Preservice Teachers' Ability to Identify Technology Standards: Does Curriculum Matter?

by

Carrie L. Lewis

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Graduate Supervisory Committee:

Brian Nelson, Co-Chair
Leanna Archambault, Co-Chair
Wilhelmina Savenye
Robert Atkinson

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ABSTRACT

With the unveiling of the National Educational Technology Plan 2010, both preservice and inservice K12 teachers in the United States are expected to create a classroom environment that fosters the creation of digital citizens. However, it is unclear whether or not teacher education programs build this direct instruction, or any other method of introducing students to the National Education Technology Standards (NETS), "a standard of excellence and best practices in learning, teaching and leading with technology in education," into their curriculum (International Society for Technology in Education, 2012). As with most teaching skills, the NETS and standards-based technology integration must be learned through exposure during the teacher preparation curriculum, either through modeling, direct instruction or assignments constructed to encourage standards-based technology integration. This study attempted to determine the extent to which preservice teachers at Arizona State University (ASU) enrolled in the Mary Lou Fulton Teachers College (MLFTC) can recognize the National Education Technology Standards (NETS) published by the International Society for Technology in Education (ISTE) and to what extent preservice teachers are exposed to technology integration in accordance with the NETS-T standards in their preparation curriculum in order to answer the questions of whether or not teacher education curriculum provides students an opportunity to learn and apply the NETS-T and if preservice teachers in core teacher preparation program courses that include objectives that integrate technology are more likely to be able to identify NETS-T standards than those in courses that do not include these elements

In order to answer these questions, a mixed-method design study was utilized to gather data from an electronic survey, one-on-one interviews with students, faculty, and administrators,

and document analysis of core course objectives and curriculum goals in the teacher certification program at ASU. The data was analyzed in order to determine the relationship between the preservice teachers, the NETS-T standards, and the role technology plays in the curriculum of the teacher preparation program. Results of the analysis indicate that preservice teachers have a minimum NETS-T awareness at the Literacy level, indicating that they can use technology skills when prompted and explore technology independently.

DEDICATION

This is dedicated to the memory of my late grandfather, Dr. James A. MacDonald who instilled in me a love for learning and exploring at a very early age. As I follow in his footsteps, I realize the creativity and enthusiasm with which he constantly entertained a small girl on countless road trips. In the dark, endless hours of highway miles, the trials and tribulations of F.E. Boone and the alternate histories of the three little pigs and their friends were forever burned into my memory. Papa, without you, none of this would be possible. When paying homage to creativity and a love of learning, I must also dedicate this to my uncle, Roger MacDonald-Evoy who sat for countless hours with an eight year old and globe – please never stop telling stories.

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- Louis Pasteur

"Try not. Do, or do not. There is no try."
-Yoda

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INTRODUCTION

General Problem

Professional competency standards for teachers exist to create consistency and accountability in PK-12 education all across the United States. Standards exist for all content areas and most recently, technology standards have been established not only by state departments of education across the nation, but also by professional organizations such as the International Society for Technology in Education (ISTE). Moving beyond the use of technology for productivity and classroom administration, the National Education Technology Standards (NETS), as drafted by ISTE, require that teachers and students alike use technology in an integrative and responsible manner as digital citizens of the 21st century. Yet according to Johnson et al. (2013), "Despite the widespread agreement on the importance of digital media literacy, training in the supporting skills and techniques is rare in teacher education and non-existent in the preparation of faculty" (p. 9).

Current research into the teaching and use of technology in the classroom has focused on how inservice teachers integrate technology into their lessons (Greenhow, Dexter, & Hughes, 2008; Franklin, 2007; Hogarty, Lang, & Kromrey, 2003; Hsu, 2010) and on the relationship between preservice teachers' attitudes towards technology and their likelihood of integrating technology into their lesson planning (Bai & Ertmer, 2008; Smarkola, 2007; Doering, Hughes, & Huffman, 2003; Anderson, & Maninger, 2007; Browne, 2009); however little research has been done to determine the of the extent to which preservice teachers are able to identify the NETS-T standards or to determine during which courses in their teacher preparation programs they begin

to dialogue about the importance of integrating technology in accordance with the standards. Research suggests that outside of specific educational technology courses (Anderson & Maninger, 2007; Doering, Hughes, & Huffman, 2003; West & Graham, 2007) or direct instruction during the practicum (Graham, Tripp, & Wentworth, 2009) preservice teachers do not learn to integrate technology into their lesson planning in a manner that is consistent with state and national standards during the core courses of their teacher preparation program. Chelsey (2012) found that teacher education program graduates claimed to have limited exposure to technology use in their preservice classroom and virtually no training on how to integrate technology in their lesson planning. Further, the study revealed that the National Educational Technology Standards for Teachers (NETS-T), the proficiencies and practices suggested by ISTE for teachers who work in an increasingly digital world, and digital citizenship, "…the norms of behavior with regard to technology use" (Ribble, Bailey, & Ross, 2004, p.7), were not a focus of instruction. NETS-T Standards for Teachers 2008 indicate that teachers must:

- Facilitate and Inspire Student Learning and Creativity
- Design and Develop Digital-Age Learning Experiences and Assessments
- Model Digital-Age Work and Learning
- Promote and Model Digital Citizenship and Responsibility
- Engage in Professional Growth and Leadership (ITSE, 2012)

Better understanding the ability of preservice teachers to identify the technology standards as a required and valid part of their lesson planning will aid administrators and curriculum developers in determining the best approach to conveying this information during the core curriculum of preparation programs. This in turn will help ensure that teacher certification programs are

meeting the goals of preparing future inservice teachers to help their students become digital citizens in accordance with the National Educational Technology Standards.

But what does it mean to be a digital citizen? Lindsay and Davis (2010) state that digital citizenship in regards to teachers is "…about transforming yourself into a professional who can effectively research technology trends, monitor the uses of technology in your school or district, avoid the fear factor that can easily paralyze you, and empower student centered learning to create vibrant, exciting learning projects" (p.12). While the definitions of digital citizenship vary from source to source, and even country to country, the common thread is that fostering digital citizens is essential to education curriculum of the 21st century. Ribble (2009) argues that "there needs to be a common language between our schools and homes that clearly outlines what we expect our children (as well as ourselves) to know and follow" (p. 17) and this common language begins with the concept of digital citizenship. In addition to teaching reading and mathematics, social studies and civics, schools must also teach students how to be safe and responsible in their use of technology as well as how to use it effectively. However, in order for teachers to instill digital citizenship in their students, they must first understand and be good digital citizens themselves.

The National Educational Technology Plan 2010 calls for an American education system that will "leverage the learning sciences and modern technology to create engaging, relevant, and personalized learning experiences for all learners that mirror students' daily lives and the reality of their futures" (Executive Summary, p. x). As schools struggle to develop policies that keep up with rapid changes in technology, legal and ethical issues surrounding children's use of technology continue to surface. Advocates of digital citizenship awareness promote the

modeling of responsible technology use in the classroom to mitigate these issues that often threaten children's safety such as described by Oxley (2010):

> Almost every day the media highlight more examples of the misuse of social networking sites, internet scams or cyber bullying. Along with illegal downloads, credit card fraud, game addictions, viruses, hate sites, pornography and predator grooming, these are referred to by some as 'digital disease' (http://www.sextingisstupid.com/stop-sexting.html). Just as we educate the public about physical diseases in our society, so we must educate our population, especially naïve and vulnerable children, about the dangers related to inappropriate and unethical use of the Internet. (p. 1)

Understanding digital citizenship and the role it plays in meeting the ITSE standards for both teachers and students is a fundamental element in PK-12 education in the 21st century. In order to meet the requirements of digital citizenship and the NETS-T standards, educators must be prepared to leverage technology in the classroom that not only engages learners but also prepares students to use technology outside of the classroom (Conley, 2010; Greenhow, 2010; Oxley, 2010; Ribble, 2008; Ribble et al., 2004).

National Educational Technology Standards

The National Educational Technology Standards (NETS) were developed by the International Society for Technology in Education in 1999 in response to the standards movement in education that failed to address technological competence as a necessary skill of K-12 students. According to Thomas and Knezek (1999), the NETS:

> include standards that describe the technology skills that should be interwoven in the curricular fabric of our schools; when such skills should be taught; and how the power of

technology can help our children become successful learners, information users, communicators, and workers" (p. 27).

The NETS have several iterations, including NETS-T (for teachers); NETS-S (for students); NETS-A (for administrators); NETS-C (for coaches); and the NETS-CSE (for computer science instructors). NETS-TE (for teacher educators) have also been suggested to provide structure for those who are modeling and instructing those students who will eventually become inservice teachers (Foulger, 2013). Bennett (2000) argues that the NETS were constructed to provide an impetus for change in an education system that lacked teachers who could engage increasingly technology literate students or use the technology tools that schools were providing. The standards, according to Bennett (2000), spell out the skills and competencies teachers must have with technology when they set foot into their own classrooms for the first time. Weinburgh, Collier, and Rivera (2003) stated that the use of the NETS-T, to frame curriculum development in both K-12 and teacher preparation program settings, supports the notion that "responsible teachers must have both a personal working knowledge/skills of technology and an understanding of how to integrate technology into their teaching in order to create meaningful learning experiences for children" (p. 46). In short, preservice teachers are expected to complete their preparation programs with the necessary skills to integrate technology in a standards-based manner that will engage students and develop their roles as digital citizens of the 21st Century. A study by Friedman, Bolick, Berson, and Porfeli (2009) found that high familiarity with the NETS led not only to higher use of technology in the classroom in general, but also higher use of discipline-specific technology tools in teacher educators. These findings would seem to support

the idea that not only do the NETS provide a framework for inservice K-12 teachers, they also play an important role in the designing and implementation of curriculum for preservice teachers.

Technology Integration by Inservice Teachers

A study conducted by Franklin (2007) indicated that inservice teachers "used computers primarily in four ways: (a) locating and gathering materials, (b) communication, (c) posting information, and (d) writing lessons" (p. 275). This supports the findings of the Graham et al. (2009) study that indicates similar trends among preservice teachers. The inservice teachers in the Franklin (2007) study self-identify as being comfortable with technology and report that they regularly integrate computers or technology in their teaching. However, studies indicate that technology uses are generally for the reasons listed in the Franklin study, namely productivity purposes, and these uses are not aligned with the NETS-T (Smarkola, 2007; Hutchinson & Reinking, 2011).

The inservice teacher's ability and experience with technology directly correlates to her/his usage of technology in a manner that satisfies the National Educational Technology Standards for Students (NETS-S), which are the standards by which the competencies and abilities of students' use of technology is assessed (Russell, Bebell, O'Dwyer, & O'Connor, 2003; Smarkola, 2007; Ertmer, & Ottenbreit-Leftwich, 2010; Hutchison & Reinking, 2011). The results of Hsu's (2010) study suggest that training is the key to increasing the inservice teacher's technology ability and therefore the amount of technology the teacher integrates into his or her daily lessons (p. 320). Palacio-Cayetano, Schmier, Dexter, and Stevens (2002) also suggest that the difference between the quality of technology integration by preservice and inservice teachers is experience, not skills with technology (p. 17). It has also been suggested by Ertmer and

Ottenbreit-Leftwich (2010) that another key element to successful integration of technology in the classroom is the inservice teacher's understanding of how effective technology integration impacts student learning outcomes. Ertmer and Ottenbreit-Leftwich (2010) state, "We must focus our change efforts on helping teachers understand how student-centered practices, supported by technology, affect student learning outcomes" (p. 278). Kim, Kim, Lee, Spector and DeMeester (2013) support this supposition, suggesting that overcoming the discomfort that many teachers feel regarding their own technology skills starts with moving away from teacher-centered learning and allowing the students to take the reins of the technology used in the classroom. The question then arises: How do inservice teachers get the necessary combination of skills and experience to successfully integrate technology into the classroom in a manner consistent with NETS-T and that positively impacts student learning outcomes? This journey starts in the teacher preparation programs at colleges and universities and continues through inservice workshops, continuing education, and administrative support. The more successful inservice teachers become at integrating technology beyond productivity uses in the classroom, the better prepared they will be to coach incoming preservice teachers on effective ways of creating digital citizens in their future classrooms.

Technology Integration by Preservice Teachers

Today's preservice teacher is most likely a digital native (Kumar & Vigil, 2011; Jongpil, Jaeki, Jones, & Nam, 2010; Lei, 2009). As Prensky (2001) defines it, a digital native is part of "the first generations to grow up with this new technology. They have spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age" (p. 2). Though comfortable with the use of

certain technologies, this does not necessarily mean that he or she is proficient in instructing others on its use or in the successful integration of it into lessons in a meaningful way that enhances the learning experience. Technology integration in accordance with the technology standards goes above and beyond what Graham et al. (2009) call productivity or teacher presentation of information. Studies have shown that preservice teachers are not fully prepared with technology integration-related computer skills over and above productivity and presentation uses (Marvin, 2004; Jongpil et al., 2010; Kumar & Vigil, 2011). Lei (2009) found that although many preservice teachers are comfortable with social networking and many Web 2.0 tools, they are reserved when it comes to integrating these technologies in the classroom or when using tools such as blogs or wikis. More importantly, Lei (2009) found that these preservice teachers lacked a knowledge about subject-specific technologies as well as technologies that can assist students with special needs. Lei's (2009) asserts:

> Although digital natives as preservice teachers use technology extensively, their use of technology has been mainly focused on and related to their social-communication activities and their learning activities as students. As preservice teachers, they lack the knowledge, skills, and experiences to integrate technology into classrooms to help them teach and to help their students learn, even though they fully recognize the importance of doing so. (p. 92)

This also means that although the preservice teachers may be digital natives, they may be unaware of what it means to be a digital citizen and the responsibilities that digital citizenship entails and the importance of their own role in creating future digital citizens.

Preservice teachers' attitudes, beliefs and self-efficacy with technology all affect their intentions to integrate technology into their lesson planning. Shoffner (2009) suggests, "Expressing a positive attitude toward technology does not automatically ensure the use of a specific technology. However, possessing a positive attitude toward technology may support experimentation with different technologies as well as clarification of personal preferences for specific technologies" (p. 158).

It is easy to assume that today's preservice teacher is a digital native with a large amount of experience with technology due to the prevalence of social networking, smart phones, and web 2.0 tools. There exists, however, a large variation between preservice teachers in regards to their experience with technology and their comfort level with technology, both of which affect their intentions to integrate technology into their future classrooms (Pierson & Cozart, 2004; Friedman & Kajder, 2006; Jongpil et al., 2010; Cullen & Greene, 2013). In order to provide preservice teachers the exposure and experience they need to become comfortable with technology over and above productivity and social networking, teacher preparation programs must examine the best methods for providing the needed information, whether through modeling, direct instruction or collaboration in the practicum (Jones, Cunnigham & Stewart, 2005; Foulger & Williams, 2007; West & Graham, 2007; Keeler, 2008). It is clear that the journey to meeting NETS in the classroom as inservice teachers begins in the teacher education curriculum (Çoklar & Odabaşı, 2010; Wetzel & Williams, 2004; Nolan, Kelly, Carroll, & Conery, 2002).

Teacher Education Curriculum

With the requirements put forth that teachers must adhere to standards in their instruction, the question turns to how they are being prepared to do so. In 2002, the International Society for

Technology in Education published *National Educational Technology Standards for Teachers: Preparing Teachers to Use Technology*. This manual was intended to describe the NETS and possible methods for Preparing Tomorrow's Teachers to Use Technology (PT3). This work recommends strategies such as modeling and digital portfolios as methods of exploring technology. Building on this framework, Borthwick et al. (2004) recommended developing learning communities of preservice teachers, teacher educators, and inservice teachers to build portfolios, reduce feelings of isolation, and to create an online community of practitioners as one step in creating competence in technology integration. Wetzel and Williams (2004) conducted a study of a PT3 program that was implemented in a teacher preparation program that encouraged and required faculty members to increase their use of technology in the classroom by modeling and assignments. Their study found that "Faculty significantly increased their planning for and implementing of technology integration in the following categories: syllabi goals, activities, assignments, Web course support, communications, and knowledge navigation" but that their requirements for students to integrate technology in their lesson planning were still inadequate (p. 48). The results of the Wetzel and Williams (2004) study support the conclusions of Graham et al. (2009) in that, teachers and by extension, preservice teachers, are not using technology in the classroom or requiring its use by students beyond the productivity and presentation purposes.

