra &

Koehler, 2006, p.18). This framework posits that stand alone technology courses and

workshops are not enough to improve teachers' technology integration knowledge and

skills. Instead, educators should utilize an integrated approach that fuses technology,

pedagogy and content. TPCK recognizes that the integration of technology should not be

done in a generic sense but should be situated within authentic contexts to enable

prospective teachers learn content specific ways to use technology.

It is equally important for teacher educators to be familiar with models or phases of

technology implementation (LoTi) (Moersch, 1995) to help them critically assess their

knowledge and competence with technology as well as how to use technology to

achieve more meaningful change. Moersh (1995) identifies six levels of technology

implementation (LoTi), which include awareness, exploration, infusion, integration,

expansion and refinement. Barab, Squire & Dueber (2000) propose a co-evolutionary

model which supports collaboration among the learner participants (preservice teachers)

and the real world practitioners or in-service teachers so that they can better relate their

practice to classroom context. Hooper & Rieber (1995) argue for a model that consists of

five phases: familiarization, utilization, integration, reorientation and evolution. The

familiarization stage is when the teacher learns to use the technology. During the

utilization stage, the teacher uses technology but may have little understanding of, or

commitment to, the technology as a pedagogical and learning tool. Integration occurs

when technology becomes an integral part of the course in terms of delivery, learning,

management, or other aspects of the class. The reorientation stage involves teachers using

technology purposefully to rethink course goals, methods, structures and learning

environment while the evolution stage involves teachers who continually modify the

classroom structure and pedagogy to include evolving learning theories, technologies and

lessons learned from experience. Teacher educators trying to integrate technology may

experience obstacles. Butler and Sellbom (2002) identify the following barriers to faculty

adoption of technology. These include: (a) reliability of technology, (b) time to learn the new technology, (c) knowing how to use the technology, (d) concern that technology might not be critical to learning and (e) perception of inadequate institutional support. In this paper, I argue that effective technology integration in teacher education can be achieved when teacher educators are committed to technology-rich pedagogy and as teacher candidates are immersed in authentic activities with various technologies within classroom context.

Methods

Transcripts from this fourteen-month study were collected from a graduate-level course in literacy at a liberal arts college in the Northeastern United States. Most students enrolled in this course were already practicing teachers often with one or two years of experience in the classroom, while some were long term or per diem substitutes. A few were full time students and worked in jobs outside of education. Participants were 65 pre-service and in-service teachers made up of four cohorts of candidates who took the course in the summer and fall of 2007, as well as the spring and summer (May/June) of 2008. Fifty-seven percent (n=37) were pre-service teachers while 43% (n=28) were in-service teachers. Ninety eight percent of the students were European Americans, while 2% were African Americans. All but two candidates were females.

Instructional context

Technology integration occurred in the context of a graduate literacy course which was primarily about literacy acquisition. This required introductory course was also a prerequisite for the majority of the other courses in the program. It covered such topics as the sociocultural theory, new literaies, cultural and linguistic variation, the reading process and historical perspectives of reading research. Course expectations included weekly reflections, group research projects and completion of two major writing assignments which consisted of long essays. Initially, technology was not integrated into this course save for one or two articles on new literacies and technologies. However, changes were implemented to accommodate the integration of new technologies. This happened incrementally in that initial attempts were evaluated which necessitated subsequent changes and diversification of projects and activities. Teacher candidates were exposed to various technological tools during the course which required them to work either individually, in pairs, or in groups to research and teach lessons that demonstrate the use of particular technologies for instruction. Students participated in different technology projects which included teaching with the Interactive White Board (IWB), or smart board as it is often called, constructing/maintaining personal blogs and group wikis, and an open ended project in which they chose from a variety of options or designed their own projects to suit their particular interests or classrooms. In-service teachers were encouraged to design projects that aligned with their classroom needs which they could immediately use with their students. For each technology project, the students wrote reflections which included affordances or constraints of using that particular technological tool for instruction and suggestions for improvement.

I approached the study using self-study as a methodological tool. Self study is a

necessary pedagogical/researcher stance that can improve teaching and learning in

teacher education learning contexts (Dinkleman, 2003; Hamilton, 1998; Loughram &

Russell, 2002; Russell, 2002). Quality self-study is a disciplined and systematic inquiry

that values professional learning and aims to develop and better articulate knowledge of

practices that promote self-criticism and self-awareness of our work as teachers

(Loughram, 2007). It is a recursive process of doing, thinking about what was done,

making adjustments and doing again (Clark, Erickson, Collins, & Phelan, 2005).

