Preparing Future Teachers to Teach Literacy in the 21st Century: Utilizing Digital Literacies in Literacy Coursework to Foster Applicable Classroom Practices

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Introduction

Preparing future teachers to face the unique challenges of teaching in the 21st century is becoming not only an area of great prominence for teacher educators, but it is also becoming a professional responsibility. The changing demands of our classrooms and the incorporation of digital devices transforms how teachers navigate a space where there is a shared place for both traditional classroom practices and those that require knowledge of digital literacies and multimodal texts. These “new” literacies are socially accepted means in which people, “generate, communicate, and negotiate meanings, as members of Discourses, through the medium of encoded texts... and include examples such as, blogging, manga producing, podcasting, along with (traditional examples) like letter writing, reading literary novels, and so on” (Lankshear & Knobel, 2006, p. 50). We need to consider how we are preparing pre-service teachers to teach in the 21st century and how to equip them with the tools and experiences to make a successful transition into the classrooms.

Researchers recognize that literacies are continually changing and adapting and therefore the relationship between literacies and technology is transactional (Leu, Kinzer, Coiro, & Cammack, 2004). When quantifying “new literacies” Coiro, Knobel, Lankshear and Leu (2008) describe that, “new literacies are identified with an epochal change in technologies and associated changes in social and cultural ways of doing things... literacies are new in a more abiding sense of being a part of a historical phenomenon that is not fleeting” (p. 7). To adequately prepare students for a world in which our definition of literacy continues to change, we need to fully understand the means in which we communicate and how these practices shape current and future classrooms. The responsibility is then thrust on universities, colleges and
teacher educators to help prepare future teachers for this changing literacy landscape where the population of pre-service teachers are fully versed and experienced in digital literacies and multimodal textual experiences.

The purpose of this study was to investigate pre-service teachers’ perceptions of technology integration in elementary classrooms and determine how their experiences with using technology help or hinder their general conceptions of teaching in the 21st century. In particular, the investigation looked at the role of a partial immersion approach to teaching literacy through technology with modeled and integrated use of classroom technological applications. Immersion is imperative for a greater understanding of the technological tools (Mason, 2000), and this study investigated an approach to elementary literacy instruction that resulted in the pre-service teachers becoming proficient at multiple modalities of technology and equally adept at using technology in class and in their field placements. Throughout the 3-course literacy block the pre-service teachers utilized multiple mediums of technology. Various web sites and applications were modeled and explored through classroom activities and assignments and then implemented during concurrent field experience placements. Central to this work were the culminating final assessments: a student research inquiry project studying elements of chosen technology integration in elementary classrooms and a classroom vision statement aimed at understanding their views of technology integration for their own classrooms.

The primary research question that informed this study is: How do pre-service teachers perceive technology integration in teaching literacy in elementary classrooms? Three underlying questions also helped to clarify pre-service teachers’ perceptions regarding technology integration and their role in future classrooms. Those research questions are: 1) What inspires and contributes to their belief systems? 2) What experiences help to shape their perceptions of
technology integration? and 3) What are the pre-service teachers’ perceptions regarding the incongruities between technology integration at the university level versus technology integration in elementary classrooms? Since the coursework, experiences, and preparation is significant to consider how those various components work in tandem and also isolation to help contribute to the pre-service teachers’ perceptions, the research questions were designed to understand these various elements.

**Theoretical Framework**

The relevant research paradigm explored the pre-service teachers’ perceptions regarding the use of technology, their experiences using different types of technology and how their coursework, assignments, exploration and field experience may have shaped their vision for teaching. Social constructivist and interpretivist paradigms guided the research design, methodology, data gathering and analysis processes. The study is grounded in research from the fields of pre-service teacher beliefs and vision (Haverback, 2009; Mercado & Turner, 2010; Parker & Brindley, 2008; Vannatta, 2010), the growing body of literature regarding technology integration among pre-service teachers (Abbitt, 2011; Anstey, 2002; Cervetti, Damico & Pearson, 2006; Hixon & So, 2009; Koehler & Mishra, 2009; Vannatta & Beyerbach, 2000), and how the TPACK framework (Mishra & Koehler, 2006) grounds our understandings of technology integration. Pre-service teachers develop visions of classroom and pedagogical practice through experiences as students, education coursework, and field placements (Parker & Brindley, 2008), which can be shaped and expanded as they acquire new strategies (Mercado & Turner, 2010).