Case studies have shown to be a relatively effective method for planning on technology integration (Brantley-Dias et al., 2007). Students who spent time analyzing case studies with the intent of integrating technology in accordance with national standards and reflecting on their solutions to the problems presented in the case studies showed improvement in what the authors termed pedagogical technology integration content knowledge (PTICK). Whereas Shulman

(1986) defines pedagogical content knowledge (PCK) as "a second kind of content knowledge…which goes beyond knowledge of subject matter per se to the dimension of subject matter knowledge for teaching" (p.9), Brantley-Dias et al. (2007) define PTICK as:

> PTICK contains five dimensions: technical procedural knowledge (knowing about and being able to operate the technology), technology integration conceptual knowledge integrated concepts, principles, strategies and ideas behind effective uses of technology for teaching and learning), pedagogical content knowledge (knowledge and ability to transform subject matter content for learners' needs), reflective knowledge metacognitive abilities to reflect, problem-solve and learn from experiences), and community knowledge (knowledge of local and school community, ability to develop a classroom community as well as participate in a professional learning community). (p. 143)

Brantley-Dias et al. (2007) concluded that case studies were effective in allowing preservice teachers a guided, collaborative environment within which their pedagogical content knowledge could be demonstrated and refined.

In their 2010 study, Gronseth et al. found that an overwhelming majority (80%) of their study respondents were enrolled in a teacher preparation program that required a separate course for educational technology. However, the most common uses for the technology taught in these classes were for productivity and presentation purposes. As of 2006, eighty-five percent of all Title IV degree-granting 4-year postsecondary teacher education programs offered some sort of stand-alone educational technology course (U.S. Department of Education, 2007). These courses serve to introduce basic technology tool usage and skills. Several challenges exist with using the stand-alone technology course model for teacher education including curriculum and

staffing issues. Students enter the stand-alone educational technology course at varying levels of competency leading some to become quickly bored with the material and some to become extremely frustrated at what they perceive to be above their skill level. In addition, finding qualified faculty to staff these courses can also be challenging (Ross & Wissman, 2001). The stand-alone technology course model often leads to a disconnect with the methods courses as students are often required to learn to use the tools but not necessarily to apply their use to their own lesson plans (Milken Exchange on Educational Technology, 1999).

Research suggests that outside of specific educational technology courses (Anderson & Maninger, 2007; Doering et al., 2003; West & Graham, 2007) or direct instruction during the practicum (Graham et al., 2009) preservice teachers do not learn to integrate technology into their lesson planning in a manner that is consistent with state and national standards. However, program after program is moving away from specific technology courses, in favor of an integrated approach (Kleiner, Thomas, & Lewis, 2007; Bucci, & Petrosino, 2004; Waddoups, Wentworth, & Earle, 2004). Pellegrino, Goldman, Bertenthal and Lawless (2007) indicated that although the intent to integrate technology into content is present in teacher preparation programs, the reality is that teacher educators are largely leveraging technology for nothing more than content-delivery and personal organization. Study results from Angeli and Valanides (2005) suggested that "more systematic efforts are needed to engage preservice teachers in technology-rich design activities, so that they can adequately develop all aspects of ICT [information and computer technologies] -related PCK [pedagogical content knowledge]" (p. 292). Keeler's (2008) study also supports that assertion, indicating that:

through this study, it became clear that even though teacher candidates knew how to use

> specific technological tools, they seldom knew how to utilize those tools in educational contexts. Even fewer students had knowledge of how to use technological tools to enhance and reinforce content learning. (p. 29)

The question remains then: *does the curriculum of teacher preparation programs give preservice teachers the ability to identify the National Technology Standards and subsequently the knowledge and practice that allows them to integrate those standards into their lesson planning?* Kumar and Vigil (2011) concluded that in order for preservice teachers to develop the skills needed to integrate technology into the classroom for educational purposes, teacher educators must model those same skills. Sutton's (2011) study revealed a disconnect between the vision of technology education shared by teacher educators and program faculty and the authentic learning experiences implemented in the preservice teacher classroom. Sutton (2011) argues that in order for transfer to occur to their students, teacher education faculty must be skilled in the demonstration and use of technology as they want their students to use it in their K12 classrooms. Kajder (2005) supports the assertion that a more firm connection between technology courses and methods courses needs to be established in order for preservice teachers to become fluent in standards-based technology integration. Kajder argues:

> If the program aims at producing technology-using teachers, then those teachers need to be equipped with courses that provide hands-on experiences and critical examination of instructional models offered. All faculty, not just those in educational technology, must move from talking about technology to modeling effective teaching with technology. (p. 21)

Pope, Hare, and Howard (2002) also concluded that the modeling of technology integration in addition to direct instruction of the integration of technology into lesson planning increases pre-service teachers' confidence in their ability to use and integrate in technology. There is evidence to suggest that teacher educators do not feel comfortable modeling technology education in their own classrooms (Wetzel & Williams, 2004; Borthwick et al., 2004). The results of the West and Graham (2007) study indicated that the students perceived live modeling as an effective method of teaching technology integration. However, it was also suggested by the results of this study that modeling is not the most effective method to encourage transfer to inservice settings.

Foulger and Williams (2007) recommend a collaborative model between educational technology faculty and core content faculty in order to support more effective integration of technology into the core classes to reinforce both modeling and technology objectives. Their study indicated:

> Where strong collaboration existed, integration of technology was successful and common identity was fostered; those instructors that did not build a collaborative group, did not progress as far in the integration process or identity building. Thus, technology was not recognized as a part of the entire program's identity. (p. 113)

Williams, Foulger and Wetzel (2009) implemented what they called the *Innovations Mini-Teach* initiative. As part of this project, preservice teachers in small groups expose their peers to one technology tool that could be integrated into future classrooms. While not designed to be a training module, these mini-lessons were designed as a collection tool for technology integration possibilities. All tools presented in the class were archived on a class wiki. The results of the study indicated:

> For preservice teachers, the assignment established a supportive environment where they could take risks with technology, learning, and teaching; for some, the assignment ignited a trajectory that preservice teachers felt will lead to innovative, technology-rich strategies that the instructors envision as 21st century teaching and learning. (Williams et al., 2009, p. 416)

Doering et al. (2004) contend that after taking an educational technology course, preservice teachers' attitudes change from dismissing technology as an option to seeing the range of ideas it offers for the classroom. Bai and Ertmer (2008) and Anderson and Maninger (2007) also concluded that an introductory educational technology course would facilitate preservice teachers' attitudes towards technology integration in addition to increasing the possibility of future technology use. Pierson and Thompson (2005) suggest a three course sequence that allows faculty to explore technology content more in-depth starting with Course 1: Introduction and Development; followed by Course 2: Evaluation and Integration; finishing with Course 3: Implementation and Assessment (p. 33). Pierson and Thompson argue that the three-course sequence "allows us to gradually scaffold our students' learning as they progress through a carefully structured sequence that eventually finds them ready to apply what they have learned in the authentic classroom environment" (p.34). A similar initiative was developed and implemented by Wepner, Bowes, and Serotkin (2005) who designed three one-credit technology courses to be co-requisites with methodology courses. These courses not only give preservice teachers hands-on practice with the technology itself but in addition they complement the concepts learned in the methodology class leading up to designing lessons that integrate technology across the curriculum (p. 117).

A need for further field experience in regards to technology integration for preservice teachers has been suggested (Greenhow et al., 2008) as it has been found that a technology use intervention plan during the student teaching practicum was successful in improving the quality of preservice teachers' technology integration skills, with a reduction of technology use for planning and productivity purposes only and an increase in the student use of technology in the classroom (Graham et al., 2009). The assumptions of Greenhow et al., (2008) study are supported by Vermillion, Young and Hannafin (2007) who found that a preservice teacher's ability to successfully integrate technology in the classroom relies on the interconnected network of technology courses, methods courses and teaching practicum. A school-university model of collaboration in regards to more effective technology integration that would "allow the deficiencies of the current models to be addressed simultaneously, and with greater flexibility" by uniting inservice teachers, preservice teachers and teacher educators in an exploration of successful technology integration in a real-life setting (Hartshorne, Ferdig, & Dawson, 2005, p. 83).

An effective curriculum model for preservice teachers is one that not only models effective technology integration in the classroom, but also requires students to explore, create, and plan with technology in a manner consistent with NETS-T both prior to and during their field experience. It is essential, Chelsey (2012) states, that "Universities must embed technology into their coursework in all classes, not just those taught by tech-savvy professors" (p. 43). Students must have a chance to develop skills with all aspects of technology from problem solving, using technology ethically and professionally, to engaging students through the use of technology (Chelsey, 2012). The problem with this model, according to Johnson et al. (2013) is

that:

> Many researchers have not had training in basic digitally supported teaching techniques, and most do not participate in the sorts of professional development opportunities that would provide them. This is due to several factors, including a lack of time and a lack of expectations that they should. Many think a cultural shift will be required before we see widespread use of more innovative organizational technology. Some educators are simply apprehensive about working with new technologies, as they fear the tools and devices have become more of a focus than the learning. Adoption of progressive pedagogies, however, is often enabled through the exploration of emerging technologies, and thus a change in attitude among academics is imperative. (p. 10)

Wetzel et al. (2009) suggest that a change to the conceptual framework on a programmatic level is necessary to instill the necessary technological and pedagogical content knowledge that allows future teachers to successfully integrate technology in a manner consistent with national standards (p. 71). This implies that pedagogy, content, and technology are not separate entities, but a complex system that supports the learning process (Mishra & Koehler, 2006). A support network of administration, faculty, and technology professionals is needed to create the framework that would give the experience and skills preservice teachers need to successfully blend content, pedagogy, and technology in their future classrooms.

Study Purpose and Research Questions

An effective teacher preparation curriculum creates opportunities for preservice teachers to study and practice this technology integration prior to entering his or her own classroom (Hofer, 2005; Pierson & Thompson, 2005; Brantley-Dias et al., 2007; Gronseth et al. 2010). To

investigate the issue of preservice teacher familiarity with the National Technology Standards, a mixed-methods dissertation study was conducted, with participants from a teacher preparation program at Arizona State University. The primary research goal was to investigate the preservice teachers' ability to identify the National Educational Technology Standards (NETS) as published by the International Society for Technology in Education (ISTE). A subset of the primary research goal was to determine whether NETS awareness levels differed between groups of students of varying characteristics, such as class standing or education specialty. This avenue of secondary research identified trends in awareness levels that will ultimately pinpoint curriculum differences at a programmatic level that would be worthy of examination by administrators wishing to see what programs or courses are leading to higher levels of NETS awareness in preservice teachers. Additionally, no current research exists regarding the relationship between characteristics such as education specialty and NETS awareness level and this study provided adequate information to examine those relationships more closely.

Also included in the research agenda was an examination of the curriculum goals of the teacher preparation program and the corresponding course objectives for five of the core courses required by the program. It was hypothesized that preservice teachers in core teacher preparation program courses that include objectives that integrate technology are more likely to be able to identify NETS standards than those in courses that do not include these elements. To assist in the possible improvement of teacher education curriculum by determining whether core course objectives support the idea of familiarizing preservice teachers with the NETS, the study also included an investigation of what program elements align themselves with the goal of Preparing Tomorrow's Teachers to Use Technology (PT3). The research study utilized surveys and

interviews conducted with students in teacher preparation programs at Arizona State University and a document analysis of the curriculum goals and course syllabi for five of the required core courses of the education program.

The research questions are as follows:

1. What degree of awareness do preservice teachers enrolled in the ASU teacher preparation program demonstrate regarding NETS-T standards?
    a. Does this awareness differ across class standing?
    b. Does this awareness differ across education specialty
    c. Does this awareness differ across familiarity with the National Educational Technology Plan 2010?
    d. Does this awareness differ across level of technology integration in lesson planning?
2. To what extent do the curriculum goals of the ASU teacher preparation program include technology integration in accordance with the NETS standards?
3. To what degree do ASU core teacher preparation courses include technology integration as course objectives?
4. To what extent does the presence of course objectives that include technology integration in the core courses impact preservice teacher awareness of NETS-T standards?

Chapter 2

METHOD

Study Setting and Audience

The school chosen for this analysis is Arizona State University (ASU). This school was selected as a sample of convenience. ASU is a large public research university located in a metropolitan area of the southwest. It has four local campuses combined with an online presence that serves approximately sixty-thousand undergraduate students, making it the largest undergraduate university in the United States The Mary Lou Fulton Teachers College (MLFTC) has been ranked 24th in a list of the best education schools in the country by US News and World Reports (Morse & Flanigan, 2013) and offers both traditional face-to-face learning environments and online course offerings for the education programs, including one early childhood education program that is completely online.. A summary of the relevant characteristics of the school can be found in Table 1 below. There are six education undergraduate and graduate majors leading to teaching certification: elementary, secondary, special education, early childhood, physical education, and bilingual education. The teacher education program focuses on early integration of the student into the school district through programs like iTeachAZ, which requires education program seniors to spend one academic year student teaching with on-site ASU faculty as a year-long student teaching experience. Approximately 4,700 students participate in the education program leading to certification per semester.

Table 1

Summary of attributes ASU teacher certification programs

Students Enrolled per Academic Year	Accreditation Held	Primary Course Modality	Undergraduate Teacher Certification	Graduate Teacher Certification	University Type
4,700	HLC	Face-to-face	Yes	Yes	Public

In order to accommodate the need for a two-semester teaching practicum for preservice teachers, beginning in 2011 Mary Lou Fulton Teachers College moved away from a required stand-alone educational technology course to an integration-model of technology, where faculty members are encouraged to both model and require technology usage in the classroom (Foulger, Buss, Wetzel, & Lindsey, 2012). The only exception to this is the graduate elementary education program, in which preservice teachers are required to take EED 531, Teaching with Educational Technology. The previous stand-alone educational technology class for undergraduate education majors, TEL 313, Educational Technology across the Curriculum, was eliminated in favor of an integrated model of technology education. Foulger et al. (2012) explain this decision:

> By addressing the technology integration curriculum across an entire program instead of a single standalone course, teaching preservice teachers how to use technology would be conducted within the context of a content-rich environment, and educational technology experts in the college could support the redevelopment of new syllabi and signature assignments. (, p. 49)

The goal of the integration model is to better connect the infusion and integration of technology with content teaching methods and pedagogy. To help meet this goal, a technology infusion specialist was hired to begin to integrate standards-based technology into selected methods classes in the undergraduate teacher education program. To date, eight methods classes have been revised to include standards-based technology infusion that includes modeling of technology use by the faculty in addition to stringent requirements that preservice teachers must demonstrate standards-based technology usage in their lesson planning. The standards that these revised, technology-enhanced courses adhere to are the NETS-T standards, which are the National Educational Technology Standards for Teachers. NETS-S standards, the NETS for students, are not addressed in these revised courses at this time. A series of required Digital Citizenship modules have also been developed by the technology infusion specialist that will be required for all undergraduate preservice teachers starting in Fall 2013 semester.

Beginning in the junior year of undergraduate study, preservice teachers are required to complete semester-long Field Experience courses, which place them in a PK-12 classroom for hands-on experience. This practicum series provides "teacher education students with authentic opportunities to integrate technology into teaching and learning activities" (Brush et al., 2003, p.59). Brush et al. (2003) sum up ASU's Mary Lou Fulton Teachers College (MLFTC) approach to preparing future teachers to use technology:

> The overall goal or outcome for the technology experiences we provide our preservice teachers at ASU is for them to develop, implement, and evaluate their own instructional activities that utilize technology effectively and appropriately in authentic situations. We believe that this, in turn, will provide our teacher education students with the myriad of

> tools necessary to integrate technology into teaching and learning activities once they leave our program. There are two major components of the field-based technology integration model at ASU specifically designed to achieve this goal: (a) modeling effective technology integration, and (b) providing just-in-time support to preservice teachers, placement teachers, and methods faculty. (p. 59)

Foulger et al. (2012) reiterate that the penultimate goal of the MLFTC curriculum in regards to technology is that preservice teachers complete their program with the skills needed to teach with technology in accordance with the ISTE NETS once they are in their own classroom and the methods by which the preservice teachers learn to do so are generally in accordance with those methods stated by Brush et al. (2003).