LaBoskey (2004) lists some methodological features of self-study that include the:

- Requirement of evidence of reframing and transformation of practice.

- Need for interactions with colleagues, students, educational literature (and the
  researcher's previous work) to continually question developing understandings in
  order to 'interrogate assumptions and values."

- Competent use of multiple methods to provide "opportunities to gain different and
  thus more comprehensive perspectives on the educational processes under
  investigation (p. 860).

Self-study aligns with the scholarship of teaching and learning (SoTL). According to

Shulman (2000), "[w]e develop the scholarship of teaching when our work as teachers

becomes public, peer reviewed, critiqued and exchanged with other members of the

professional communities so they, in turn can build on it" (p.50). Boyer (1990), an early

advocate of SoTL, had argued that scholars must build bridges between theory and

practice through scholarship and communicate their   knowledge effectively to students.

In recent years, there seems to be a consensus that SoTL is the development of teacher

knowledge (Kreber, 2005; Meyers, 2008) which "should be informed by the knowledge

of the field, be inquiry driven and involve critical reflectivity" (Kreber, 2005, p. 328). I

engaged in SoTL as I systematically documented my teaching experiences, professional

growth and students' learning.

 Data sources: Major data sources included course syllabi for the four semesters,

students' reflections, surveys, focus group interviews, online discussions, and my

reflective journal in which I analyzed my sense making of the teaching and learning

process. There were two surveys: the pre-study survey was used to collect demographic

information and to assess students' initial knowledge of literacy and technology, while

the post-study survey assessed students' perceptions and knowledge gained from the

course. The post-study survey was a twelve-item questionnaire that had a mix of likert-

type, essay, and short answer questions. All participants took the surveys. This

instrument enabled me to capture students' evaluation of course activities and their

emergent practical theories about literacy and technology. In addition, I conducted one

focus-group interview for each cohort. The focus group interview allowed me to interact

directly with participants, allowing for clarification of points and probing for further

information. Through the interviews, I sought information about students' opinions on

the technologies they used and their perception of the course. In addition, students'

artifacts such as transcripts from individual blogs and group wikis, technology

presentations and reflective papers were also used for analysis.

Data analysis

Data was analyzed using both self-study and grounded theory approaches. Analysis

through self study involved looking inwards to question, reexamine or validate my

teaching in view of students' learning and feedback. Using my reflective journal, I

documented instances of perceived changes both in my pedagogy and students' learning.

Grounded theory (Glaser & Strauss, 1967) is a way to generate theory from data

through inductive and constant comparative analysis. Contextual nuances are used to

generate theory through participants' lived experiences. Data analysis of students'

artifacts was recursive and occurred in stages, during which open, axial and selective

coding techniques were employed. I approached the analysis through some guiding

questions to help me focus on data interpretation. These questions were; how has my

pedagogy changed or evolved as a result of integrating new technologies? Were teacher

candidates provided with authentic technology-using experiences? What additional

changes need to be made? What evidence demonstrates students' satisfaction with their

technology-using experiences? Which activities were particularly motivating? Did the

candidates demonstrate an integrated knowledge of literacy, technology and pedagogy?

Did they make connection between literacy, technology and everyday practice?

Data analysis was recursive and occurred in phases. At the end of the each semester,

I analyzed the data and used the result to refine my research methods, course objectives

and activities. I usually started the analysis with open coding, which is the process of

breaking down, examining and conceptualizing data. During this initial analysis, I

immersed myself in the data, reading and rereading all data to get a general impression of

the teachers' thought processes, perspectives and challenges. I generated marginal notes

for main ideas and important details. Coding schemes were developed through an

iterative process of individual coding, and re-checking against the data. Codes were also

generated from the research literature. I developed three coding schemes for students:

course experiences, connections and integrated knowledge. These were later expanded to

represent broad categories. The course experience category was divided into a sub-

category that included negative and positive experiences. I documented all instances of

students' expressed experiences of using technology in the course and how it impacted

their learning. In the connections category, I pulled together instances where students

made connections between literacy and technology or when they linked technology-use

to literacy theories, students' backgrounds and classroom practice. For the integrated

knowledge category, I coded instances where the candidates creatively used some

technological tools to enhance the teaching of particular literacy skills. For example, I

coded for creative smart board lessons, virtual books, WebQuests, videos, podcasts,

among others. A separate category; actions/changes, was created for the instructor.