Processing time, reflective thinking and examining one’s beliefs are a powerful means for understanding teachers’ classroom practices and behaviors (Hart, 2004). Additionally, action research has aided pre-service teachers in their inquiry and evaluation of teaching practices
Pre-service teachers often struggle to integrate technology in their field experiences due to the pedagogical complexities and educational contexts (Dawson & Dana, 2007). Yet, researchers found that opportunities for pre-service teachers to utilize technological tools in field experiences encourages technology integration and helped to shape their perceptions and attitudes toward technology integration (Mason, 2000). Pre-service teachers need to learn about technology through modeling and engagement and they need to embrace technology rich environments (Cervetti, Damico & Pearson, 2006; Vannatta, 2000). Most importantly, if pre-service teachers can navigate the technological landscape they can help their students understand how to draw upon various modes to meet the challenges of the twenty-first century (Borsheim, Merritt & Reed, 2008).

The TPACK (Mishra & Koehler, 2006) is a framework to consider the necessary knowledge a pre-service or practicing teacher must have in order to effectively deliver instruction where technology enhances learning. The framework was developed from Shulman’s (1986) conceptualization of pedagogical content knowledge (PCK); the knowledge teachers need to teach content effectively. The TPACK framework describes the coinciding areas of knowledge that are integral to teachers being able to teach content effectively with digital mediums and applications. Although the TPACK is an encompassing construct that helps to identify a useful lens to examine teacher knowledge, several researchers have enriched this conceptualization by adding other important considerations. For example, Vaerenwyck, Shinas & Steckel (2014) describe what they call the TPACK+ which is a bi-theoretical framework encompassing the TPACK but also adding sociocultural theory to extend the construct to include socially situated learning within authentic contexts. Similarly, Wilson, Zygouris-Coe, Cardullo & Fong (2013) formulated the M-TPACK that widens the TPACK by incorporating metacognition
and teacher dispositions. M-TPACK describes how teacher dispositions (attitudes, perceptions or beliefs plus personal characteristics) especially toward technology is important to how teachers are able to incorporate technology, their confidence, and their self-efficacy. These constructs illustrate the need for considering not only the knowledge necessary to carry out effective instruction, but also the personal and social influences that are integral to make teaching with technology meaningful and sustainable.

These frameworks are important to practicing teachers and illustrate the many areas of knowledge a teacher must have in order to be successful in teaching content with technology. For a pre-service teacher these areas of expertise are just developing. They are only beginning to understand how to teach content and pedagogical methods to work best in different classroom situations. Therefore, it would seem extremely important to help these new teachers to have ample time, practice and opportunities to explore how to integrate technology. It is almost like learning a new language with an immersion approach, where a new language learner learns the oral, written and conceptual understandings at the same time. By immersing pre-service teachers with opportunities to incorporate technology into their literacy teaching, they should be able to assimilate into this culture of learning.

Methodology

Social constructivist and interpretivist paradigms guided the research design, methodology, data gathering and analysis processes. This method allowed the analysis of the pre-service teachers’ contextual worlds through the experiences they shared. I employed a qualitative research design to collect data that answered my research questions (Patton, 2002), and this was an exploratory approach to understanding how pre-service teachers perceive technology integration in teaching literacy in elementary classrooms and what helps to shape their conceptions of technology.
integration for future practice.

**Partial Immersion Approach to Technology Integration**

The literacy education methods coursework is taken together, all during one semester in students’ junior year. During the 3-course literacy block numerous opportunities for modeling, exploration, and application were given to the pre-service teachers for both instructional and assessment purposes. Students explored various web sites and applications through classroom activities and assignments. The Substitution, Augmentation, Modification, Redefinition (SAMR) model is utilized throughout the design and implementation of the coursework. The premise is to outline the importance of redefining tasks to ensure students are not just being asked to substitute one outdated literacy practice for another simply by using technology (Puentedura, 2006). In order to design this kind of meaningful instruction, much time and consideration is given to the applications that should be shared and the assignments to demonstrate both proficiency in literacy teaching and technology integration.