Study Design

This study utilized a mixed-methods design employing a participant survey, a document analysis of the program curriculum and core course objectives, and follow-up interviews with select participants. In order to control for curriculum differences between majors, methods courses and programs, courses common to every education undergraduate regardless of specialization were determined to be the ideal courses to examine. To determine which courses to analyze in this study, all courses required for each education major were listed side-by-side on a spreadsheet. Using a conditional formatting command, all duplicate courses across majors were identified and highlighted (Appendix E). A subset of five core courses common to all undergraduate teacher certification students regardless of specialization and two core courses common to graduate teacher certification students regardless of specialization were identified and are described in Table 2. In addition to an analysis of the syllabi and course objectives,

approximately students in these five undergraduate and two graduate classes (n=250) were asked to take the NETS familiarity survey (n=62) and to participate in follow-up interviews (n=15). The survey response rate was approximately 25%, which is slightly lower than a 30% response rate typically seen from an online survey (Fowler, 2009). Faculty from each of the seven selected courses were asked to participate in an interview (n=6). Administrators from each area of the program (undergraduate, graduate) were asked to participate in an interview (n=3).

Table 2

Percentage of core courses currently or previously enrolled

Core Course Name and Title	Description	Percentage of Respondents (n=62)
BLE 220: Foundations of Structured English Immersion	Examines current educational practices and historical legal issues. Prepares teacher candidates with a provisional Structured English Immersion endorsement.	45.2
ECD 418: Instructional Methods for Young Children	Develops integrated experiences with children's literature for facilitating development in reading, writing, speaking, and listening. Further develops educational strategies for promoting growth in the social studies and creative arts curriculum, and instructional/assessment strategies for preprimary- and primary-level children; developmentally appropriate methods and strategies for effective instruction.	1.6
EDT 180: Computer Literacy	Introducing digital technologies and their place in society. Applies 21st-century skills to problem solving using digital technology applications including spreadsheets and databases.	32.3

EDT 321: Computer Literacy	Surveys the role of computers in business, industry, education, and personal life. Lab experience with word processing, spreadsheet, and presentation software as well as Internet research and the creation of a personal Web site.	12.9
EDP 311: Educational Psychology for Future Teachers	Planning and conducting effective instruction based on learning theories and principles.	12.9
EDP 313: Childhood and Adolescence	Principles underlying total development of pre- and early-adolescent children. Emphasizes physical, intellectual, social, and emotional development with practical implications for teachers. Meets ADE requirement for one course in early adolescent psychology for middle grade endorsement.	14.5
MTE 280: Investigating Quantity	This course explores numbers, number systems, operations on numbers, and problem solving. It is designed to meet the requirements for prospective elementary education teachers.	17.7
SPE 222: Orientation to Education of Exceptional Children	Includes gifted, mildly handicapped, severely handicapped, and the bilingual/multicultural exceptional child.	79.0
TEL 215: Introduction to	This course emphasizes the cognitive, social - emotional and physical domains of child and adolescent	19.4

Child and Adolescent Development	development. From a knowledge base of theory, research, and current issues, students will apply learning to developmentally appropriate principles and practices that guide relationships and learning experiences for all children. The course will make use of available technologies. Additional emphasis will be on the complex ecosystem of culture, ethnicity, family and school.	
TEL 311: Instruction and Management in the Inclusive Classroom	Planning and delivering instruction, organizing and managing classrooms, and making adaptations for English language learners and students with special needs.	24.2
USL 216: Service Learning	Examines the effects of social justice issues on student achievement. Correlates academic coursework with required community service to analyze community needs, the importance of civic engagement and community issues affecting ethnic minorities and marginalized populations in contemporary American society, particularly how it applies to our education system. Students dedicate a minimum of 45 hours at a preapproved site (including Title I K-12 schools, youth programs, health services, social services) directly serving high-needs youth or adults. Weekly seminar, course readings, discussions, and reflection assignments facilitate critical thinking and a deeper understanding of cultural diversity, citizenship and social injustices, and how to utilize this knowledge in the teaching profession to better serve all students. Provides "real-world" experiences that exercise academic skills and knowledge applicable to each student's program of study and career goals.	3.2

PPE 310: Health Literacy: Creating Healthy and Active Schools	Signature course for elementary educators and special education educators in order to prepare future teachers with the knowledge, skills, and dispositions to teach healthy and active content knowledge and to create healthy and active school environments.	0
ELL 515: Structured English Immersion (SEI) Methods	Addresses the role of language and culture in teaching, program types, and specific SEI strategies for teaching English Language Learners (ELLs).	0
ELL 516: Advanced SEI Methods for ELLs	More fully prepares teachers for linguistically diverse classrooms in which there are students learning through SEI methodology.	0

In cooperation with the Teachers College at ASU, participants were recruited from sections of the five core undergraduate and two core graduate courses common to all teacher preparation students, regardless of area of specialization. Descriptions of these courses can be found in Table 2. These courses were chosen because they would provide the largest number of potential preservice teacher participants without bias of area of specialization since these courses are common to all education undergraduate and graduate students respectively.

Based on the approval received from the Institutional Review Board at Arizona State University (Appendix D), participants of the study were asked via their course instructor to complete an electronic confidential survey based on NETS.S 2008. The instructors were asked to place the participant recruitment letter (Appendix B) and the link to the survey on the course learning management site. The participants were informed that their responses would be kept confidential and would have no effect on course grading or program completion.

Fifteen students enrolled in Mary Lou Fulton Teachers College undergraduate programs leading to teaching certification were interviewed for this study. The students interviewed were those who consented to be interviewed after taking the survey based on the final question (Appendix C). These participants contacted the researcher directly or via their instructor and expressed their interest in completing the interview. The interviewees who completed the interview were entered into a drawing for a gift card. Fifteen students expressed interest and all fifteen were interviewed. The participants interviewed were at varying points within the program and were either currently or previously enrolled in one of the seven courses being examined in this study. All fifteen had taken the NETS survey prior to responding to the interview questions.

Six faculty members were interviewed from the Mary Lou Fulton Teachers College. All faculty teaching the core courses at the time of the study were contacted. The six faculty interviewed were those who consented to participate by contacting the researcher. Two were teaching assistants in the doctoral program, one was a department adjunct, one was a lecturer, one was a clinical instructor, and one was an associate professor. All have previously or currently taught one of the seven courses being examined in this study; however, no instructors who had taught either BLE 220 or PPE 310 consented to be interviewed. Table 3 shows the breakdown of courses represented by the faculty participants interviewed.

Table 3

Core Courses Taught by Faculty Interview Participants

Faculty Participant	Core Course Taught
Teaching Assistant 1	EDT 180/321
Teaching Assistant 1	SBE 322

Adjunct Instructor	ELL 515/516
Lecturer	EDT 180
Full Professor	ELL 515/516
Associate Professor	EDT 180

Three administrators from the Mary Lou Fulton Teachers College (MLFTC) were purposefully selected based on their area of administration as representatives of teacher preparation undergraduate programs, graduate programs, and those programs that do not lead to certification. One is the Director of Teacher Preparation, supervising all undergraduate teacher preparation programs (Elementary, Secondary, Special education, Early Childhood, Physical education, and Bilingual education). The second administrator is the Assistant Division Director of all graduate programs within the Mary Lou Fulton Teachers College at ASU. The third administrator is the Director of the Division of Educational Leadership and Innovation.

The mixed-method design was chosen in order to elaborate upon quantitative results with qualitative data. While the quantitative data provided the researcher with an opportunity to assess the trend of a larger number of people from diverse groups, the qualitative data allowed for a more complex image to form around the backbone of the quantitative data (Creswell, 2008). The data from both the quantitative and qualitative portions of the study were triangulated in order to develop more complete answers to the research questions in this study and to establish the validity of the study results. The documents were analyzed using the coding template and the results from the interviews were analyzed for technology themes. The results from each of these analyses were then compared to the survey data to determine if the self-identification of NETS awareness levels were accurate. Regarding the advantages of the triangulation design of mixed-method studies, Creswell (2008) states:

> The strength of this design is that it combines the advantages of each form of data; that is, quantitative data provide for generalizability, whereas qualitative data offer information about the context or setting. This design enables a researcher to gather information that uses the best features of both quantitative and qualitative data collection.
>
> (The Triangulation Design section, para. 4)

Data Sources

The data sources for this study included electronic survey results from participants via http://www.surveymonkey.com/; interviews conducted via telephone and/or in person with willing student participants, program faculty and program administrators; document analysis of the curriculum goals gathered from the Mary Lou Fulton Teachers College website or ASU course catalog; and a document analysis of the core course syllabi and course objectives obtained via email from the administration offices of the Mary Lou Fulton Teachers College.

Measures

NETS.S Knowledge Survey

A cross-sectional survey was adapted from an ISTE NETS.S pre-survey created by Naomi Harm as part of an Enhancing Education through Technology (ETTT) grant that allowed the Wisconsin Department of Education to adopt the NETS for their students, teachers and administrators (N. Harm, personal communication, February 20, 2012). This survey (Appendix C) has been used to pre-test inservice teachers before training courses and the questions are taken directly from the 2008 ITSE National Technology Standards for Teachers (NETS-T).

The survey questions ask participants to self-identify their level of awareness of each NETS-T standard. Table 4 lists examples of the questions asked on the survey. The levels of

awareness of the NETS-T are as follows:

- **Awareness**: Learners are exploring technology and developing foundational skills but have not developed sufficient expertise to use the skills in daily life.
- **Literacy**: Learners continue to explore technology and have developed the skills enabling them to use technology when prompted.
- **Integration**: Learners select and apply appropriate technology to successfully complete tasks.
- **Leadership**: Learners share new knowledge through proactive modeling, peer coaching, and mentoring (Harm, 2008).

Table 4

Example of Survey Questions

I feel that the courses in my Teacher Prep program have prepared me to integrate the following into my lesson plans and my future classroom:

Facilitate and Inspire Student Learning and Creativity
Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.

	Awareness- I am aware but do not use this in my practice	Literacy- I am literate and integrate some of the indicators	Integration- I integrate this into my teaching	Leadership- I am able to teach others	I have not learned this
Promote, support, and model creative and innovative thinking and inventiveness					
Engage students in exploring real-world					

issues and solving authentic problems using digital tools and resources	
Promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative processes	
Model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments	

The Harm survey was chosen for the direct relation it has to the NETS-T standards. Other surveys concerning standards based technology integration are largely attitudinal or do not ask questions directly related to the NETS-T standards, focusing more on Technological Pedagogical Content Knowledge (Ash, Sun & Sundin, 2002; Schmidt et al., 2009; Shin et al., 2009). While some surveys such as the MITTEN Technology Survey (Taylor & Duran, 2006) focus on standards based technology use, the intended audience is primarily inservice teachers already experienced in integrating technology. For this reason, the Harm survey is ideal for this study since the questions are directly related to the NETS-T standards and therefore is a valuable tool for determining the level of awareness of the NETS-T standards in preservice teachers.

The survey asked the participants to identify the courses they have completed in their

program, in addition to their specific content area. Participants were then asked questions related to identification of ISTE technology standards for teachers. Demographic data was also collected including age, gender, ethnicity, grade point average, class standing and major. Participants were also asked if they were willing to give their information for a following up telephone interview.

No previous reliability or validity data was available for this survey. Therefore it was field-tested in a process following Dillman's (2007) recommendation. The survey was first reviewed by the researcher's committee chairs and the format was revised for readability. The standard-specific questions were placed in table format and verbiage changes were made to several of the demographic questions.

A field trial of the survey was completed with a graduate class for elementary education majors. EED 531, Teaching with Educational Technology, addresses the integration of technology in all K-12 curricula. Responses from the field trial, N=20, were judged to be reliable with a Cronbach's Alpha $\alpha = .977$.

A think-aloud pilot was conducted with four experienced inservice teachers. This think-aloud pilot asked the participants to share their thoughts as they moved through the survey items. The major theme that emerged from this process was that the standards-based questions themselves were "wordy" and lengthy, for example in question 12.B: "I can develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress" (Appendix C). Since these questions are taken directly from

the National Educational Technology Standards the decision was made to make no changes to the questions.

Course Objectives Coding Template

A review of the Mary Lou Fulton Teachers College stated teacher education core curricula was performed to determine the goals of the program in terms of technology integration. Syllabi were requested and received for each core course from the college administration. A thematic analysis was performed on the documents to determine if technology integration is included in course objectives and planned activities. The coding template (Crabtree& Miller, 1999) is based on the criteria set forth by Graham et al. (2009) of productivity, pedagogy, student use of technology, teacher presentation of information and the themes set forth by the NETS-T standards. Following the Crabtree and Miller (1999) approach, the coding template was developed a priori and defined based on the research questions and theoretical framework of the NETS-T standards. Nine broad categories were identified as relevant (Use of technology for productivity purposes, Use of technology for pedagogy purposes, Planning for student use of technology, Using technology for teacher presentation of information, Using technology to Facilitate and Inspire Student Learning and Creativity, Using technology to Design and Develop Digital-Age Learning Experiences and Assessments, Using technology to Model Digital-Age Work and Learning, Using technology to Promote and Model Digital Citizenship and Responsibility, Using technology to Engage in Professional Growth and Leadership).

In an adaptation of the study done by Fereday & Muir-Cochrane (2006), there were several stages of the coding process. Boyatzis (1998) defined the process of using a coding

template as "recognizing (seeing) an important moment and encoding it (seeing it as something) prior to a process of interpretation… A "good code" is one that captures the qualitative richness of the phenomenon...Encoding the information organizes the data to identify and develop themes from them" (as cited in Fereday & Muir-Cochrane, 2006, p. 4). During the first stage, the code label and the definition of the code were established. The second stage of the process was testing the reliability of the code. The reliability of the coding template (Appendix C) was tested with curriculum goals for the teacher education program at Minnesota State University (MSU), in addition to sample syllabi and course objectives for MSU course EEC 424: Students with Special Educational & Behavioral Needs in the Regular Classroom. This school and course were chosen for the field test due to the similarity in topic and objectives to the courses chosen for the study and to lessen the effect of rater bias on ASU courses that raters may have prior knowledge of. MSU was also a sample of convenience as the researcher had prior connections with the school and could depend on faculty cooperation in assisting with document collection. The sample documents were given to four independent evaluators in order to establish inter-rater reliability. Three out of the four evaluators had identical responses on the entire template. No modifications were made to the template based on the results of the field trial.

In stage three of the coding template analysis, after the field testing, the codes were applied to the documents (syllabi, course objectives, curriculum goals) gathered from ASU courses and programs, in order to identify meaningful elements. The data was then qualitatively analyzed by the researcher for themes and patterns and connected to the research questions.

Participant Interviews

Follow-up interviews were conducted via telephone or in person with those participants who gave their permission to do so after having taken the survey. Fifteen participants gave their permission and all fifteen were interviewed. The interview participants were a sample of convenience due to the need to have permission for contact to be established. The structured interview questions allowed the researcher to obtain a more in-depth understanding of the participant's reflections on their familiarity with the NETS-T standards and technology integration in general. The full interview protocol can be found in Appendix C.

Prior to the main study, the interview questions were reviewed with a convenience sample of three inservice teachers. Through the pilot testing process, several of the interview questions were modified for clarity. The acronym NETS was explained in questions one and two. Verbiage was added to questions two, three, and four that asked for specific examples of technology usage. The specification of "education" was removed from the phrase "education program" in question five as it was seen as redundant and examples were provided of how technology might be used in a program (presentation of information, organization of assignments, engagement with the content). Question six was revised to assume that the participant was familiar with the term "digital citizenship" and ask them to reflect on what the term means to them personally.

Faculty Interviews

Interviews were conducted with teacher preparation faculty and administration in person and via telephone. The faculty members were asked direct questions regarding the degree of their use of modeling and direct instruction of technology integration in their courses. Faculty

were also asked to identify the degree to which they require standards-based technology integration in their students' assignments.

The faculty interview questions (Appendix C) were reviewed by an expert for clarity and consistency. This expert is currently a faculty member for the College of Education at the University of Phoenix with over 20 years' experience in teaching. Through the reviewing process, several of the faculty interview questions were modified for clarity. Verbiage was added to question three that clarifies what is meant by the term "program." The question now includes the specification "for which you teach." A question was added in conjunction with question five that asks faculty members to describe their strengths with technology. This question subsequently became question six. The wording of question 11 was rearranged for clarity. The main question was moved to be prior to the definitions of National Educational Technology Standards knowledge.

Administrator Interviews

Three program administrators from the teacher preparation program at ASU were interviewed in person or via telephone. Administrators were asked for their expectations of standards-based technology integration from both students and faculty. Administrators were also asked to describe their policies and support for faculty in terms of modeling and direct instruction of technology capabilities.