Categories were continuously refined as new information emerged. Axial coding

was employed as I explored these categories for conditions that influenced the learning

context. For example, initial data from the first semester of the study indicated that

students were not satisfied with their technology experiences. Based on this knowledge, I

refined the technology projects and included more hands-on activities that involve both

individual research and collaboration with peers. Each semester, I followed the same

process and compared both the categories and the themes from previous semesters using

a constant comparison approach (Bogdan & Biklen, 1998). I also reflected on the

information I collected from students such as prior knowledge about technology, growth

in technology knowledge, factors that influenced their learning with new technologies

and suggestions for effective technology integration. During selective coding, attention

was paid to key words used by students as they described their technology learning and

teaching experiences such as *comfortable, confident, useful, useless, motivating,*

prepared, confused and clarified, among others, noting contexts where they were used

and activities they related to. At the end of the fourth semester, I compared and examined

all data for consistency or discrepancy, and then synthesized all emerging themes.

Validity of the study was facilitated through prolonged involvement with participants and

triangulation of data sources. In addition, member checks were used to ensure that the

participants' views were adequately represented. These measures ensured trustworthiness

or reliability of the study because the major themes were consistent across the four

semesters of the study.

Results

Results from this study indicated that the instructor's personal philosophy, the

support system, understanding students' perspectives, modeling, and the development of

a critical disposition enhanced the successful integration of technology in the course.

These measures produced some learning gains. The major themes that emerged from

students' data included (a) authenticity, (b) increased confidence, (c) participatory

learning, and (d) learning connections.

Looking inwards: Examining my philosophy for technology in teacher education

The impact of a teacher's philosophical stance and beliefs about technology

integration on actual technology use cannot be overemphasized (Ertmer, 2005). As a

teacher educator, I believe that technology is very important in teacher education. New

teachers should be trail blazers in using technology for teaching especially now that most

children's home lives revolve around popular culture, media and new technologies.

While many children are very adept at using technology for entertainment and social

interaction, the literacy demands they encounter when using these same technologies for

learning are different and necessitates that teachers are well equipped to thoughtfully

guide students' use of technology for instruction. I also believe strongly that teacher

education should be in the forefront of using state-of-the-art technologies so that teacher

candidates are well prepared to integrate technology in their own classrooms. Ultimately,

technology can be used to reconceptualize classroom learning in ways that can enhance

instruction and mediate learning environment. My background in both literacy and

technology impacted my perspectives and equipped me with the necessary background

knowledge about technology integration. However, newer technologies have

continuously emerged, rendering my prior knowledge outdated, but my resolve and

interest in using various technologies remained unshaken. To successfully integrate

technology in this graduate course, I was willing and did learn from my colleagues,

experts, research literature and my students. The support system notwithstanding, my

experiences suggest that effective technology integration is not a one shot linear process

but a recursive process that involve experimentation, thinking about and doing, learning

from experience, refining and doing again.

Learning from initial integration effort

Prior to this study, I depended solely on the Blackboard for technology integration.

The Blackboard was used to post all course readings, students' grades, assignments, and

PowerPoint files. Group pages were set up with functionalities that included online

discussions, e-mails, and file exchange. I realized however that while the use of the

Blackboard represents technology integration of some sort, it has some disadvantages.

First, students did not have access to the Blackboard once they graduated from the

program. Secondly, many new technologies and online resources have continuously

emerged, so depending only on the Blackboard will greatly limit students' technology

experiences.

My initial expansion effort included the creation of a classroom blog for the purpose

of online discussions. In addition, a technology project was added as part of the course

assessment. This project required candidates to describe three major ways to use

technological tools such as websites, blogs, wikis, literacy software, Swish, WebQuests

among others. However, looking back at my initial approach, I realized that it was

flawed, although it provided opportunity for learning and growth. There was an over

reliance on the Blackboard and later a classroom blog. Hands-on activities were not

emphasized, and students did not teach with these technologies but rather talked about

them. Feedback from students' end-of-semester reflections revealed that most of them

did not feel prepared to integrate technology in their own classrooms. An excerpt from a

student's interview buttressed this:

> Personally, I don't feel as though the discussions on Blackboard or through the
>
> blog were worthwhile. It seems they were forced on us and I did not really feel
>
> invested in it and I didn't enjoy it as much. I also do not feel I am prepared to use
>
> them in my classroom because I don't know how they were set up. We don't have
>
> access to Blackboard in my school. I think the better approach is to teach us how
>
> to set up or maintain blogs and allow us to use it for our own purposes.

Another student had a different perspective of the technology integration:

> I feel that this course has helped me become familiar with a wide variety of forms
>
> of technology that I did not know existed previously. I enjoyed the different uses
>
> of technology within this course. If possible, using technology more while in the
>
> classroom may help those of us who are visual or auditory learners. Just like
>
> students in elementary school, older students like us are often interested in
>
> technology and would be engaged more with those.