The assignments were incorporated into the concurrent elementary field experience placements where the pre-service teachers provided a limited amount of instruction to children and used classroom experiences to implement class assignments in those field placement classrooms. A few of the class assignments included: 1) the creation of a content area video associated with a picture book using iMovie; 2) utilizing wix.com to create an interactive author study web page; 3) the development of a digitalized literacy instruction photo journal representing the gradual release of responsibility model; and 4) the culminating technology-focused action research inquiry projects. This approach was developed because of the need to include technology in pre-service teaching experience. Currently, no integrated technology or educational technology courses exist for students to take as education majors.
Class assignments and projects were integral to the immersion model; however, it was also imperative to use class time for students to play and explore web and tablet applications to understand their use and to begin thinking about their pedagogical implications. Examples of just a few of the web applications that were used during the semester include: 1) Arounder.com where students can take virtual field trips and build background knowledge related to children’s literature and informational books; 2) Popplet.com used for organizing thoughts and mind mapping; 3) Pixton.com, an online comic-making tool used as assessment of course concepts; 4) Shadow Puppet, a storytelling app used for creating short videos integrating art, literacy, and technology, and 5) Sock Poppets, an iPad app used to show how to help students creatively work on fluency. The above list is not exhaustive but illustrates a few of the ways in which pre-service teachers were exposed to different tools to expand on literacy objectives using technology.

**Selection of Participants**

All participants selected to participate in this study were former students enrolled in the literacy block courses. Three cohorts of pre-service teachers comprised the participants of this study, with ten to twelve students in each cohort. The first cohort was conducted as a pilot study. The total number of students included in this investigation was 44. The pre-service teachers were asked to participate in the investigation following their junior-year coursework. During the literacy methods block, each of the juniors take three 3-credit literacy courses: Teaching Reading in the Elementary School, Teaching Language Arts in the Elementary School, and Teaching Children’s Literature. The juniors are also simultaneously enrolled in a suburban field placement where they work with a cooperating teacher two mornings per week in a classroom. The suburban school where they are placed has wide access to digital tools including Smart Boards,
Chromebooks, iPads, and multiple computers for daily use in the classroom. The school has a one-to-one initiative so each of the students has access to their own device.

The pre-service teachers then enter their senior year, with a year-long placement in a large, urban school with a high poverty rate that coincides with all remaining methods coursework. In the fall semester they are in courses three days a week and in their placements for two full days. During the spring those seniors are solely in their placement classrooms. It is during the students’ senior year when they are asked to complete the questionnaire and take part in focus group interviews. This field placement is in stark contrast to the suburban placement from the previous year. Each classroom in the schools where they are placed has only two to four computers available and they are from the late 1990’s-early 2000’s. The only current technology consistently available in each of the classrooms is Promethean boards.

Data Sources
Consistent with qualitative research design, various methods of data collection are used in this study. Anecdotal records, artifact analysis, questionnaires and focus group interviews were the methods of data collection used. Anecdotal records taken during class sessions recorded observations of the pre-service teachers’ reactions, discussions and overall use of the technological tools. A baseline reflection was collected in the beginning of the semester that asked students their beliefs about the role of technology on literacy instruction. The pre-service teachers also had numerous opportunities in class to discuss and create a teaching vision to guide future practice. These vision statements were later analyzed to identify patterns about perceptions, experiences, and beliefs regarding teaching in the 21st century.

A questionnaire adapted from Schmidt, D., Baran, E., Thompson, A., Koehler, M.J., Shin, T, & Mishra, P. (2009) was distributed to each of the cohorts of students following their
first semester in their senior year. The questionnaire included survey items taken from Schmidt et al. (2009) to look for specific characteristics related to the TPACK framework that sought to understand the pre-service teachers’ experiences and perceptions about integrating pedagogy, content and technology. The questionnaire also included several open-ended questions to give the students an opportunity to elaborate on their ideas, insights and experiences. The questionnaire had 15 survey items using a Likert scale and five open-ended questions.