The administrator interview (Appendix C) was reviewed by a College of Education administrator from the University of Phoenix in order to determine consistency, clarity and relevance in the items. Based on recommendations from the pilot interview, several of the administrator interview questions were modified for clarity and for consistency with the research

questions. The word "university" was added to most of the questions to emphasize that the data collected with this instrument is regarding the teacher preparation classrooms, as opposed to the practicum or on-site classrooms of the preservice teachers. Question 1 was reformatted to become an open-ended question. A follow-up question was added to a reworded version of question 6: "Do you feel that your instructors have access to resources that would allow them to hone their skills/knowledge about technology topics that they are unfamiliar with?" The follow-up question asks respondents: "What resources are available?"

Data Analysis

A descriptive analysis was performed on the student survey data in order to determine the mean, variance and range for each question. The data for questions 11-15, which asked about the specific NETS-T categories, were recoded to make them continuous in order to compare means. Table 5 illustrates the coding change. The recoded responses from the NETS-T survey items, N=20, were judged to be reliable with a Cronbach's Alpha $\alpha = .976$. A factor analysis was also completed on the recoded NETS-T survey items. However, as all items were highly correlated, as seen by $\alpha = .976$, all items were placed in one factor. The results of this analysis can be found in Appendix A, Table 8. Based on the results of the factor analysis, further analysis of the data were performed in order to answer research question number one and provide additional clarification regarding the NETS awareness levels of preservice teachers. Grouping the twenty NETS survey items under one factor category led to the question of whether or not the overall factor, NETS awareness, differed between certain subcategories such as class standing, education specialty, familiarity with the National Educational Technology Plan 2010, or level of technology integration in lesson planning. Currently, no literature exists exploring the

topics of NETS familiarity or awareness across various factors such as class standing. The opportunity existed with this survey to examine more closely whether programmatic differences (education specialty) or experiential differences (class standing) contributed to the variation in NETS awareness levels in preservice teachers.

Table 5

Data Coding Change

NETS Awareness level	Original Coding	Recoded Value
I have not learned this	5	1
Awareness	1	2
Literacy	2	3
Integration	3	4
Leadership	4	5

A one-way ANOVA was used to compare means of awareness level of each subcategory across participants' class standing and education specialty. Due to the lack of equal variances between groups, the Welch t-test procedure was used to compensate. Also due to the unequal variances, Dunnett's C post-hoc test was used to control for Type I errors.

Qualitative techniques were used to analyze responses to open-ended questions on the student survey as well as the interview responses from students, faculty, and administrators. These methods were also used to analyze the data organized and coded in the coding template from the syllabi, objectives, and curricular goals. Once the coding was completed and existing themes were established, the data was used to answer research questions two and three. The

interview question responses were also used to build upon the quantitative data and provide a more in-depth examination into research questions one and four.

Chapter 3

RESULTS

NETS-T Knowledge Survey

General Technology Use Questions

The survey participants (n=62) responded to an online survey via the online survey administration tool Survey Monkey using a link provided from their course instructor or via the Mary Lou Fulton Teachers College student list-serv. The survey consisted of 19 items, five of which addressed the NETS-T standards and had a subset of four items each. The entire survey can be viewed in Appendix C and the tables of survey results can be viewed in Appendix A. The first part of the survey was designed to collect demographic data, including class standing and current course enrollment. Of the sixty-two survey respondents, twenty-three percent were freshman, seven percent were sophomores, thirty-seven percent were juniors, twenty-six percent were seniors, and seven percent were graduate students. One respondent did not self-identify their class ranking. A little more than a third of the respondents (37%) were not currently participating in their student teaching practicum. Table 2 summarizes the current course enrollment for survey participants. Many participants had previously or were currently enrolled in more than one core course at the time of participation. Because question 4 of the survey asked participants "Please select the courses from the list that you have already taken or are currently enrolled in," it was not possible to determine if students were enrolled in multiple common core classes simultaneously or if they had taken them sequentially across multiple semesters. While it is unlikely that participants took the survey more than once, to safeguard anonymity no identifying information was obtained for survey participants. Therefore it is not possible to say

that all participants took the survey only a single time. However, a visual inspection of the data reveal no identical responses to the survey as a whole, although duplicate responses on select questions are to be expected given the population and their similarities in course enrollment and class standing. Almost half (44%) of the respondents had taken or were currently enrolled in BLE 220 and/or SPE 222, which is logical given the class standing of the majority of the respondents and the fact that these two courses are taken early on in the program.

The largest percentage of respondents (30.6%) was Elementary education (ELE) majors, followed by Secondary education (SED) majors (29%). 8.1% of the respondents were Early Childhood (ECH) specialists and 19.4% were Special education (SPED) majors. Of the 12.9% that self-identified in the "other" category, 3.2% indicated that they had no education specialization. The remaining 9.7% were made up of health science majors, sociology majors, speech pathology majors, and those who are double majoring in elementary/secondary education, special/elementary education, and special education/speech pathology. Figure 1 illustrates the distribution of majors by class standing. The largest percentage of respondents were elementary education majors who were in their junior year (16%), followed by secondary education majors in their junior and senior years, 13% each respectively.

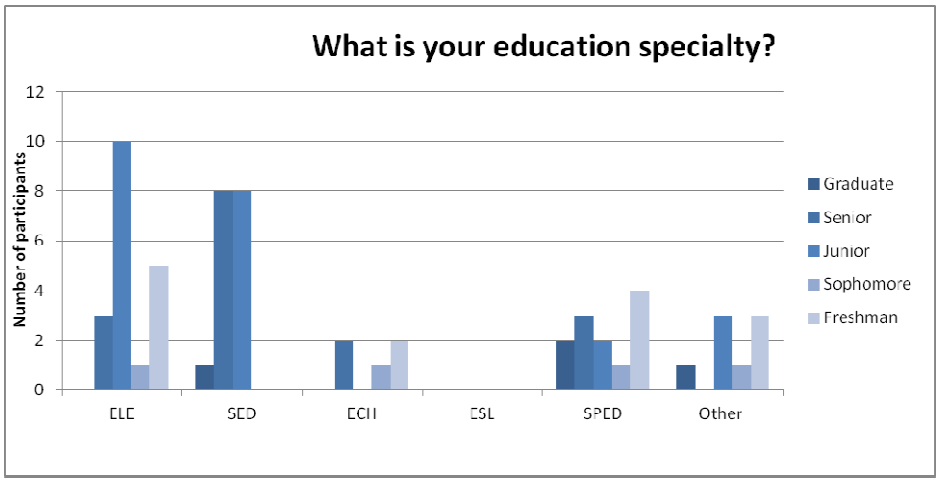

Figure 1: Education specialty by class standing

When asked about their current GPA, 48.4% of respondents indicated that it fell in the 3.6-4.0 range. 8.1% indicated a GPA of 4.1 or higher and 22.6% indicated a GPA between 3.1-3.5. The remaining respondents indicated that their GPA fell below 3.0.

The majority (80.6%) of respondents were female as compared with the 71.3% of total female students in the Mary Lou Fulton Teachers College (Morse & Flanigan, 2013). The majority of respondents (84%) were between the ages of 18-29. When asked to self-identify race, 70.9% of respondents identified themselves as Caucasian, which is again slightly higher than the MLFTC overall enrollment percentage of 65% ("Az State Snapshot", 2012), 11.3% as Hispanic/Latino, 4.8% as Asian. The remaining respondents were equally divided between African American, Arab, American Indian, Pacific Islander and mixed-race.

The majority of the respondents (95.2%) indicated that they use a personal computer, either for personal or educational use, on a regular basis, followed closely by use of a smart phone such as an iPhone or Android (88.7%). Tablet computer systems such as an iPad were used by far fewer respondents on a regular basis (22.6%). No respondent indicated using a Smart Board on a regular basis, although blogs and Web 2.0 applications are used equally

(11.3%). Sixty-six percent of respondents indicated that they used some form of social networking on a regular basis and 50% indicated that they used some type of video or audio technology such as Skype or YouTube regularly. None of the 62 respondents indicated that they use none of the technology listed. One respondent indicated that regular use of a laptop, printer, fax machine, copier and scanner were included as part of using a personal computer.

Almost half of the respondents (46.8%) indicated that they were very unfamiliar with the National Technology Plan for 2010, although thirty-nine percent indicated that they integrate technology into the lesson plans they create as assignments in their courses. Almost all (93%) of the respondents indicated that they learned about technologies such as Web 2.0 tools, games, productivity tools such as Microsoft Office suite, creative programs such as iMovie, and classroom tools such as Smartboards, doc cams and computers in their teacher education courses. Of those who responded, 8% indicated that they had not yet learned anything about these types of tools or software in their classes. For those respondents in their student teaching practicum, fourteen percent indicated that they would like more information on the use of Smartboards

NETS Awareness

The second part of the survey asked respondents to self-identify their level of awareness of the individual components of the NETS-T standards. The levels of awareness of the NETS-T are as follows:

- **Awareness**: Learners are exploring technology and developing foundational skills but have not developed sufficient expertise to use the skills in daily life.
- **Literacy**: Learners continue to explore technology and have developed the skills enabling them to use technology when prompted.

- **Integration**: Learners select and apply appropriate technology to successfully complete tasks.
- **Leadership**: Learners share new knowledge through proactive modeling, peer coaching, and mentoring (Harm, 2008).

Facilitate and Inspire Student Learning and Creativity

The Facilitate and Inspire Student Learning and Creativity Category is defined as: "teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments" (ISTE, 2012). In the four subcategories, the majority of respondents placed themselves in either the Literacy or the Integration level of awareness. For this first category, twenty-eight percent of respondents declined to answer the question or to give a response for any of the four subcategories. The awareness level for each sub-category as selected by percentage of respondents is indicated in Appendix A, Table 9.

Design and Develop Digital-Age Learning Experiences and Assessments

Design and Develop Digital-Age Learning Experiences and Assessments Category is defined as: "teachers design, develop, and evaluate authentic learning experiences and assessments incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the NETS-S" (ISTE, 2012). As with the previous category, the majority of respondents placed themselves in either the Literacy or the Integration level of awareness. For this first category, there was a non-response rate of twenty-nine percent. The awareness level for each sub-category as selected by percentage of respondents is indicated in Appendix A, Table 10.

Model Digital-Age Work and Learning

The Model Digital-Age Work and Learning Category is defined as: "teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society" (ISTE, 2012). Overall, the mean for the Integration level of awareness was slightly higher than the Literacy level in this category. Also in this category, there is a rise in the percentage of respondents who self-identify as being able to model digital-age work and learning at the Leadership level with the exception of the final subcategory, "I can model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning", which shows the majority of the respondents placed themselves in the Literacy and Integration levels of awareness. There is an overall decrease across the four subcategories of respondents who self-identify at the Awareness level, who indicate that they have not learned the indicated skills, or who declined to respond to the question. The awareness level for each sub-category as selected by percentage of respondents is indicated in Appendix A, Table 11.

Promote and Model Digital Citizenship and Responsibility

The Promote and Model Digital Citizenship and Responsibility Category is defined as: "teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices" (ISTE, 2012). In this category, there is also a rise in the percentage of respondents who self-identify as being able to promote and model digital citizenship and responsibility at the Leadership level compared with the first two categories although it is not as striking as in the third category. As with category 2, there is overall increase in the mean of the Integration level of awareness as

compared to the Literacy level. There is an overall decrease across the four subcategories of respondents who self-identify at the Awareness level, who indicate that they have not learned the indicated skills, or who declined to respond to the question. The Awareness level for each sub-category as selected by percentage of respondents is indicated in Appendix A, Table 12.

Engage in Professional Growth and Leadership

The Engage in Professional Growth and Leadership Category is defined as Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources (ISTE, 2012). In this category, there is an increase of respondents who self-identify at the Awareness level and a sharper decrease in those that self-identify at the Leadership level. There is also an increase over categories three and four of the number of respondents that did not choose a response at all. In subcategories one and three there is also an increase in respondents who self-identified that they had not learned the indicated skill. The awareness level for each sub-category as selected by percentage of respondents is indicated in Appendix A, Table 13.

NETS Awareness Summary

Table 6 shows the average percentage of responses for each NETS category, broken down by awareness level. The average across all four categories of each awareness level shows that Literacy and Integration levels received almost the same percentage of responses, 20.3% and 20% respectively, when averaged across all four categories. Figure 2 shows the highest level of response percentage by category.

Table 6

Average percentage of responses by NETS category

	NETS Category Average % of Responses				Total Average
	1	2	3	4	
Awareness	11.3	12.5	9.3	14.5	11.9
Literacy	20.6	23.4	19.4	17.8	20.3
Integration	19.8	18.6	20.2	21.4	20
Leadership	13.7	12.1	17.4	13.3	14.125
I have not learned this	6.5	8.9	6.5	8.9	7.7

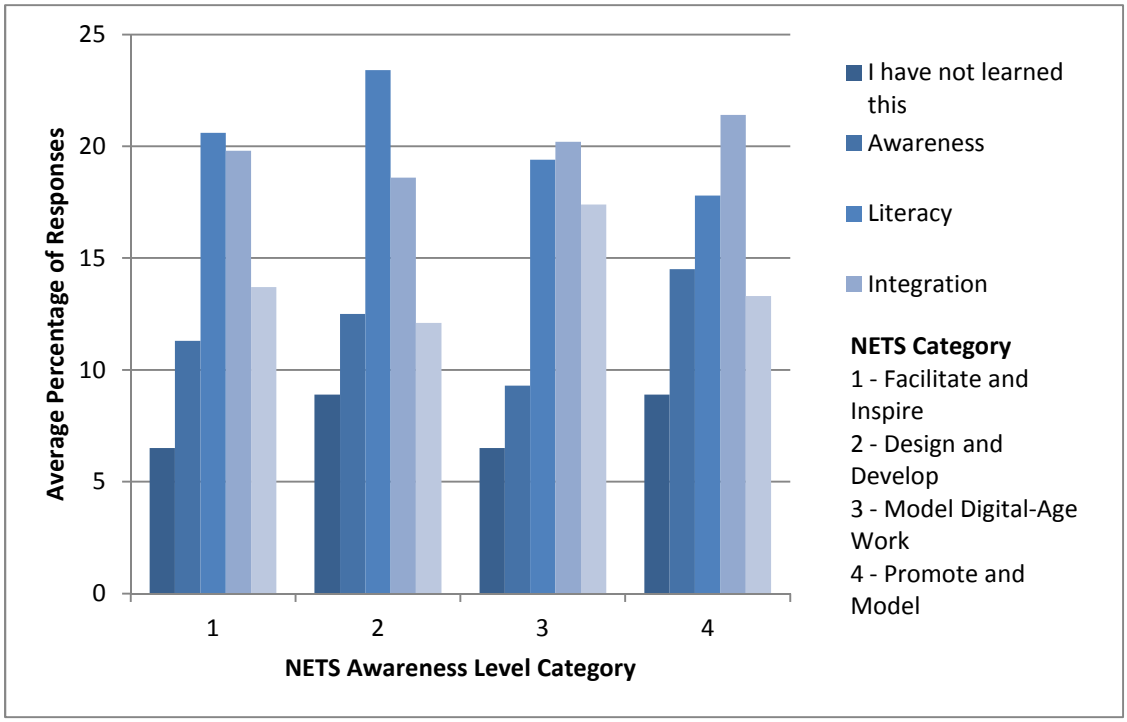

Figure 2: Average Awareness Response % by NETS Category

Awareness level by specific category

A comparison of the number of awareness-level responses of each NETS-T subcategory across class standing groups shows that the majority of juniors and seniors self-identified at the Integration level. The majority of freshman and graduate students self-identified at the Literacy level, while sophomores were almost evenly split between the Leadership and Awareness level. Appendix A, Table 14 lists the classes previously taken or currently enrolled by class standing.

A similar comparison of self-identified awareness levels of each NETS-T subcategory across education specialty groups shows that the majority of elementary (ELE), secondary (SED), and early childhood education (ECH) majors self-identify Integration level, while Special Education (SPED) majors self-identify largely at the Literacy level. No English as a Second Language (ESL) majors participated in this study, however, the participants who identified a major in the "Other" categories, self-identified at both the Leadership and Awareness level almost evenly. Appendix A, Table 15 lists the classes previously taken or currently enrolled by education specialty.