Notice the difference between these two perspectives. In the first reflection, the student

made it clear that merely using a blog or Blackboard was not enough for her to feel

confident to use technology in her classroom. The second student was happy that she was

exposed to various technologies. However, there was no indication that she would feel

comfortable using them in the future.

While my initial effort was flawed methodologically, feedback from students

indicated that it did motivate them. It also promoted engagement with course content and

reduced the usual complaint of boredom hitherto expressed in the class. It was clear

however that a hands-on, problem-based approach would better prepare candidates to use

technology and equip them with the necessary skills and confidence needed to integrate

technology in their own classrooms. At this point, I probably operated between the

utilization and integration phases of technology utilization (Hooper & Riebert, 1995).

Although technology was an integral part of the course in terms of delivery, management

and learning, it was not used as an effective pedagogical and learning tool since the

experience provided to students was inadequate in preparing them to teach with

technology or instill confidence in them. This corroborates the findings of other

researchers (Mishra & Koehler, 2006; Russell et al., 2003) that simply urging teachers to

change their shaping belief or requiring them to infuse technology in classrooms will be

fruitless unless we provide them with authentic contexts and numerous experiences to

engage in thinking, practicing, teaching and reflecting with new technologies. One of

such experiences was modeling good technology use in authentic context.

Modeling technology use

   Teacher modeling in the use of technology has been cited as the single most important

influence in subsequent technology use by students (Niess, 2005; Otero et al., 2005).

 At different times in my technology integration effort, I modeled different uses of

various technologies. Initially, modeling was very limited because I was still grappling

with several issues including understanding how to use the technologies myself.

However, as I reflected on my teaching with new technologies, acquired new tools and

learned to use them, modeling increased. As soon as my classroom was equipped with an

Interactive White Board, I integrated it fully into my teaching. I used it to model revision

strategies, highlight articles for critique and to capture class discussion using graphic

organizers. The board was also utilized for word sorts and to access the Internet quickly

and more easily. The Blackboard was equally utilized. All course materials and grades,

including the surveys, were posted on the Blackboard. Alongside the Blackboard, I

created a personal wiki and uploaded some course materials to the wiki to demonstrate its

use. At the beginning of each semester, I prepared a podcast "About me," and played it

for students. This set the stage for them to produce their own podcasts. Video cases and

video clips from online resources such as the united streaming website, children and

teacher websites or YouTube videos were integrated whenever appropriate. In addition,

exemplary teachers who used technology were invited to the class to talk about and

demonstrate what they did.

     All focus group interviews and group discussions were recorded using my iPod.

Group discussions were later played back for discourse analysis. In addition, the teacher

candidates had the opportunity to observe an expert demonstrate how to use iPod for

instruction. Prior to this time, most of the teacher candidates were not aware that iPod

had other uses apart from music, but observing the instructor and another expert who

demonstrated its instructional use, went a long way in changing the teachers' beliefs

about the educational value of this piece of technology. I engaged students in one-on-one

conversations through their blogs. These conversations provided valuable information

concerning each student's learning and promoted better teacher-student relationship.

Furthermore, journal articles or book chapters that provided good models of teachers' use

of technology were included as part of course readings.   Over 90% of the participants

cited teacher modeling as important in their developing technology proficiency. This students' reflection mirrored the view of most participants:

> I would definitely feel confident using an iPod in my classroom after taking this course. I had no idea that an iPod could be used for so many things! I enjoyed the technology presentation that day and saved all the materials that the speaker gave us, and I plan on playing around with my iPod and using it in my classroom. I think there is a stigma that using new technologies is difficult and complicated. However, with the demonstrations we have in class, these doubts have been alleviated.

There is no doubt that modeling the use of technologies had an impact on the way the teacher candidates perceived their usefulness. There were indications that modeling helped them overcome some fears associated with technology use in the classroom. However, modeling alone cannot guarantee that the candidates will effectively use technology or develop TPCK. Innovative activities and creative thinking were needed to move to the next stage. It was also important to understand the perspectives of the teachers on their learning.

Understanding students' perspectives

In order to continue to refine my pedagogy, I realized that students' voices were very crucial in any decisions concerning their learning. Therefore, students' perspectives about the course, the challenges they faced and suggestions for improvement were instrumental to most of the changes that I implemented. Each data source had a question that elicited

students' input about how they perceived the use of particular technologies and

suggestions for improving classroom instruction.