The focus group interviews captured a more thorough understanding of the artifact analysis and provided an in-depth discussion of the pre-service teachers’ perceptions of the role of technology in literacy instruction and assessment. Students who completed the survey were asked to participate in focus group interview. Five students from each cohort were randomly selected to participate in the focus group interviews. The focus group interviews were semi-structured, using the same 15 questions, with follow-up questions being asked when appropriate.

The importance of the pre-service teachers’ beliefs and perceptions was an attempt to more profoundly understand the phenomenon being investigated.

Data Analysis

I analyzed the data with specific strategies and across multiple sources in an ongoing and systematic manner using content analysis (Taylor-Powell & Renner, 2003) to identify categories and patterns of how pre-service teachers perceive teaching in the 21st century and their conceptions of what that means. Assertions generated from across all data sources and findings, and interpretive commentary connected the assertions. Merriam (2002) described content analysis as analyzing interviews, field notes, and documents so that the researcher can seek to find themes and reoccurring patterns of meaning. Content analysis is also defined as a systematic, replicable technique for compressing words in text into fewer content categories,
based on explicit rules of coding (Stelmer, 2001).

Taylor-Powell and Renner (2003) defined the five steps of content analysis as follows: (1) Get to know your data, (2) Focus the analysis, (3) Categorize information, (4) Identify patterns and connections within and between categories, and (5) Interpretation—bringing it all together. The students’ systematic analysis of the quickwrites, classroom artifacts, anecdotal records, and vision statements helped to create patterns and then themes to generate findings associated with the investigation. Descriptive statistics were used for the survey items to analyze the pre-service teachers’ responses and look for patterns in their perceptions and feelings about teaching with technology. Focus group interviews were also recorded, transcribed, and analyzed. Creswell (2009) advocates the need to validate the data. The data was triangulated using the analysis and comparison of multiple data sources including the artifact analysis, questionnaire analysis, and interview data. The multiple sources confirmed interpretive accuracy and helped to validate the themes. The evidence was collected and analyzed to understand whether experiences with technology helped to shape pre-service teachers’ conceptions of using technology to enhance literacy practices.

**Role of the Researcher**

Data collection took place throughout the semester with one course instructor. I am both the course instructor and the researcher in this study. The role of the qualitative researcher ranges on a continuum from a fully-present researcher and a co-participant, to a researcher who experiences the investigation, without being fully involved in the events around him or her (Rossman & Rallis, 2003). I had an active role in the study because I am the course instructor implementing the partial immersion approach to literacy instruction. I tried to extricate myself as the center of this work by collecting data following students’ coursework and by also allowing
them to speak freely about their experiences. Creswell (1998) suggests that the qualitative researcher often takes on the role of the active learner and tells a story from the participants’ point of view, rather than an expert passing judgment. The researcher’s role as an active learner is especially important in today’s literacy classrooms. Often, the researcher’s own knowledge, within the context of observation or study, constraints or broadens what he/she can observe, and, therefore, is in a position to explain and theorize (Steinkuehler, Black, & Clinton, 2005).

**Findings**

**Pilot Study Findings**

The first cohort of students served as the pilot study for this investigation. At this early point in the investigation the data collection only involved artifact analysis of the quickwrites, anecdotal records, and the students’ vision statements. The data mined from this analysis revealed not only important findings in a general sense, but also provided a foundation from which the exploration could be expanded. Three general themes emerged from the data that converged and helped to clarify the pre-service teachers’ perceptions. Those themes were: 1) New learning about technological tools were understood and assimilated; 2) Students had a perceived boost in confidence in using technological tools, and 3) The students’ perceived immersion approach as a contributor to their new learning and offered a means to incorporate technology into their future classrooms. Data analysis generated important considerations that led to a wider knowledge base about the pre-service teachers’ perceptions regarding the role of technology and its use in elementary classrooms.