Sophomores have the highest overall mean across all twenty NETS-T survey items (3.65) which is slightly higher than the overall awareness level means of the Graduate students (3.58) and Seniors (3.55). A one-way ANOVA was used to compare means of awareness level of each subcategory across participants' class standing. The Welch procedure was used and Dunnett's C Post-Hoc test was used to control for Type I errors, as the Levene's test indicated that equal variances between groups could not be assumed for all items (Appendix A, Table 16). There was no significant difference in awareness level between groups on any subcategory. Dunnett C post-hoc comparisons of the groups indicated that no statistically significant results exist

between class standing groups for this subcategory at $p < .05$. Results from this procedure can be found in Appendix A, Table 17 and Appendix A, Figures 6-11.

A one-way ANOVA procedure was conducted to compare means of awareness levels of each subcategory across education specialty, familiarity with the National Technology Plan 2010, and the level of integration of technology in lesson planning. No statistically significant difference in awareness level exists at $p < .05$ for education specialty and National Technology Plan 2010 familiarity. The item "I can customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources" was significant, $F(3, 39) = 2.29$, $p = .019$. Results from this procedure can be found in Appendix A, Tables 18-19. Results of the one-way ANOVA comparing awareness level means across technology integration in lesson planning show statistically significant results in several categories, as seen in Appendix A, Tables 20-21. The Dunnett's C post-hoc test show statistically significant differences in the means of the frequency of technology integration in the following three questions:

- I can engage students in exploring real-world issues and solving authentic problems using digital tools and resources (Always and Seldom)
- I can address the diverse needs of all learners by using learner-centered strategies and providing equitable access to appropriate digital tools and resources (Always and Seldom; Always and Never)
- I can participate in local and global learning communities to explore creative applications of technology to improve student learning (Always and Seldom; Often and Never)

Figures 3-5 illustrate the awareness level means across education specialty, familiarity with the National Technology Plan 2010, and the level of integration of technology in lesson planning.

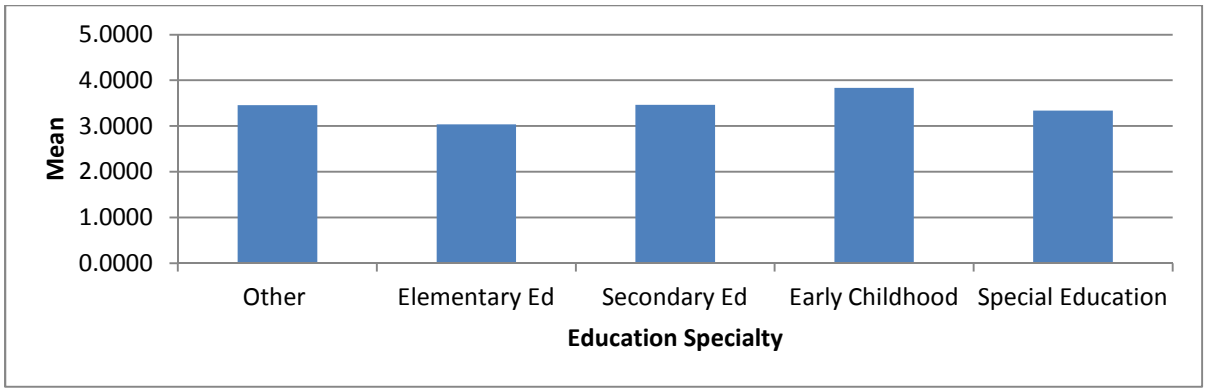

Figure 3: Awareness level means across Education specialty

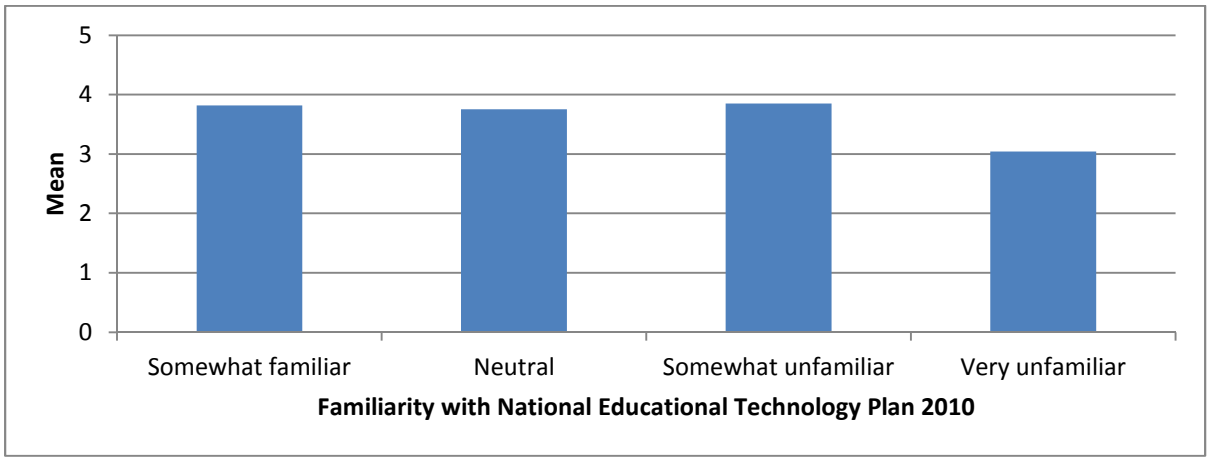

Figure 4: Awareness level means across National Technology Plan 2010 Familiarity

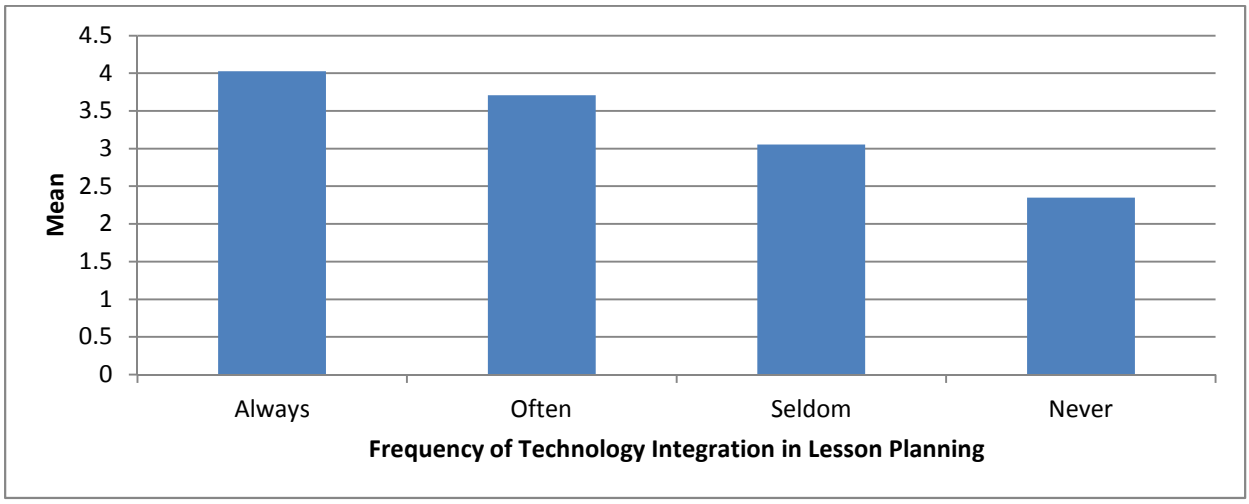

Figure 5: Awareness level means across lesson plan technology integration

Coding Template

Mary Lou Fulton Teachers College Curriculum and Program Goals

A coding template was used to analyze the program curriculum and goals for themes centered on technology usage and integration in accordance with the NETS-T. Specifically, the Mary Lou Fulton Teachers College mission statement, the program description, and the curricula requirements were examined to determine the extent to which technology integration themes occurred. For vague descriptions using only the word "technology" or the phrase "technology integration", a general categorization of "Use of technology for pedagogy purposes" was the default selection due to the definition of that category: "Technology Assists with Teaching" as no clear intention for use can be inferred from either the single word or phrase.

The results from an analysis of Arizona State University's Mary Lou Fulton Teacher's College website indicate technology-related themes are present only in certain areas of focus for the education major. Although the Professional Learning Library contains resources in the form of articles and web links about subjects such as "Technology NETS-S;" "Technology NETS-T;" and "Technology Infusion," only the program description for the Early Childhood program description can be categorized into "Use of technology for pedagogy purposes" as it is not clear what the phrase "technology integration" entails in the Early Childhood program description (n.d), as stated on the program website:

> This is a premier program taught by nationally renowned faculty members who emphasize community connectedness, technology integration, administration, policy analysis and advocacy related to young children with disabilities or developmental delays. (Program Description section, para. 2)

An analysis of the course requirements for the various education areas of emphasis, as seen in Table 7, indicated that all undergraduate majors, with the exception of the Physical Education majors, must choose one of two Computer Literacy courses. These courses, per the descriptions as found in the course catalog, indicate that the technology uses in these courses fall largely into the "Use of technology for productivity purposes" and "Using technology for teacher presentation of information" categories on the coding template. Both the Early Childhood and Special Education majors require an additional course beyond the computer literacy course. Early Childhood majors must also take a digital media integration course, which, according to its course description, can be placed into the "Use of technology for pedagogy purposes", "Using technology for teacher presentation of information" and "Using technology to design and develop digital-age learning experiences and assessments." The additional required course for Special Education majors is a technology and methods course which can be categorized into "Use of technology for pedagogy purposes."

The graduate students enrolled in the MEd in elementary education must take EED 531, Teaching with Educational Technology. The description for this course indicates that it falls into "Use of technology for pedagogy purposes" and "Using technology for teacher presentation of information" due to the mention of "technology use" and "technology integration" (Arizona State University, Course Catalog, 2013). Those students enrolled in the MEd/SPE program must take SPE 535 Curricula, Methods, Technology, & Adaptations in Special Education. The description of this course places it in the "Using technology to Facilitate and Inspire Student Learning and Creativity" category due to the intent for students to develop "strategies for effective adaptation of special education and general education curriculum through use of

technology" (Arizona State University, Course Catalog, 2013). This phrasing indicates that preservice teachers in the course will be developing lessons that encourage learning through the use of technology. Students in the MEd in Early Childhood and MPE are not required to take a specific technology related course. Students enrolled in the MEd in Secondary Education are not required to take a specific technology class unless they are enrolled in the Teacher Education for Arizona Math and Science (TEAMS) program. The TEAMS students must take either SED 560 Teaching Mathematics with Technology or SED 561 Teaching Science with Technology, the descriptions of which can be placed in the "Use of technology for pedagogy purposes" from the vague reference to teaching "with technology" (Arizona State University, Course Catalog, 2013).

Table 7

Arizona State University Required Course Theme Analysis

Area of Focus	Required Course Title	Course Description
Elementary Education	EDT 180 – Computer Literacy	Introduces personal computer operations and their place in society. Problem-solving approaches using databases, spreadsheets, and word processing.
	or	
	EDT 321 – Computer Literacy	Surveys the role of computers in business, industry, education, and personal life. Lab experience with word processing, spreadsheet, and presentation software as well as Internet research and the creation of a personal Web site.

Early Childhood Education	EDT 180 – Computer Literacy	Introduces personal computer operations and their place in society. Problem-solving approaches using databases, spreadsheets, and word processing.
	or	
	EDT 321 – Computer Literacy	Surveys the role of computers in business, industry, education, and personal life. Lab experience with word processing, spreadsheet, and presentation software as well as Internet research and the creation of a personal Web site.
	and	
	ECD 418 – Instructional Methods for Young Children: Integrating Digital Media	Develops integrated experiences with children's literature for facilitating development in reading, writing, speaking, and listening. Further develops educational strategies for promoting growth in the social studies and creative arts curriculum, and instructional/assessment strategies for preprimary- and primary-level children; developmentally appropriate methods and strategies for effective instruction.

Special Education	EDT 180 – Computer Literacy	Introduces personal computer operations and their place in society. Problem-solving approaches using databases, spreadsheets, and word processing.
	or	
	EDT 321 – Computer Literacy	Surveys the role of computers in business, industry, education, and personal life. Lab experience with word processing, spreadsheet, and presentation software as well as Internet research and the creation of a personal Web site.
	and	
	SPE 423 – Technology and Instructional Methods in Language, Reading, and Mathematics in Students with Mild/Moderate Disabilities 3	Technology and instructional methods in language, reading, and mathematics for students with special needs.
Secondary Education	EDT 180 – Computer Literacy	Introduces personal computer operations and their place in society. Problem-solving approaches using databases, spreadsheets, and word processing.
	or	
	EDT 321 – Computer Literacy	Surveys the role of computers in business, industry, education, and personal life.

		Lab experience with word processing, spreadsheet, and presentation software as well as Internet research and the creation of a personal Web site.
Physical Education	EDT 180 – Computer Literacy	Introduces personal computer operations and their place in society. Problem-solving approaches using databases, spreadsheets, and word processing.
English as a Second Language/Bilingual Education	EDT 180 – Computer Literacy	Introduces personal computer operations and their place in society. Problem-solving approaches using databases, spreadsheets, and word processing.
	or	
	EDT 321 – Computer Literacy	Surveys the role of computers in business, industry, education, and personal life. Lab experience with word processing, spreadsheet, and presentation software as well as Internet research and the creation of a personal Web site.
MEd in Elementary Education	EED 531 - Teaching with Educational Technology	Focuses on using technology in K-12 classrooms. Addresses the integration of technology in all curricular areas for all

		students.
MEd in Special Education	SPE 535 Curricula, Methods, Technology, & Adaptations in Special Education	Develops strategies for effective adaptation of special education and general education curriculum through use of technology.
MEd in Early Childhood	None Required	
MPE	None Required	
MEd in Secondary Education	SED 560 Teaching Mathematics with Technology	Strategies and methodologies to teach mathematics with technology, focusing mainly on the middle grades (5-9).
	or	
	SED 561 Teaching Science with Technology	Strategies and methodologies for effective technology-enhanced science classrooms and improved learning. Models student-driven inquiry teaching throughout the course.

Analysis of Common Core Course Objectives and Syllabi

SPE 222, Orientation to the Exceptional Child

A thematic analysis of the SPE 222, Orientation to the Education of the Exceptional Child, course syllabus revealed no technology themes present in the course objectives or desired learning outcomes (Appendix A, Table 22). However, the analysis of the course syllabus indicated a number of areas where technology is used by both the course instructor and the

preservice teachers. The three course projects include the creation of a Venn diagram using multimedia software, a series of article reviews based on a news website, and a collaborative presentation of a professional development workshop which required the use of an interactive multimedia component. The technology themes present in the SPE 222 syllabus relate largely to the preservice teacher (student) use of technology and little is known regarding the course instructor use of technology during instruction, although from the assignments, the instructor's use of technology falls into "Using technology to Design and Develop Digital-Age Learning Experiences and Assessments" and "Using technology to Facilitate and Inspire Student Learning and Creativity".

BLE 220, Foundations of Structure English Immersion

Few technology themes were present in either the course objectives or syllabi in BLE 220, Foundations of Structure English Immersion (Appendix A, Table 23). The syllabus states that Blackboard, the commonly used Learning Management System (LMS) at ASU, will serve as a resource website and house the online readings (using technology for teacher presentation of information). Policy statements regarding Electronic Communication and Technological Services Support are also contained within the syllabus.

EDT 180, Computer Literacy

The analysis of EDT 180, Computer Literacy, indicates a course syllabus and course objectives that, due to the topic of the course, integrates technology at all nine levels of the coding template, in terms of what preservice teachers will do with technology (Appendix A, Table 24). Little on the syllabus or objectives indicates what the course instructor will do with technology beyond the productivity and pedagogy levels. EDT 180 gives students a broad view

of computers and their potential uses. At the productivity and pedagogical levels, the syllabus contains an acceptable use policy and an identification of where to go for technical support. The syllabus also states that all communication will be conducted via Blackboard and all materials and assignments will be posted on the learning management system as well. The assignments included productivity software exploration, internet search activities, an action research project, and an electronic portfolio assignment. All seventeen learning outcomes have relatively measurable technology-related objectives such as "demonstrate an understanding of and an ability to use a word processing program to create documents such as reports, research papers, or letters." The students in this class are not required to create technology-based lesson plans or address the NETS in their assignments.