Initially, many candidates complained about inadequate teacher modeling and hands-

on experiences. With time, the concern centered on three major issues: course structure,

course load, and access to various technologies outside the campus. 70% of the teacher

candidates wanted some class time set aside for hands-on activities. They indicated that

finding time to meet with their partners and groups was very challenging, given that some

of them had full time jobs and even families. About 80% of the students felt that the

workload for the class was heavier than usual because of all the technology projects,

coupled with the research and academic papers required in the course.   Another

challenge that students identified was access to various technological resources outside

the campus. As much as 80% of the in-service teachers had no access to the smart board,

podcasting software and other tools in their classrooms.

All the candidates (100%) wanted to see consistency in technology integration in

their future teacher education courses. Specifically, they were worried that other courses

may not integrate technology which might hinder their ability to consolidate what they

have learned. They wanted all courses in the program to provide them with similar

technology experience so that they can reinforce the knowledge gained in the course.

Developing a critical disposition

Critically reflecting on my initial integration effort and students' concerns made me

raise a number of questions, such as: How can technology enhance the pedagogical goals

of this course? How can I help my teacher candidates develop technological pedagogical

content knowledge (TPCK)? How can technology be used to promote critical thinking, problem solving and classroom discourse? What course readings might provide good theoretical knowledge about the relationship between literacy and technology as well as models of good practice in technology integration? These questions made me reexamine and rearticulate the course objectives and consequently revised them, addressing the technology dimension of the course. The course syllabus was again revised and updated with additional readings on literacy/technology connections. The previous technology projects were removed, and three new ones were created. These included (a) Interactive White Board (IWB) project in which students taught minilessons using the smart board, (b) the wiki project which required a group of four to five students to set up a wiki and use it for weekly discussions and e-portfolios, (c) an open-ended technology project in which candidates worked in pairs to investigate, design and teach a lesson using a particular technology and (d) a personal blog used for online journaling and written conversation between the students and instructor. Each student also prepared and uploaded a podcast titled "About me" to their blogs.

For each technology project, candidates were required to write a critical reflection to document their experiences with learning and teaching with that particular technology. These actions produced some results. Learning became more authentic and students expressed confidence in their ability to use various technologies. In addition, participatory learning increased and students made better connections between literacy, technology and learning.

Authentic learning

Authenticity was enhanced through blogging, wiki, group and whole class discussions

as well as class presentations on various forms of technologies. In their reflection, almost

all the teacher candidates (95%) indicated that having a real audience for their technology

projects and a real purpose for doing it motivated them to work hard to learn about

various technologies. This was echoed by one candidate when she indicated that "it was

great to have a smart board presentation because that motivated me to actually play with

and use the smart board first hand." As this candidate observed, it appeared that

requiring students to teach mini lessons that incorporated different technologies helped

them situate technology use in authentic context. Having an authentic audience online

also facilitated better writing. One candidate reflected on her writing online. "Because I

participated in our wiki discussions, I revised and edited my written responses properly

so that when others read it, it would make complete sense." Others expressed support for

online discussions because they were able to "read other classmates' ideas about course

materials." In addition, a co-evolutionary model (Barab, Squire & Dueber, 2000) was

promoted as some in-service teachers partnered with pre-service teachers to design

specific projects for their classroom needs. Engaging in various authentic activities may

have boosted the self-efficacy and confidence of the teachers.

Self efficacy/confidence in using technology

As the teacher candidates engaged in a variety of projects, they expressed confidence

in using various technologies in their classrooms. During the focus group interviews, I

asked the candidates to say which technological tools they would feel comfortable using

in their classrooms as a result of their course experiences. An excerpt from this student's

response represented the view of most of the candidates:

> I believe I would feel comfortable using many of the technological tools I was
>
> introduced to. However, the ones that I got hands-on experience with would
>
> probably be the ones I feel most comfortable using. The smart board would
>
> definitely be at the top of the list since it is something we worked with all
>
> semester. However, I also feel extremely at ease using blogs, wiki, podcast, and
>
> the wonderful website, nicenet.org. This class definitely taught me the importance
>
> and benefits to modern day technology. It taught me about the relationship
>
> between literacy and technology. The knowledge and experience I now have
>
> about technology provides support for wanting to use various technologies for
>
> teaching and my comfort level with maneuvering them.

It appeared that the teacher candidates felt well prepared to teach with technology when

they were exposed to various technologies online and offline and given the opportunity to

design, practice, teach and reflect on their technology-using experiences. In doing so,

they learned collaborative and participatory skills.