First, the pre-service teachers felt the different modalities of technology integration offered them experience using tools they may not have explored on their own. Cervetti, Damico, and Pearson (2006) differentiate between new literacies, which typically involve new
technologies and multiple literacies that extend the many literacies beyond print. The pre-service teachers reported having experience with both kinds of literacies and that each helped shape their conception of how they can be used in an elementary classroom. For example, one pre-service teacher remarked, “The website ‘wix’ is a new favorite of mine. I could find multiple ways to bring this into the classroom. The students could make their own website about an author or about an historical event. I would also like to incorporate some kind of blog so the students can start learning to be professionals on the computer.” Another pre-service teacher discussed how to hopefully keep parents engaged in student learning by saying, “As a teacher I will utilize online bulletin boards, blogs, and webpages to keep parents involved in classroom lessons and events.”

The analysis revealed the pre-service teachers’ beliefs regarding the application of many of the web sites and technological tools. They shared the benefits, challenges and insights about how the tools could be used effectively.

The pre-service teachers also reported an increase in their confidence regarding the use of the tools and how they aided them in teaching literacy. One pre-service teacher remarked, “I feel good about integrating technology into my classroom because of having the chance to use it in our class and see it being used in the second grade classroom.” A pattern emerged through the analysis illustrating their desire to continue to use technological tools in future classrooms and to explore new applications to guide their literacy instructional practices.

Finally, the pre-service teachers discussed that the immersion in a technology-saturated classroom positively impacted their ability to engage the students in their field placements. At the beginning of the semester the pre-service teachers reported a minimalistic role on literacy instruction, assessment and student engagement. Following the literacy block the pre-service teachers reported that technology has a significant role on their ability to teach literacy, engage
students and assess content knowledge in meaningful ways. For example, one student suggested, “Making movies on the computer makes information more personal, interesting, and funny... it draws the students’ interest more.” Another suggested that, “E-books have the potential to change the way our students read and consume texts.” Someone said that, “I would want to use technology in my classroom because I firmly believe it can impact a students learning more than worksheets and posters.” The pre-service students’ comments helped to illustrate their own learning about technology, perceived confidence in utilizing technology, and their belief that the experience in the courses contributed to their learning about not only literacy practices but ways to incorporate technology into elementary classrooms to enhance literacy practices.

Findings from Larger Study

The larger study offered an opportunity to expand on the findings from the pilot study and understand the students’ perceptions more profoundly outside of just their junior block experience. The questionnaires and focus group interviews took place during their senior year, while they were in a different school environment, with different cooperating teachers, and had new methods instructors. The same three themes emerged, but the students offered rich and sometimes divergent perspectives related to the identified themes. New themes generated new insights and contributed to the larger study and helped to clarify the students’ perceptions, regarding the preparation of future teachers using technology. The themes presented below that expand and enhance the previous findings are: 1) New learning about tools and technology is not always transferable, 2) Pre-service teachers’ perceived confidence was contingent on applicable technological practices, 3) Literacy block learning helped provide essential T-PACK experiences, 4) Limited access prohibits meaningful student technology integration, and 5) University practices did not mirror expectations for elementary students. The themes illustrate
the patterns that emerged from the pilot study and were broadened during the larger study.

**New learning about tools and technology is not always transferable.** The first major understanding that the students shared was the disconnect between what they learned the previous year and what they had anticipated using in their senior-year placements and beyond. They quickly realized that some of that new learning about technology was how *not* to use it. One of the more insightful perspectives was that teaching with technology does not automatically mean the learning will be better and the artifacts will be meaningful. The teachers as the suburban school used technology much differently than those at the urban schools. The students identified that technology-use was more meaningful. They discussed the student artifacts as the focus and how those artifacts were entrenched in some kind of literacy practice. Yet, their current placements in the urban school illustrated that the focus of technology integration is linked to programs that are purchased by the district and sometimes have no purpose other than to be an “add-on.” They are also sometimes just linked to the basal program the district is using. Jaime mentioned, “We use programs like Reading Eggs... but it doesn’t get linked to anything else we do” where Donna said, “We put on videos and then just move on to something else.” They understood enough about how technology should be used in classrooms that they are concerned about the issues they are seeing. Felicia remarked, “Throwing students on centers on the computers because the school paid for it doesn’t make it meaningful.” They noticed that the learning from their previous year could not be used in the classrooms where they are currently placed. They cannot use sites like arounder.com or powtoons.com because their cooperating teachers do not have knowledge or comfort using these tools.