EDT 321 Computer Literacy

Similar to EDT 180, the analysis of EDT 321, also called Computer Literacy, reveals a course syllabus and objectives that meet the criteria at all nine levels of the coding template (Appendix A, Table 25). Little on the syllabus or objectives indicates what the course instructor will do with technology beyond the presentation of information level. EDT 321 also gives students an overview of computers and their potential uses. As with many of the courses in this analysis, all course materials and assignment submissions are conducted via Blackboard and the instructor explicitly states that all communication will be though email, meeting the criteria for the "Use of technology for productivity purposes," the "Use of technology for pedagogy purposes" and the "using technology for teacher presentation of information" themes. The assignments include skills-based evaluations, unit-level projects, technology talks, an eportfolio assignment, and a final technology project and presentation. All twelve course objectives have

technology-related objectives such as “be able to discuss issues surrounding, software, and the use of technology in the classroom and workplace fluently” and “demonstrate your ability to use computer applications for productivity, data analysis, and problem solving.” The students in this class are not required to create technology-based lesson plans or address the NETS in their assignments. Students with prior computer experience are directed by the syllabus to “expand their knowledge and skills of the applications.”

PPE 310, Health Literacy: Creating Healthy and Active Schools

A thematic analysis of the course objectives and syllabus for PPE 310, Health Literacy: Creating Healthy and Active Schools, reveals the first syllabus to state an alignment to the NETS-T standards to the course objectives and selected assignments, although no course objective specifically mentions technology or NETS-T (Appendix A, Table 26). This hybrid class, taught mostly online through Blackboard, meets four times during the semester.” Although the analysis of the course objectives and syllabus indicated that no technology use could be placed above “Use of technology for teacher presentation of information,” a table of course objectives indicates that several of the objectives meet NETS-T standards 3a,d and 4a,c as indicated in Appendix, A Table 27-28. The syllabus lists NETS-T alignment for two assignments, the participation in four ASU campus sessions and Signature Assignment research paper, aligned to standards 1d and 3a,d/4a,c respectively.

ELL 515 Structured English Immersion

A thematic analysis of the ELL 515, Structured English Immersion, syllabus revealed several areas where both students and instructors use technology for presentation, productivity and student use purposes, although the objectives mention neither technology nor NETS-T

(Appendix A, Table 29). There is a statement within the syllabus that provides students with information about the available Technology Services and Support provided by the university in addition to a campus connectivity statement. The technology themes present within the syllabus are include the use of technology for presentation purposes by the instructor, the use of technology for pedagogy purposes, planning for technology use by the students, and using technology to design and develop digital-age learning experiences and assessments. In the category of use of technology for productivity purposes, the syllabus expressly states that all communication outside class time will be conducted via email. The syllabus states that appointments can be made with the instructor through Blackboard. This element can be categorized into the use of technology for pedagogy purposes for the instructor. The planning for student use of technology category is represented for students, who are required to use Blackboard for submission of assignments and the completion of quizzes. TK20, a supplementary data management system used by MLFTC for preservice teachers to track and manage their records and assignments related to their steps to certification, is also a requirement of the class, as is an IDEAL subscription, a repository for education resources. Since the instructor will use Blackboard to post course materials, the category of using technology for teacher presentation of information is also present. The students will complete both a wiki and a blog assignment, both of which represent the using technology to design and develop digital-age learning experiences and assessments.

ELL 516 Advanced SEI Methods for English Language Learners

The analysis of the syllabus and course objectives for ELL 516, Advanced SEI Methods for English Language Learners, reveals technology usage that falls into planning for student use

of technology and using technology for teacher presentation of information in the body of the syllabus although there is an absence of technology themes in the course objectives (Appendix A, Table 30). Students use both TK20 and Blackboard to submit assignments (planning for student use of technology). The instructor uploads webcasts, videos and conducts discussions on Blackboard (using technology for teacher presentation of information). The syllabus also contains the standard Electronic Communication Policy Statement in addition to a statement that indicates that computers and other electronic devices are encouraged to be used during class time for the purpose of meeting the goals of the course. This statement has not been present in other syllabi analyzed.

Course Evaluation Summary and Discussion

The evaluation of the course objectives and syllabi indicated that the core classes common to all education majors plan for little technology use above and beyond productivity and presentation of information purposes, with the exception of EDT 180 and EDT 321. Four of the courses examined contained elements that could be placed in the "Using technology to Design and Develop Digital-Age Learning Experiences and Assessments" category, either by assignment design or course objective. Both EDT 180 and EDT 321 show the most standards-based design, meeting both "Using technology to Promote and Model Digital Citizenship and Responsibility" and "Using technology to Engage in Professional Growth and Leadership" categories, both of which adhere to NETS-T.

Student Interviews

Student interviews (n=15) were conducted in person and via telephone as a follow-up for participants who had previously completed the survey. The interview questions were read

from a script to ensure that all participants were responding to the same questions (Appendix C). The table of results for the student interviews can be found in Appendix A.

NETS Familiarity

When asked, "Where did you first learn about the National Educational Technology Standards?" a variety of answers were given from all fifteen respondents (Appendix A: Table 31). The majority of the respondents, 60%, responded that they either did not know about the National Educational Technology Standards (26.6%) or they only learned about them through the course of this study via the survey, email solicitation, or interview (33.3%). Several students indicated that they "just heard about it" from the interview question and one student mentioned hearing about the standards "while subbing." The follow-up question to the first question, "To what extent is your choice to integrate technology in your lesson planning based on familiarity with the National Educational Technology Standards?" produced an equal variation among responses, several of which seemingly had no connection to the content of the question (Appendix A: Table 32). Several respondents (26.6%) reiterated that they had no knowledge of the NETS while 33.3% of the respondents indicated that it was the increased availability of technology options that encouraged them to integrate technology in the classroom. An equal number of respondents (6.7%) indicated that personal preference towards technology use, having seen technology in use, and technology experience in their practicum are factors that led them to integrate technology in their lesson planning rather than NETS-T familiarity. A few respondents indicated that lesson planning did not apply to them (13.3%) or declined to answer the question (6.7%).

Technology Integration

The majority (38.9%) response to the question "How do your instructors require you to integrate standards-based technology into your homework or lesson planning?" was an identification of productivity or presentation tools such as Prezi, Poplet, PowerPoint and Smartboards (Appendix A: Table 33). Required online research and use of the LMS for coursework and assignments received an equal number of responses (16.7%). Some respondents indicated that their instructor modeled technology use (5.6%) while some stated that they are not required to integrate technology at all (5.6%). There were also some respondents who indicated that technology integration and/or lesson planning did not apply to them (11.1%). A follow-up question was asked: "How do your program faculty integrate technology into the classroom? Can you give an example?" (Appendix A: Table 34). The overwhelming majority of respondents (93.3%) named tools such as PowerPoint, online videos, outlines, overheads, computers, smartboards, Canvas, movies, multimedia, and clickers. The remaining respondents (6.7%) could not give an example but declined to elaborate.

When asked "In your opinion, what role does technology integration have in your program as a whole? Is it primarily to present information and provide organization for assignments? Or do you use it to explore content and complete activities?" almost half of the respondents (46.7%) indicated that perceive the role of technology to both present information and provide organization and explore content and complete activities (Appendix A: Table 35). Of the respondents, 20% indicated that technology plays a large part in the program while 13.3% stated that technology is largely used only for the presentation of information. One student indicated that this use of technology for presentation of information only was "unfortunate – it

loses student attention because we are shown information rather than learning with it." The responses of exploring content and completing activities, preparation and set up, and information is right at your fingertips were given by an equal number of respondents (6.7% respectively).

The majority of respondents (62.5%) had no concerns about integrating technology in future lesson plans (Appendix A: Table 37). Other respondents indicated that their concerns centered on access to technology (12.5%), losing skills through too much reliance on technology (12.5%), and not knowing enough about the technology (12.5%). Other concerns regarding integrating technology in the classroom were that it is advancing to quickly (6.3%) and the fragility of the technology devices (6.3%). Most respondents (93.3%) stated that they felt they had access to adequate resources such as an instructor, library, mentor, etc that would allow them to explore technology topics that they were unfamiliar with (Appendix A: Table 38). A small number of respondents, 6.7%, indicated that they did not feel that they had access to these resources and one student indicated that it was "unfortunate that the Ed Tech [class] in education was eliminated because the professors are not integrating it into the classroom".

Digital Citizenship

The respondents were asked "What does the term digital citizenship mean to you?" (Appendix A: Table 36). Almost half the respondents (46.7%) indicated that they were unfamiliar with the term. 20% stated that they believed the term meant doing something online while 13.3% stated the term referred to social networking. A few respondents (6.7%) recognized the term but could not define it and an equal number of respondents defined the term as a standard of behavior online or as a policy of accountability in an online setting.

Student Interview Summary

Most students interviewed were unfamiliar with the terms National Educational Technology Standards and digital citizenship. When questioned about the type of technology they or their instructor use in class, respondents indicated that technology usage that largely falls into the presentation of information or productivity categories. All but one respondent felt that adequate resources existed to allow them to explore unfamiliar technology topics. Most respondents also indicated that they had significant concerns about integrating technology into their own lessons, due to a variety of reasons including lack of skill and availability of technology in their future classrooms.

Faculty Interviews

Faculty interviews (n=6) were conducted in person or via the telephone with faculty members who had taught or were currently teaching one of the five common core undergraduate classes or one of the two common core graduate classes. Table 3 indicates the breakdown of core courses taught by interview participant. The interview questions were read from a script to ensure that all participants were responding to the same questions (Appendix C). The tables of results for the faculty interviews can be found in Appendix A.

NETS Familiarity

When asked about their familiarity with the NETS-T (Appendix A: Table 39), five out of six of the respondents indicated that they were aware of the standards enough to recognize the name and their purpose. Only the adjunct indicated that she was unfamiliar with the NETS-T. One TA, who is also an elementary school teacher, indicated an awareness of NETS at the name

recognition level only. The remaining three interviewees were familiar with the NETS-T at the curriculum implementation level.

Technology Integration

When asked how they integrate technology in the classroom (Appendix A: Table 40), two of the respondents indicated that is largely through technology tools such as Prezi, PowerPoint, Web 2.0, and the use of laptops. The TA trained as an instructional designer indicated that in terms of standards-based technology integration in the classroom, he was not as stringent about following standards, although he was aware of them, but he does mention them to students during class time. He stated that he used Google Docs, research videos, Hole in the Wall, virtual office apps and virtual collaboration sites in the classroom. The TA who is also an elementary teacher indicated that she used PowerPoint, Google, Youtube, Prezi, Blackboard, Jing, Skype, Adobe Breeze, and Dropbox in her classrooms both as modeling technology use and allowing students to explore technology. She indicated that her goal was to try to teach preservice teachers how important technology is for all kids. The adjunct instructor indicated that her choices in curriculum were limited. As an adjunct, she stated that her methods and activities in the classroom are dictated by the department. She also mentioned that she follows the syllabus exactly, which is created by a committee within the MLFTC. She indicated that she does encourage the students to bring their laptops to class and that all content is placed on the course management system, Blackboard. The lecturer stated that the current courses he teaches are all technology based, as they are taught in a computer lab. The clinical instructor indicated that the level of technology integration depended on the course being taught. She indicated that all technology integration followed the Arizona Common Core standards and that the framework for

the integration, developed by a Teachers' College faculty member, was communicated to the instructors via the course coordinator. The clinical instructor also indicated that common technologies used in her classes were Screencast, Blackboard, Weebly, online homework modules, and Google docs. The associate professor indicated that she integrates technology into her classroom in layers: through modeling, asking students to learn how to integrate technology of their interest; asking them to apply what they have learned in their own lesson planning. She also indicated that in her opinion, the technology must enhance the curriculum or it should not be used. The associate professor also indicated she takes more of the flipped classroom approach to her courses, requiring lectures and readings to be viewed at home and designing activities and collaborative assignments for in class.

When asked the extent to which their decision to integrate technology in their classroom is based on the standards, three out of the six faculty indicated that the standards were influential in that decision (Appendix A: Table 48). The first TA indicated that he only mentions the existence of the standards in his lesson planning, but that they are not the basis for his decision to integrate technology. The second TA and the adjunct both indicated that the standards were not influential in their decision to integrate technology. The lecturer indicated that his decision to integrate technology was due more to his passion for technology than the NETS-T. The full instructor stated that she bases most of her technology integration decisions on the standards as does the associate professor.

The faculty were asked to what degree they require their students to integrate technology in accordance with the lesson planning in accordance with the NETS-T degree definitions of Awareness, Literacy, Integration, and Leadership (Appendix A: Table 49). Two of the six

faculty interviewed indicated that they either did not require lesson planning in their class or they did not use the NETS-T for those assignments. The first TA stated that his class had no lesson plan requirements for the students, although they were allowed to write lesson plans if they desired. The second TA indicated that she requires her students to integrate technology at the NETS-T levels of Awareness, Literacy and Integration. The adjunct professor indicated that she requires technology integration on the levels of Literacy and Integration. The lecturer stated that he requires students to integrate technology at the Integration level. The full instructor stated that her students are required to achieve a minimum of the Literacy level of NETS-T technology integration while the associate professor stated that although her content is aligned with the NETS-T standards, her students would most likely be unable to describe the standards or identify them in their own lesson planning.

When asked to specify how the students are required to integrate standards-based technology into their lesson planning, four out of the six faculty stated that at least one assignment requires the students to demonstrate the use of technology (Appendix A: Table 50). While the first TA did not have a lesson plan requirement in his course, the second TA indicated that her students were required to use Microsoft Office products, complete internet searches and use various Web 2.0 tools such as Prezi, Google products, and Skype. The adjunct professor requires "a couple" of assignments where the students have to integrate and demonstrate technology use but she was unable to provide an example. The lecturer requires his students to integrate technology in an inquiry-based lesson plan to which they must tie in four of the six NETS-S standards. The full instructor indicated that the technology integration requirements depends on the class she is teaching, however, in the majority of her classes she requires at least

one technology element, such as Gradepop, Blogs, Screencast, Weebly, to be integrated into each lesson plan. Students are assigned "technology buddies" in a type of peer mentoring system. The associate professor requires her students to use Mendeley and Blackboard. Every assignment and activity is submitted in electronic form and all course materials are electronic. They are also required to give a Google presentation with recorded audio for certain assignments and students must bring their laptops to class every day.

Concerns about Technology Integration

Regarding concerns about integrating technology in the classroom (Appendix A: Table 43), two of the respondents indicated that they have no concerns regarding the integration of technology except for the availability of technology. The first TA indicated that he had no concerns and that he "loved technology and felt obligated to use it". The second TA stated that one concern was the availability of the technology outside of class for both students and instructors. In addition, a concern for her was the extent of the available technology made her feel that it was difficult to become well versed in more than just a few technology options. The adjunct faculty gave an example of the type of situation that concerned her about the use of technology. She stated she had a student who was an older woman, unfamiliar with technology usage. The adjunct stated that although the student's cohort was supportive and by the end of class was more comfortable with technology, the adjunct herself was not able to assist this student. The adjunct is concerned that students such as the one in the example will find the use of technology "daunting" and may not have access to instructional support due to a lack of knowledge or skill on the part of the instructor. She also indicated that she feels the students, while well prepared to use technology in general, seem ill-prepared to use TK20, the Teachers

College document repository for preservice teachers. She stated that many of her students felt frustrated when navigating this system and due to the high expectations of use throughout the program, she feels the Teachers College should provide small training modules for the students on the use of the system. The lecturer reported no concerns regarding the integration of technology in his own classroom. He did indicate that he had concerns with technology integration in K-12 classrooms by inservice teachers who, in his opinion, often cite a lack of time to use technology, a lack of professional development opportunities to learn the technology tools, or the lack of financial means on the part of the school to acquire the technology as reasons not to attempt technology integration in their own classrooms. The full instructor had no concerns about the use of technology other than her statement that she felt it was not happening frequently enough due to budget constraints. She indicated that her main concern would be safety in technology use and cited examples such as being able to uphold FERPA (Family Educational Rights and Privacy Act) or maintaining the safety and privacy of children as technology users in social networks and photo sharing sites. She felt that if the right safety systems were in place, the students could be protected from online predators of all kinds. The associate professor indicated that her major concerns when it comes to integrating technology are the questions of access and expense. She stated that students are more frequently bringing technology to class in the forms of laptops and tablets but there are still issues of usability and compatibility.