Participatory learning

According to Jenkins, Clinton, Purushotma, Robinson, & Weigel (2006)

participatory culture shifts the focus of literacy from one of individual expression to

community involvement through active participation, creative expression, informal

mentorship and collaborative problem-solving. Participatory culture promotes distributive

expertise in which members benefit from their more knowledgeable peers. As the teacher

candidates worked collaboratively in pairs and groups to research, design and present

their projects, they were involved in problem solving and peer mentoring. In their

reflections, 95% of the teacher candidates attributed their success in acquiring proficiency

with different technologies to their peers or group members. These views were captured

by one of the   teacher candidates when she explained how she acquired proficiency with

some technological tools:

> One thing I enjoyed in this class was working with my partner and group in many
>
> of our projects. Technologically, I was a novice but   I was lucky to work with
>
> someone who was very savvy. My partner and I created a virtual book and
>
> designed a WebQuest from scratch. She put me through some of the things I
>
> needed to learn for our presentations and helped our group set up our wiki. Later,
>
> our group members took turns to maintain our wiki. I modified the front page,
>
> uploaded our weekly summaries, maintained my personal page and uploaded my
>
> podcast. Gradually, I started to work effortlessly with various technologies.

Although some groups did not have tech savvy members, they were able to jointly

explore and negotiate meaning through collective intelligence and sharing of ideas. It

appears then that success with various technologies depended to a large extent on

distributive knowledge, experimenting with new technologies as well as observing

models in authentic context. These experiences helped the candidates to make

connections between technology, learning and students' background.

Making connections:

A combination of course readings, hands-on experience, collaboration and reflection

helped the candidates to make better connections between literacy and technology, and

understand the need and purpose for technology integration in the classroom. One

candidate noted "The readings in this course gave me a whole new perspective about

technology." Another observed that guest presenters helped her see how "technology was

implemented in different classrooms." In all, most teacher candidates were able to link

technology to the needs of children in the information age. They were also able to

explain and justify the need for technology integration. This candidate exemplified such

thinking:

> I never really knew how much technology influences the learning of literacy.
> This course has helped me realize that we live in a constantly changing world in
> terms of technology and our students are bringing in all types of technological
> knowledge to the classroom. The 'new literacy and technology' theory also made
> me realize what schools and districts should be offering their students in terms of
> technology. Therefore, it is important and almost imperative that we teach our
> students how to use various technologies so that they can meet the challenges of
> today's changing world.

This perspective was echoed by another participant when she noted that technology has

influenced and changed the nature of the learners, requiring teachers to adjust or change

their pedagogy:

> I think technology is very important in today's classrooms. Our students have
> become accustomed to immediate feedback and gratification with the use of

computers, the internet and video games. Therefore, their learning styles now

encompass this particular style. Children are also extremely visual and seeing

their work in different formats and styles whether it is through a web page or

PowerPoint e.t.c can be very gratifying.

The recognition that technology might be better aligned to students' learning style

demonstrates that the candidate was making connection between technology and

learning. The teacher candidates were better able to make connections and justify the

need for technology integration based on a totality of their course experiences (Author,

2008). In order to develop technological pedagogical content knowledge in literacy,

teacher candidates need these integrated and holistic experiences.

Lessons Learned and Implications

   My experience at integrating technology in one literacy course over four semesters

supports the saying that "doing is learning." Because I had to teach students how to use

various technological tools for instruction, I was forced to learn how to use these tools.

Going through the iterative process of inquiry, reflection and refinement, and negotiating

existing constraints within the course structure to create conditions necessary for

technology integration was very insightful. Refining my course objectives, methods and

materials were instrumental to continuous improvement and the evolution of my practice

over time. To do that, I relied on colleagues, institutional support, research literature and

experimentation to discover things myself. In addition, some of my tech savvy students

assisted in teaching the rest of their classmates. My zeal could be traced to my belief in

the importance of integrating technology in teacher education and the need to produce

teachers who would demonstrate competence in teaching literacy to children in the 21st

century and be competitive in the labor market that is continuously shrinking.

During the course of the study, I played several transforming roles (Rogoff, 1994)

which resulted in the acquisition of new skills and dispositions toward new technologies.

First, I was a learner and novice, then a teacher and more knowledgeable other. Changes

in participation pattern also occurred as I moved through several phases of technology

utilization (Hooper & Rieber, 1995; Moersch, 1995). This was not linear but a recursive

and ill-structured process that started with the exploration of and familiarization with

several technologies. My initial effort was marred by inadequate understanding of how to

effectively engage the students and use the technologies as pedagogical tools. However,

through critical reflection and feedback from students, I refined my pedagogy, during

which I engaged with both integration and reorientation phases of technology utilization.