The one tool that was not demonstrated or used over the course of the literacy block was a Promethean Board. They had to jump in and learn how they are used once arriving at their
placements. The students discussed their concern for how the board technologies are being used in their senior-year placements. One student shared, “We use the Promethean Boards but there are so many other things we can probably do that would be meaningful and make it more engaging.” They have major concerns about what the other students are doing when only one student is at the Promethean Board and the others are at their seats. They discussed that teachers should be providing meaningful ways of interacting with the content. Ideas shared were whiteboards, magnetic letters and trays, and other tools that students could be manipulating at their seats while the one student is manipulating the Promethean Board. One of the major findings is that the learning that took place during their junior year was not yet applicable during their senior year; however, they all had enough learning to know what they are seeing is not an effective use of technology integration and they instead are trying to create ways and ideas to make the technology more meaningful for students.

**Pre-service teachers’ perceived confidence was contingent on applicable technological practices.** Although the pre-service teachers in the pilot study found a perceived confidence boost, the findings from the larger study are similar but with the caveat that their confidence hinges on the belief that they have relevant technological knowledge. The questionnaire asked the pre-service students to use a Likert 5-point scale to rate their perceived confidence using the following statement: I have an increased confidence to use technology following the LLED course block. The mean score of the participants was a 4.25. They felt much less confident is being able to provide leadership to others related to technology integration. The mean score for the following statement was only a 3.17: I can provide leadership in helping others to coordinate the use of content, technologies, and teaching approaches in their teaching.

They realized that what was learned in their literacy block was only a small portion of the
tools and resources that can be incorporated into classrooms and they want to make sure they have the most current, relevant knowledge possible in their future careers. Stella shared, “If I am in a school that does not provide me with PD with the technology they use I don’t know how confident I will be.” Felicia followed that by saying, “Last year I felt confident but this year I am a bit doubtful of my own abilities because the only experience we had with technology was in our literacy courses.” Fortunately, Laura had a number of technology-rich experiences in her field placements and said, “I feel confident because I have seen so many different things being done in different placements. I have a number or experiences to draw from.” They all felt that they had knowledge and expertise they could draw from, but felt as though their experiences during senior year focused on a programmatic connection and did not help them increase their understandings. It is through their own knowledge and the disconnect they see that they realize the importance of focused professional development relative to how technology will be used in the districts where they will be teaching.

Literacy block learning helped provide essential T-PACK experiences. The pre-service teachers remarked about their experience in the literacy block and believed it was helpful to them in order to think about how and what ways technology could be integrated into elementary literacy instruction and assessment. For example, Talia remarked, “Before I thought technology hinders education more than it enhances, but now I think that meaningful uses with technology can help make instruction more focused.” The pre-service teachers spoke specifically about the assignments they had to complete for class such as the iMovie and the technology inquiry project. They also discussed the applications that were used in class like sock puppets, shadow puppets, and blendspace, and described the activities in detail, explaining how it illustrated meaningful literacy applications. The questionnaire also revealed their perceptions
about the literacy block and illustrated that the pre-service teachers valued their experience in their literacy block courses relative to the integration of technology. It allowed the students to be exposed to different ways of using technology and it allowed them time to explore different approaches.

**Limited access prohibits meaningful student technology integration.** Access continues to be a primary issue for meaningful technology integration, and it is exemplified through the words of the pre-service teachers in this study. Access to resources, professional development and time were the three issues discussed by the students. The need for continued professional development was discussed during the focus group interviews. They specifically talked about the importance of professional development related to meaningful technology integration. They saw the program and basal program focus and describe the need for districts to provide meaningful professional development for teachers to enhance learning with technology.

One of the survey items asked the participants to select their view of technology integration. The item chosen by over 85% of the participants was, “Collaboration is essential.” The only way to make this possible is to provide teachers time to collaborate. Many of the pre-service teachers expanded on this during the interviews saying how limited their collaboration time is and that technology does not seem to be a district focus and therefore there is no time for collaborative conversations among grade levels about this topic.