Role of Technology in the College

In the opinion of three of the interviewed faculty, the education program leadership desires and supports more integration of technology by faculty into the curriculum (Appendix A: Table 41). One TA is a doctoral candidate in the Educational Technology department and

indicated that in a changing world, he sees technology as having a large presence in workplace decisions and that basic technology skills are vital to the success of all students. This TA indicated that he felt that technology as a whole was "undervalued in the Teachers College" and for teaching assistants they are not evaluated on the use of technology in the classroom. The classes are content-driven and only if a TA is interested or has the aptitude does technology integration occur. This TA stated that he felt there was no drive to integrate technology into the classroom and that the use of technology is not valued as it should be. The second TA indicated that technology plays a minimal role in the classroom. She described it as a "linear" role that is largely for the presentation of information to the students. She indicated that she was aware of a repository of technology resources that she felt were largely under-utilized. She stated that the instructors should be modeling the standards-based integration of technology in the classrooms in order to open up options for the students and to differentiate instruction. The adjunct instructor stated that she felt that there was an emphasis on technology integration from the administration and that there are existing activities that have technology built in. The adjunct stated that the resources for instructors in the Teachers College, such as websites and videos, were very easy to navigate and very well organized. The lecturer indicated that he felt technology was being well integrated into the curriculum, mentioning the technology infusion specialist and professional development offered to faculty to assist them in increasing the technology integration in their own classrooms. The full-time instructor stated that she felt the support from administration for those instructors who want to integrate technology is consistent. She indicated that she herself is a strong advocate for using technology across the curriculum in order to increase student engagement. She stated that to her knowledge, technology integration

is completed within the Teachers College on a course-by-course basis. The associate professor indicated that in the undergraduate education program technology is used to enhance education and learning. She also indicated that she felt complete technology integration was unlikely because of the cost in development ("too damn expensive"), equipment and training.

Digital Citizenship

Four out of the six interviewees reported being familiar with the term digital citizenship (Appendix A: Table 42). The TA trained in instructional design defined the term as a "standard of how we interact". In his opinion, to be a responsible digital citizen means to be aware of the repercussions of one's online behavior. The TA who is also an elementary teacher indicated that she was aware of the digital divide but not digital citizenship. The adjunct faculty was unfamiliar with the term but stated that she believed that teaching students to respect technology was a high priority for her as an instructor. The lecturer stated that he defines digital citizenship as "knowing how to act appropriately in the digital age." The full instructor was familiar with the term and indicated that her familiarity was due to a recent technology course taken with a faculty member of the Teachers College. This course was also responsible for her increased use of technology in the classroom. This instructor also indicated that her goal was to teach students to use technology ethically and responsibly, citing electronic copyright learning modules as one example. The associate professor also stated that she was familiar with the term digital citizenship and that she felt it could be defined as responsibility, morality, ethics, decision-making, and dilemmas surrounding the use of technology. A facet of digital citizenship that the associate professor felt was important to consider was that in her opinion, often in the online

environment, things are done contrary to the norm because it can be considered “wrong” to be normal.

A wide range of self-identified strengths were listed in answer to the question of in what areas of technology did the participant feel were his or her strengths (Appendix A: Table 44). Software was the primary strength identified by three of the respondents. The first TA indicated that his instructional design background gave him capabilities in software usage, productivity tools along with an interest in robotics. The second TA indicated that her strengths lie in word processing applications and productivity applications such as Microsoft Excel and PowerPoint. She indicated that she is comfortable performing internet searches as well as using new applications. The adjunct instructor stated that she was very good at using Microsoft PowerPoint as she used it both at ASU and her elementary school teaching job. She indicated that she would be interested in receiving more practice and knowledge with technology in general. The lecturer indicated that his background was in Educational Technology and therefore was extremely comfortable with both technology integration and instructional design. He also stated that he emphasizes instructional design to his students as that is his area of expertise. The full instructor stated that she was proficient in using screencasting software, creating online modules, exploring the internet and using topics learned in professional development workshops in the class, or putting what she learned into practice. The associate professor indicated that her strength was the pedagogical aspects of using technology in the classroom. She stated that without technology, collaboration between students would not be possible as she prefers to use class time to maximize face-to-face “conversational opportunities”.

Perception of Available Resources

Two out of the six participants indicated that they did not feel they had adequate resources at the university that would allow them to explore unfamiliar technology topics (Appendix A: Table 45). The first TA indicated that on a personal level, he felt that he had more access to technology than at the university. The second TA felt that she had no access to resources while the adjunct indicated that she felt tech support at two of the university campuses were "wonderful" and very helpful when she had experienced technical issues with Blackboard, hardware, laptops, or PowerPoint. The lecturer stated that he did feel he had adequate support and resources and that he consistently relied on tools like how-to YouTube videos, tutorials from www.lynda.com, or Google searches to locate information. The full instructor indicated that she felt that she did not have adequate resources at her disposal, although she would be very interested in further technology training as professional development. She stated that she felt that the Teachers College had neither the personnel nor the funding required to provide adequate technology training via a technology specialist or a technology infusion specialist. The associate faculty indicated that she felt there are acceptable resources to support her technology needs, though she stated that a limitation of that support was a lack of ideas. While support existed if ideas were provided by the faculty member, the associate professor felt that new developments in technology were not being presented to the faculty by the support specialists indicating a culture of limited innovation within the Teachers College. The associate professor also indicated that many Teachers College faculty are not always "up" on what teaching content through technology would look like in a classroom above and beyond using presenting information in electronic format.

Modeling Technology Usage

All participants except the adjunct instructor indicated that they did attempt to model standards-based technology usage in the classroom (Appendix A: Table 46). The two teaching assistants stated that they do try to model standards-based technology usage in the classroom, with the second TA indicating that her focus for this modeling strategy is the modification and adaptation of technology usage for difficult students. The lecturer indicated that he doesn't teach the students how to use the technology, but prefers to model it and provide them with resources to determine how to use it on their own. The full instructor and the associate professor indicated that they model standards-based technology usage consistently and the associate professor clarified that she felt that she "could push herself a little farther" although she indicated that her students would likely place her at an advanced level of usage in the classroom. The full instructor indicated that she "tinkers" with modeling technology use in the classroom, however, changes to the course syllabus and instructional plan requires approval of the course coordinator.

Direct Instruction of Standards-Based Technology

The extent to which faculty included direct instruction of standards-based technology varied widely from participant to participant (Appendix A: Table 47). Two out of six of the participants reported that they let the students explore the technology on their own, while another two indicated that they include a substantial amount of direct instruction of technology integration. The first TA reported a heavy use of direct instruction, as did the second TA who explained that she uses direct instruction with iPad apps and listservs. The adjunct and the lecturer both indicated that they performed no direct instruction of standards-based technology in the classroom while the full instructor stated that the amount of direct instruction varied based on

her students skills with technology. She reported that a survey is sent out to the students at the beginning of each semester to see what tools they are familiar with. The full instructor then provides direct instruction on those tools that they identify as being unfamiliar with. The associate professor stated that she steps back and lets the students solve their technology problems in an attempt to further develop their problem-solving skills.

Faculty Interview Summary

The majority of the faculty participants both recognized and could identify the NETS-T and the term digital citizenship. While most of the participants attempt to model and integrate technology on some level, technology integration is not a large part of the requirements for student lesson planning and the decision to integrate technology is generally not based on the NETS-T. Most instructors felt that technology as a whole was undervalued or under-utilized by the College although the majority of the participants felt that they had adequate resources available to them should they wish to explore a technology tool or topic.

Administrator Interviews

Three administrators from the Mary Lou Fulton Teachers College were interviewed in person or via telephone. The interview questions were read from a script to ensure that all participants were responding to the same questions (Appendix C). The results of the administrator interviews can be found in Appendix A.

NETS Familiarity

All three administrators indicated that they were familiar with the NETS standards at least on a surface recognition level (Appendix A: Table 51). Out of the total responses, 2 out of three administrators indicated that they were vaguely aware of the NETS, while one

administrator stated that she was “pretty familiar” with the NETS. The Educational Leadership director was very familiar with the NETS standards, the various types (NETS-A, NETS-S, NETS-T) and their history. The graduate director stated that she was familiar with the name NETS and the types of standards, but unfamiliar with the use of the NETS-T in the classroom. The undergraduate director stated that she was “vaguely” familiar with the NETS and also indicated that the NETS-T were “required on the MLFTC undergraduate course syllabi for those courses leading to certification” and that the students were “required to read the standards” at some point during their program. This administrator indicated that MLFTC teacher educators were required to show technology innovation on their lesson plans, however, no specific examples or definition of innovation were provided.

Student Competency with Technology at Graduation

In terms of the programmatic expectations that graduating education students will be able to integrate technology in accordance with the standards, 2 out of 3 administrators indicated that it is expected that their students will be able to use technology tools on a “minimal level” and to have awareness that “technology integration is possible” (Appendix A: Table 52). One administrator mentioned that the program administration found that the students were not applying the information learned in the stand-alone educational technology course which was why it was eliminated in favor of the integrated approach that would better prepare the students to use technology in their own classrooms. One response indicated that the NETS and technology integration requirements are “less applicable to PhD students” stating that because these students are on a path to become future faculty members at institutes of higher education, it is the administrators opinion that doctoral candidates must be self-motivated in the area of

technology integration as they are most likely already interested in technology integration in teaching and learning in addition to the wide variation that exists among this population in ability and experience with technology.

Role of Technology in the College

When asked about the role of technology within the education program (Appendix A: Table 53), the administrator in charge of the graduate teacher preparation program indicated that for preservice teachers in the elementary education graduate program, there exists a stand-alone educational technology course. The administrator of the non-certification programs did indicate that the NETS-T are used in the MEd in Ed Tech (K-12) program but examples of how the NETS-T are used within this program was unspecified. The administrator of the undergraduate programs stated that the program hired two technology infusion specialists to revise and develop courses to include technology in every subject area and also indicated that the learning outcomes of these revised courses will not change; however, the technology will be integrated to assist the students in meeting these outcomes.

Digital Citizenship

All three administrators indicated familiarity with the term digital citizenship (Appendix A: Table 54). When asked to define the term, all three mentioned ethics, understanding copyright and privacy issues, netiquette, and responsible technology use. The undergraduate program administrator indicated that the undergraduate education majors must take a digital citizenship module at some point in the program that helps them understand the ethics of using technology, particularly the Internet.

Technology Integration in the Classroom

Administrative concerns regarding the teacher education faculty integrating technology into the program include a lack of resources, a lack of training, concerns of how to go about improving technology use and making it a priority among faculty who may be resist to the perception of added workload or learning new and potentially challenging skills (Appendix A: Table 55). One administrator stated that she was "concerned about how to improve [technology integration] because it was not a priority." All three administrators followed up this question with the indication that they felt adequate resources existed for their instructors in the form of the technology infusion specialists and mentors (Appendix A: Table 56). The non-certification graduate program administrator felt that these resources were currently "not being utilized to their full potential" and the program as a whole could do better in encouraging or perhaps requiring the use of the resources.

Standards-based technology integration is required by program faculty in both undergraduate and graduate education programs leading to teacher certification (Appendix A: Table 57). It is not required in any of the non-certification graduate programs. For the certification programs, faculty members are expected to model standards-based technology use and it is also required of students (Appendix A: Table 58). The teacher preparation program administrators indicated that while learning outcomes cannot be modified, the technology was expected to be a tool that assisted students in exploring the content. For the non-certification programs, the only mandate is the uploading of grades into the online system. The learning management system, Blackboard, is optional for these programs. Program faculty are expected

to adhere to copyright law and provisions of fair use. Technology integration training is offered but optional.

Examples of how technology is used within the programs provided by the two teacher preparation program administrators include the use of Pearson's MyEducationLab for the completely online early childhood education program; Voice Thread; Blackboard; flipped classroom and hybrid classrooms; and professional development opportunities provided by the half-time faculty technologist on staff. The undergraduate program administrator indicated that the challenge in applying many different types of technology tools is that those tools faculty find to be less effective are then seen as a burden and technology use as a whole can fall into disuse as a result of over-generalization.

Administrator Interview Summary

All three administrators were familiar with the terms National Educational Technology Standards and digital citizenship. The administrators in charge of the teacher certification programs indicated that there is a programmatic expectation that students graduate with the ability to integrate technology in the classroom in accordance with NETS-T. Administration has dedicated resources to revising the core curriculum to include standards-based technology integration and usage by both instructors and students. The expectations for PhD students or students in non-certificate education programs are not as high in terms of standards-based technology knowledge and skills upon graduation.

Chapter 4

DISCUSSION

Discussion of the Main Purpose

The main purpose of this study was to determine preservice teachers' level of awareness of the NETS standards and the extent to which the curriculum goals of the examined Teacher Preparation program, core course objectives and course activities influence this level of awareness. Avenues of investigation for this study included an exploration of the perceptions and observations of administrators, instructors and students in terms of expectations and classroom practices related to standards-based technology integration. Identification of standards-based technology themes within the MFLTC program documents was also conducted as a means to investigate the awareness levels. Finally, preservice teachers' perceptions of their own NETS-T awareness levels were collected in the form of an electronic questionnaire.

This study revealed five main findings: 1) Preservice teachers' average self-identified awareness level of NETS-T standards lies between the Literacy and Integration levels, 2) there is variation among administration, instructors, and students in terms of programmatic expectations and awareness of resources, 3) in the core courses common to almost all education majors, regardless of specialty, little standards-based technology integration is documented as an objective or requirement, 4) a misconception exists among instructors and students on what standards-based technology integration means beyond the productivity and presentation level, and 5) programmatic policies and procedures are in place within the Mary Lou Fulton Teachers College that indicate an intent to revise courses to include standards-based technology and to train instructors to integrate technology beyond the presentation level.

What degree of awareness do preservice teachers enrolled in the ASU teacher preparation program demonstrate regarding NETS-T standards? The preservice teacher survey responses showed that on average, 20% of respondents place themselves in the Literacy and Integration levels of NETS-T awareness. Participants who were in their junior or senior year or who were in either Elementary, Secondary, or Early Childhood education programs self-identified at the Integration level of NETS-T awareness. This indicates that for most NETS-T items, typical respondents feel that they can both continue to explore technology and have developed the skills enabling them to use technology when prompted and select and apply appropriate technology to successfully complete tasks (ISTE, 2012).

Juniors and seniors in the study show the highest self-reported level of NETS-T awareness as do Elementary and Secondary education majors, which corresponds to the majority of the respondents (37% juniors; 26% seniors; 30.6% Elementary education majors; 29% Secondary education majors). Interestingly, this information does not correspond directly to the level of courses surveyed. The majority of the respondents were currently enrolled or had previously taken both SPE 222, Orientation to the Exceptional Child, and BLE 220, Foundations of Structured English, both of which are sophomore-level courses that are generally taken prior to official entrance into the education program. Upon analysis of the course objectives and syllabus, the SPE 222 course showed assessments and activities that integrated technology in the categories "Using technology to facilitate and inspire student learning and creativity;" Using technology to design and develop digital-age learning experiences and assessments" and "Using technology to engage in professional growth and leadership." This differs from BLE 220, which contains technology elements only in the "Using technology for teacher presentation of

information" category. The higher level of technology integration in the SPE 222 may account for the higher level of NETS-T recognition in juniors and seniors, despite the survey of lower-level classes. However, it is more likely that juniors and seniors have acquired this knowledge elsewhere in the program, having most likely taken several of the technology-infused courses or other major-specific courses that contained standards-based technology integration but were not included as part of this study.

The participant interviews indicated that the majority of preservice teachers interviewed were at the Literacy level of NETS-T awareness at a minimum, indicating that they can "continue to explore technology and have developed the skills enabling them to use technology when prompted" (ISTE, 2012). This conclusion is based on responses that listed technology tools that the participant was able to use in the classroom or for an assignment (Google Docs, Prezi, Smartboards) in addition to the stated and implied use of these tools (for presentation of information or productivity purposes). While 60% of respondents indicated that they were unfamiliar with the NETS-T, 38.9% indicated that they integrate technology into their assignments including lesson plans. None of the respondents were able to articulate this integration as compliance with the NETS-T. Nevertheless, their claims to use technology for productivity and presentation of information would seem to indicate that they are practicing the content of the NETS-T without being aware of the formal standards they are following. It is encouraging that 20.3% of preservice teachers in the study self-identify knowledge of technology standards at a minimum awareness level of Literacy and an equal number self-identify at the Integration level. There does, however, seem to be a disconnect between this knowledge of the content of the standards and the ability to name or identify what that content is. In other words,

since 60% of the participants who were interviewed reported only learning the term "National Educational Technology Standards" as a result of participating in this study, it would appear that more direct instruction or identification of the NETS-T may be necessary for preservice teachers to make the connection from what they are currently doing with technology to the standards they are unknowingly following. The participant interviews revealed one area that would allow for an increase in standards-based technology integration. A little more than one-third (38.9%) of the participants reported use of technology in the classroom mainly for productivity and presentation purposes (Graham et al., 2009) when they listed using presentation and productivity tools as methods of completing assignments or reviewing content. Encouraging students to go beyond this level and integrate technology as a way to engage their future students would allow preservice teachers to blend pedagogy with technology. There was little evidence in either the survey or the follow-up participant interviews to indicate that preservice teachers were able to identify methods in which to use standards-based technology for pedagogical purposes. However, this does not preclude that they may be integrating standards-based technology for pedagogical purposes without being able to accurately verbalize that they are doing so due to a lack of explicit knowledge of NETS-T or technology integration levels.