During this time, technology was used more purposefully to rethink course goals,

methods, structures and the learning environment. For example, I realized that using a

podcast "About me" to introduce myself was effective in modeling podcasting and

getting the candidates to prepare a similar podcast about their lives and backgrounds. In

addition, engaging teacher candidates in one-on-one blogging gave me better insight into

their lives, expectations and academic needs. These experiences shaped my evolving

practice and my resolve to explore other learning technologies such as iMovie, clickers,

videoconferencing and others.

Being able to critically reflect on why, how and when to integrate technology

helped me to use technology as both cognitive, management and motivational tools.

Cognitively, students' learning was facilitated by the use of technology. Technology was

used to restructure the learning environment and extend classroom boundaries in ways

that would not have been possible. Constructing and maintaining blogs and wikis,

designing virtual books, WebQuests, Swish, electronic portfolios, as well as learning to

teach with the smart board, promoted hands-on and inquiry-based learning activities.

These in turn promoted critical thinking, as students reflected on each tool, analyzing its

affordances and constraints or its suitability for instruction. As a management tool,

technology helped me to manage group learning because students worked in groups to set

up wikis which they used to document group activities and discussions. E-portfolio was

especially useful as an organizational tool for assessing students' work while the wikis

facilitated the assessment of group processes and products. Online discussions and

activities gave students time and place advantage, allowing them to work at their own

convenience. Finally, as a motivational tool, technology was used to foster hands-on

activities, engagement and motivation. The complaint about boredom or the theoretical

nature of the course reduced drastically after technology was integrated in the course.

Integrating technology helped the candidates to make a better theory to practice

connection. For example, the connection between literacy and technology as well as the

impact of new technologies on literacy practices became more apparent as students

analyzed different tools and their impact on literacy practices. As most students indicated,

the realization that each new technology requires new literacies to use it effectively

(Baron, 2001) helped them to rationalize the need to continue to learn about and teach

with new technologies. They realized that purposeful technology use in the classroom

impacts students' literacy acquisition and better prepare them for education and life in the

21st century. This understanding facilitated teacher candidates' interest and commitment

to the use of technology for teaching.

Evidence from this study indicated that there was a huge difference between merely

exposing students to different technologies or modeling their use versus making them

teach with these technologies. Exposure resulted in students being familiar with these

tools, yet they did not express confidence in using them in their classrooms. However,

when they were required to teach lessons with these technologies, most of them spent

hours of their private time practicing how to use them to enhance their instruction,

thereby increasing their comfort level with using these tools. This led to increased

confidence and self efficacy. As a result, new skills, attitudes, and values toward

technology-use were developed. When teachers are confident and comfortable with

newer technologies, they not only use them in their classrooms but also become

advocates for their colleagues and schools. For example, some participants in this study

started to negotiate with their school authorities for the purchase of Interactive White

Board, podcasting software and other equipment.

So far, I have discussed the lessons I learned from integrating technology in one

graduate literacy courses. The next section will discuss the implications of these

experiences.

First, the importance of reflection and self-study cannot be overemphasized in any

technology integration process. Educators, who want to integrate technology in their

literacy courses need to constantly review, reassess and readjust their instructional

decisions to meet course objectives. Teacher educators need to examine their beliefs and

be willing to learn new ideas through experimentation and from experts, colleagues and

students. They should be ready to be lifelong learners in this area. Invariably, by

initiating action, learning from our mistakes and from students' feedback, the propensity

for growth is limitless. Teacher educators need to help their students understand the

relationship between literacy and technology through course readings and hands-on

projects, while at the same time be self-aware and self-critical of actions taken (Clark et

al, 2005). Students should be made to write a reflective paper for each technology-

learning experience. To maximize the benefit of this process, teacher candidates should

be given a guideline to write quality reflections which would help the instructor to

understand their thought processes, successes and challenges. Students' reflection must

address how the projects helped or did not help them understand the relationship between

literacy and technology.

Second, a successful integration of technology in teacher education requires that

technology should not be treated as a peripheral tool but an integral tool with diverse uses

and inherent potential to enhance teaching and learning beyond what the traditional

methods allow (Niess, 2005). Evidence from this study indicates that teacher preparatory

programs would benefit from a model that integrates technology in all courses in teacher

education, not just in the methods courses. Technology integration should be done in

ways that support teachers in gaining skills and knowledge in teaching different subjects

with technology, instead of having a dedicated course for it (AACTE Committee on

Innovation & Technology, 2008; Mishra & Koehler, 2006;Niess, 2005; Otero et al.,

2005). Method courses should facilitate the reinforcement of skills already learned, as

well as provide the opportunity for teacher candidates to effectively apply their

technology knowledge in planning, designing, and implementing content specific lessons.