Time is essential, as are resources. With budget cuts both of these things are harder to ascertain but the pre-service teachers noted the importance of having access to these things. Stella shared, “I think about the inquiry project I did last year with blogging... I would never be able to do that in my current placement because they only have 6 laptops available.” Laura also iterated, “We had the space to do the inquiry projects... we had opportunity, guidance, feedback
The time and the resources are integral to being able to try anything and take risks with something new. Technology integration is new for everyone, seeing as it is continually changing. Time and resources need to be offered to teachers and pre-service teachers in order for them to experiment with current technology. The pre-service teachers recognize this and having access to resources, professional development and time as essential.

**University practices did not mirror expectations for elementary students.** One of the research questions of this study relates to pre-service teachers’ perceptions regarding the incongruities between technology integration at the university level versus technology integration in elementary classrooms. I would be remiss as a researcher if I was not interested in what teacher educators can do differently to help prepare pre-service teachers for teaching in elementary classrooms. Several ideas were shared that are worth communicating as part of the findings from this study. First, the students discussed a mismatch between what and how pre-service teachers are expected to teach and what they are being taught. For instance, the university currently has a MacBook requirement for education majors (that is currently being revised). The students often find that they are being asked to use technology and find ways of incorporating it into elementary classrooms, yet university faculty are still asking them to put their technology away in the classrooms instead of teaching them how to use it appropriately during lectures and classroom activities. Similarly, students need time to put it all together. They need to process how technology is being used (and not used) in classrooms and time to share that information with each other. University faculty should provide time for them to share and problem solve regarding what they are seeing and offer tools to allow them to feel more equipped to face the challenges they are confronting.

An important consideration Laura raised is that both university faculty and teachers/pre-
service teachers have an assumption that just because students grew up with technology they know how to use it. While is it a common understanding that these groups of students were raised with technology, they are not shown how to use technology in meaningful ways and to enhance learning. That becomes the job of the teacher educators and for future teachers to model and provide experiences with tools that will enhance learning. Finally, instructors teach with many different digital tools, websites and applications in decontextualized situations different from a typical classroom setting and often miss more simplistic, practical applications. For instance, it was realized that the pre-service teachers know how to work with fluency apps, create iMovies and websites, and yet they never learned skills they need on a more immediate basis, like how to create flipcharts on Promethean Boards and how to analyze data using Excel spreadsheets. An assumption was made about what students knew and could do and unfortunately a needed skill set was missed.

**Limitations**

Several limitations exist in this work that should be discussed. The small number of participants and the relatively short time period for interview periods might be considered limitations; however, they suited the limited scope of this investigation and the chosen methodology. If continued, this study will have more information to share about the pre-service teachers following graduation when they are in their own classrooms.

Additionally, a major limitation of this study is my role in the study and my own bias toward a technology-immersion approach to teaching literacy education courses. I am apt to believe the students would gain something from being part of the literacy block coursework and I have the ability to tune into their voices and understand them as future teachers. My use of codes and my method of data analysis allowed me to reduce any of my own previous biases and
allowed me to be able to drill down to a deep level of understanding.

A final limitation is my own knowledge base and expertise about technology and integrating technology. Although I stay as current as possible, technology is continually changing and I can only know a finite amount of information relative to how to integrate technology effectively. I do not know whether what I have deemed the most appropriate or relevant means of integrating technology is the most effective, although I continue to reflect on my practices, survey students, and change my approaches to reflect the students whom I teach.

Conclusion

This study is important to literacy educators because it identifies a growing area of research due to changes in modes and resources related to technology. Given modeling, a chance for exploration, opportunities for application and a means to demonstrate their growing knowledge of literacy methods through technological approaches, pre-service teachers are able to identify the importance of their role in delivering literacy instruction utilizing technological mediums. Through communication and dialogue occurring between groups of pre-service teachers they gleaned important insight, shared relevant challenges for technology integration and described how to make it meaningful. This work illustrates how immersion in technology-based literacy education can prepare elementary teachers for the changing climate of schools. It is equally important to researchers and literacy teacher educators to illustrate how using technology can help provide experience, opportunity, confidence and a means to engage students.
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