We need to challenge teachers to reconsider their subject matter content and the impact of

technology on the development of that subject itself as well as on teaching and learning

that subject. That is one effective way to build technological pedagogical content

knowledge (TPCK).

Furthermore, effective development of TPCK would require teacher educators to

provide multifaceted and holistic learning experiences situated within classroom context.

TPCK cannot be achieved with a singular course activity or experience, no matter how

robust the experience is. Teacher candidates need sound theoretical knowledge,

especially those from the sociocultural theory, new literacies and critical media literacy.

These theories will challenge their long-held beliefs and provide a necessary foundational

knowledge that will help them justify the need for technology integration. Teacher

candidates also need robust hands-on, problem-based approach to learning with new

technologies as well as the opportunity to observe models in authentic contexts. In

addition, it is important for teacher educators to help their candidates develop

participatory learning (Jenkins, Clinton, Purushotma, Robinson & Weigel, 2003) in

which distributive expertise would form the nexus of their learning with different

technologies. These experiences can be enhanced as teacher candidates engage in creative

thinking, planning, designing, practicing and critiquing different literacy technologies.

Finally, technology-learning experiences must be reinforced throughout the teacher

education program.

Technology integration does not necessarily make the work of instructors easier in

all respects, but it does facilitate teaching and learning in remarkable ways. Modeling is

very important in any integration effort just as the instructor has to continuously assess

the need or appropriateness of particular technologies for the enhancement of course

goals.

A focus on authenticity is very essential. Teacher educators should not just prescribe

how to use various technologies for their students but should provide authentic contexts

and opportunities for them to develop the skills to create or design integrated instruction

using technology. Teacher candidates should be made to weigh the affordances and

constraints of different technologies before implementing their use in the classrooms. In

addition, educators trying to integrate technology in their courses need to consider course

load. Technology integration and projects take a bit of student's time and must be

factored in the course design. A slight reduction in course content or assignments would

create a balance between content learning and the learning of technology skills. Students

might feel overwhelmed or may not have enough time to practice using various

technologies if technology projects are simply added to existing course structure without

considering course load. It is also necessary to introduce technology in an incremental

manner starting with simple to complex ones.

Limitation of the study

This study is limited in scope because only one course and one instructor were

involved. This will limit generalizing its findings. In addition, because I was a

participant observer and a researcher at the same time, I played insider/outsider roles

simultaneously. These multiple roles could lead to a blurring of the researchers' role and

could cause potential ethical problems. Merriam (1998) argues that ethical dilemmas

usually arise in the collection of data and dissemination of findings where a researcher

takes a totally interactive, collaborative stance. To reduce this ethical dilemma, I

consciously reminded myself of my role as a teacher researcher and the need to make the

invisible become visible.

Suggestions for further research

   This study focused on the experience of one teacher educator at integrating technology

in one course and in one setting. While this gives a snap shot of the processes involved

and the challenges of integrating technology in teacher education, further studies will be

needed that would involve many teacher educators from one or several colleges, in order

to get a more holistic view of the processes and challenges of integrating technology in

teacher education. In addition, both in-service and preservice teachers participated in this

study. It was not clear though, if the in-service teachers effectively transferred the skills

they learned from the course to their classrooms. It may be pertinent to observe and study

the classroom of in-service teachers after they completed courses that integrate

technology, to see which skills and ideas they would transfer from their teacher education

courses to their classrooms. This is the same with preservice teachers. Observing this

group in their future classrooms would inform educators if the effort at integrating

technology in teacher education yields benefits for teachers. Finally, it may be pertinent

to study teacher candidates' perspectives about the skills needed to develop technological

pedagogical content knowledge (TPCK).

Conclusion

Effective teacher education in the 21st century cannot be realized until teacher education programs are committed to equipping teachers with the skills necessary to effectively teach with technology. This depends to a large extent on teacher educators' beliefs about the efficacy of technology, ability to model technology use and requiring teacher candidates to teach with technology. Obstacles such as fear, time to implement technology pedagogy and other problems would be reduced or eliminated if educators constantly reflect on their teaching and students' learning and continually modify their instruction based on these reflections. My conviction is that learning to teach with new technologies is and should be a lifelong process. As new technologies continue to emerge, we need to constantly update our knowledge in order to improve on our technological pedagogical content knowledge and those of our students.

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