The current study did not directly examine the extent to which education faculty were practicing standards-based technology integration in the common core classes. Despite this, the findings from the study suggest that the technology integration model adopted by the MLFTC education curriculum may benefit from inclusion of direct instruction of both the NETS-T and technology integration that supports pedagogical use and promotion of digital citizenship beginning in the lower-level required courses such as SPE 222 and BLE 220. In addition,

requiring students to create lesson plans that include standards-based technology integration to support pedagogy and not presentation of information would also serve to raise the level of NETS-T awareness (Chelsey, 2012; Brantley-Dias et al., 2007; Angeli & Valanides, 2005; Graham et al., 2009).

To what extent do the curriculum goals of the ASU teacher preparation program include technology integration in accordance with the NETS standards? At face value, the analysis of the curriculum goals of the MLFTC, as described on the program website, does not reveal a policy of standards-based technology integration. Technology-related themes do not appear in the curriculum goals statements, nor do they appear as either a major or minor focus of most program descriptions. The descriptions on the program websites of certain education majors, such as Early Childhood Education, do contain explicit statements that express the importance of technology within the program. A closer investigation of the policies and views of the program administration indicates a view far more supportive of technology and standards-based technology integration than the curriculum goals would suggest. Looking at policy, each preservice teacher is required to take a computer literacy class such as EDT 180 or EDT 321. Both of these courses support standards-based technology use by preservice teachers. Although neither course requires preservice teachers to create lesson plans, in class activities and assignments give them practice with technology on a pedagogical level.

Further, several of the education majors require an additional technology themed course. Early Childhood, Special Education, MEd in Elementary Education and the MEd in Special Education all require independent teaching with technology courses. Conversely, the MEd in Early Childhood and the MPE programs require no computer literacy or technology courses.

This variation in requirements for graduate students in certification programs may account for the lower awareness levels of the graduate students as indicated by the NETS-T survey, as might the unfamiliarity of the graduate program administrator with the NETS-T and their classroom implications.

When interviewed, the program administrators indicated that the program curriculum as a whole was moving towards standards-based technology integration. The presence of a technology-infusion specialist who is working at revising individual courses in alignment with the NETS-T is a sign of the seriousness with which the administration takes the technology integration model that has been adopted by the program. Almost all students, faculty and administration agreed that there are sufficient resources to support standards-based technology integration. These include the Professional Learning Library on the program website, as well as the technology services advisors and the technology infusion specialist that support faculty and students who wish to explore technology more in-depth.

A recognized concern from the administration and faculty alike is the challenge of supporting innovation and training for the program instructors. Although the program policy is one of technology integration, both administrators and faculty indicated that the skill, knowledge and time are not present for all program faculty to integrate technology in a manner that aligns with NETS-T. As one faculty member stated: "I would love more [technology] training but there is not enough personnel, not enough funding. We need more tech/infusion specialists to offer professional development." Since only eight courses have currently been revised by the technology infusion specialists, and the required computer literacy courses do not specifically address standards-based technology use in the classroom, program faculty must develop their

own courses that integrate technology. With a wide range of instructors teaching the core courses, from full professors to teaching assistants, maintaining consistency in quality standards-based technology integration may be impossible. In addition, with only one technology infusion specialist, revision of every program course may take many years, during which the NETS-T and technology in general will continue to evolve faster than the curriculum.

Based on findings from this study, administrative support for the technology integrated curriculum is present, and administrators are encouraging change from within in terms of supporting preservice teachers' awareness of NETS-T at a level above Literacy or presentation of information. "Technology is a tool to explore the content," stated one administrator. Changes are being made to core classes by technology infusion specialists that integrate NETS-T in order to give the preservice teachers the skills they will need to support future digital citizens. It is a slow process, but change is occurring and the "unspoken technology rule" mentioned by one administrator is making its way down to the instructors course by course. Revision of the curriculum goals to include mention of NETS-T, standards-based technology, or digital citizenship would emphasize the importance that these elements would seem to have upon discussion with the administrators. Making these items curricular goals would also hold faculty and students accountable for reaching them prior to the end of a student's program and publicize the change that is already happening internally.

To what degree do ASU core teacher preparation courses include technology integration as course objectives? Only the course objectives for EDT 180 and EDT 321, the computer literacy courses, mention technology. Both courses have one objective that states students will "analyze some social and ethical issues related to the increased use of technology in

education, business, or society" which seems to support the exploration of the concept of digital citizenship without explicitly defining that term. The remaining objectives for both classes indicate that the students will be able to use specific technology for discrete tasks, largely for productivity and presentation purposes.

The PPE 310 course specifically states that certain course objectives align with NETS-T standards. However, it is unclear from the syllabus how "Understand the current health of the children in the U.S" aligns to NETS-T 3a or d:

> a. Demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations
>
> d. Model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning (ISTE, 2012).

The remaining course objectives that are labeled as being in alignment with NETS-T are similarly unclear as to how the alignment is implemented in the course. Without observation of the in-class activities, the verbiage in the syllabus would indicate that the course objectives are in fact not aligned with the NETS-T nor is technology present as an overall objective of the course as a whole.

The presence of course objectives that contain standards-based technology goals for the course would help demonstrate how the objectives alight with NETS-T, and help demonstrate alignment with the larger program goals that include a technology integration model. In general, course objectives hold both instructor and learning accountable for achievement within the confines of a course. Combs, Gibson, Hays, Saly, and Wendt (2008) stress the importance of

course objectives as they "define a course in terms of the outcomes the instructor expects students to achieve" (p. 88) and Allison (2012) emphasizes that they "form the structure and purpose of your training solution and provide learners clear expectations of what the learning experience will present them with" (p. 15). If, as the responses from interviews with program administration suggest, standards-based technology competence is an expectation of graduating preservice teachers, course learning objectives should reflect that expectation and give students and teachers an assessable outcome to strive for. If no courses have standards-based technology objectives, is it possible for a program to graduate students with technology competence? Creating an aligned system of standards-based technology integration program goal and course objectives would allow MLFTC to more fully and accurately assess the technology competency with which their preservice teachers complete their program. From the interviews with administrators, these changes are coming to core courses within each program, but have yet to be implemented in the courses analyzed in the process of this study.

To what extent does the presence of course objectives that include technology integration in the core courses impact preservice teacher awareness of NETS-T standards? Based on the limited sampling of courses, it would appear that course objectives that specify technology integration have little to no impact on preservice teacher awareness of the NETS-T standards at least in terms of the core courses. Of the courses, only EDT 180 and 321 have objectives that include technology goals. While both of these courses, because of the nature of their content, have technology related objectives, none of the objectives include standards-based technology objectives but rather objectives that develop a working knowledge and level of comfort with technology tools for productivity, presentation of information and for research.

Despite the lack of standards-based technology objectives, preservice teachers' mean level of NETS-T awareness fell equally on Literacy and Integration. This would seem to indicate that the courses include practice, either as activities, assignments, or teacher modeling, that gives the preservice teachers the awareness of the content of the standards even if they are unable to identify the specific vocabulary or articulate the function of the standards themselves.

Since the average awareness level is at the Integration level for Elementary, Secondary, and Early Childhood education majors and/or juniors and seniors in the program, potentially it is the specialty-specific courses or those courses already revised by the technology infusion specialists that are contributing to the higher level of awareness. Further studies at a specialty level may help pinpoint whether course objectives that contain standards-based technology integration goals impact NETS-T awareness levels in preservice teachers on a programmatic level.

Conclusion

Overall, the teacher certification program at the Mary Lou Fulton Teachers College at Arizona State University provides preservice teachers with a technology integrated model of education that allows them to reach at least a Literacy level of National Educational Technology Standards for Teachers awareness. While the stated curriculum goals and the course objectives of the five core courses common to all undergraduate education majors contain very little in terms of standards-based technology goals, preservice teachers gain exposure to technology tools both through modeling of their instructors and through hand-on activities and assignments. The program administration expresses support for technology integration on a program-wide level and faculty interviewed indicate an interest of learning and doing more with standards-based

technology in the classroom. Conversely, data from this study revealed an overall lack of understanding from both students and instructors as to how to use standards-based technology at a pedagogical level – that is, beyond the presentation of information or the organization of the course. While assignments existed that allowed students to create with technology, few assignments presented them with the opportunity to develop lessons that would potentially develop better digital citizens or encourage them to teach others about meaningful technology usage in the classroom (Leadership level).

Suggestions for improvement of this program in terms of standards-based technology are for a clearer policy to be established regarding standards-based technology. If standards-based technology awareness and integration skill is indeed a program goal for students to have at program completion, as indicated verbally by the administrators, then a revision of the official curriculum goal of the program to reflect that is a necessary first step. A programmatic-wide revision of course objectives to include at least one standards-based technology goal can provide a basis for judging student competency at program end. Furthermore, a clear policy on standards-based technology can give direction to all course instructors. Clear expectations regarding how instructors should integrate technology and how they should require students to use technology should be communicated, and mandatory professional development on the integration of standards-based technology into course curriculum will insure consistency across all program courses in terms of methods of instruction. This type of initiative may require the services of more than one technology infusion specialist. Finally, direct instruction of the NETS-T should be incorporated into courses early in the program, and standards-based technology integration should become the norm, not the exception, for preservice teacher lesson planning.

Adoption of NETS-TE, National Educational Technology Standards for Teacher Educators, can enhance the rigor with which technology is integrated program wide. Foulger (2013) describes the importance of NETS-TE

> Teacher educators who help educational leaders and teachers understand what relevant and effective digital age teaching and learning looks like are functioning in the spirit of the NETS-TE vision. They influence teachers, either directly or indirectly, to create learning experiences that help students develop the knowledge and skills needed for the digital age. The values, beliefs, and behaviors of those educators will comprise the NETS-TE. (p. 70)

Following the vision of NETS-TE, explicit instruction of NETS-T would allow students to give a name to what they perceive they are already capable of and allow them to begin to connect that awareness with the importance of standards-based technology in their future teaching experiences.

Limitations of the study

As with any study, a number of important limitations need to be considered when interpreting the findings. First, a large portion of the study depended on self-reported data from the participants in both the survey portion and the interview portion. These self-reported data relied on the participants' interpretations of the survey and interview questions. In addition, the participants' responses may have been biased based on their attitudes towards technology in general. In an attempt to address this limitation, data was triangulated from documents and follow-up interviews with faculty and administrators. Further, the participants self-selected participation in the survey and the follow-up interview. Outside and unidentified common

factors that encouraged the respondents to participate may have influenced their answers on both the survey and the interviews. The same idea also applies to both faculty and administrator participants. It is entirely possible that those individuals who agreed to participate had motives or factors outside the scope of the study that motivated them to participate and which colored the nature of their responses.

In addition, because data collected through the study are primarily from student, faculty, and administration self-report, they cannot provide an objective view of what occurs within the classroom in terms of standards-based technology integration or instruction, whether due to modeling, direct instruction, case studies, or problem-based assignments. Future studies should include in-class observations, perhaps over the course of a semester, to gain an expert-evaluator's insight into the role technology plays in the classroom itself. Artifacts such as student-created lesson plans or teacher-created activities would provide another valuable glimpse into how standards-based technology is incorporated into the classroom.

An additional concern regarding the participants is that the population of each class examined was not limited to education majors. Participation in the student survey by non-education majors may have skewed the survey results. Non-education majors may have more or less technological competence than education majors, and are unlikely to be able to formally articulate these skills in terms of their impact on teaching and learning. However, only 3.2% of survey respondents identified themselves as non-education majors. No interview participants were non-education majors.

Data analysis was another potential limitation of this study. It is possible that the multiple one-way ANOVA procedures performed on the data set to determine the NETS

awareness levels of the subcategories of participants (class standing, educational specialty, etc) increase the probability of Type I errors, which are errors that occur when the results of the statistical test are determined to be significant although no actual relationship exists. This inflation of the Type I error rate occurs when the same statistical tests are performed on the same set of data multiple times. With each repetition of the test, the overall p value is increased, increasing the likelihood of a significant result. While statistical significance was found in the post-hoc tests of the last data set (technology integration in lesson planning), the possibility exists that the statistical significance found in this test was due to a Type I error, indicating that in reality, no statistical significance exists and the null hypothesis is indeed true. An additional concern with the data is the lack of equal groups within the subcategories. For example, 23 out of 62 respondents were juniors while 4 were sophomores and 19 were Elementary education majors and 5 were Early Childhood education majors. The unequal sample sizes within these subcategories could lead to a increase in the effect of the inequality of variances which in turn could lead to incorrect conclusions regarding statistical significance or lack thereof.

A final concern regarding the student survey is the fact that for most of the standard-related questions on the survey, at least 27% of the participants did not respond. This lack of response could have been due to a lack of knowledge or understanding of the question wording or impatience with the length of each subcategory. This noncompletion of the full survey by 27% of the participants could contribute to both an increase in sampling variance and bias of the estimates, depending on the demographics of those participants who chose not to complete the NETS-T portion of the survey.

Another limitation of the study is that challenges in communicating with potential participants likely reduced the pool size, resulting in a less representative subject pool. As with any research with students, this study required cooperation between researcher and institution in order to contact participants and to obtain the documents needed for the document analysis. Using a survey administration protocol such as Dillman's (2000) Tailored Design Method, in which there is a pre-notification; a notification inclusive of the survey link; and three follow-up emails; was difficult to complete due to the lack of access to the individual participant emails. In accordance with the approvals and permissions from the Institutional Review Board, the researcher was reliant on contact with course faculty members for participation The consequences of relying on the cooperation of the faculty include a lack of follow-up available to insure that the students were indeed notified of the survey. In addition, it was not possible to send reminders to the students. Even the survey sent out on the MLFTC list-serv was not controlled by the researcher and consequently no follow-up could be sent after that notification either.

During the course of this study, many instructors declined to participate, citing time constraints or lack of interest or applicability to their class. Of those instructors who agreed to participate, it is unknown the percentage of their specific students that agreed to participate as well. Both levels of cooperation were needed for this particular study. Along similar lines, survey return rates, as with most survey-based research, were likely low. Because the survey was sent either by electronic mail to student accounts from the instructor or posted within the course learning management shell, it is possible that a portion of the students did not receive the survey link, or that they declined to participate, or that instructors did not distribute the link.

Also, the revised, technology-infused undergraduate methods courses were not included as part of this study, as they were not part of the five common undergraduate and two common graduate core classes identified in the analysis (Appendix F). These courses were also not identified by course name/number at any point in this study and it is not clear from the course catalog which courses might be the revised ones. A pre-post study design focusing on those technology-infused methods classes could better pinpoint the effectiveness of the technology integration model in educating preservice teachers about the NETS-T.

Many factors could account for the difference of the level of awareness of NETS-T standards between students, whether it is class standing, previous experience at a different institution, or different instructors. It is difficult to isolate these factors due to the design of the study and the lack of a controlled trial. Opportunities exist for future studies that could attribute causal factors to the level of NETS-T awareness in preservice teachers.

There is a lack of prior research into the question of NETS-T recognition in either preservice or inservice teachers. While attitudes towards technology and actual use of technology in the classroom are both areas that have been examined, the concept of NETS-T recognition in teachers, either preservice or inservice, provides an opportunity for future studies.

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APPENDIX A

DATA TABLES AND FIGURES

Table 8

Factor Analysis results with recoded data

	Component		
	1	2	3
q0011_0001_recoded	.858	-.152	-.082
q0011_0002_recoded	.799	.119	-.396
q0011_0003_recoded	.856	-.008	-.241
q0011_0004_recoded	.755	-.269	.113
q0012_0001_recoded	.792	.470	.030
q0012_0002_recoded	.764	.515	.036
q0012_0003_recoded	.881	.060	-.096
q0012_0004_recoded	.805	.310	-.228
q0013_0001_recoded	.757	.352	-.026
q0013_0002_recoded	.841	-.030	.287
q0013_0003_recoded	.797	.090	.476
q0013_0004_recoded	.795	.091	.473
q0014_0001_recoded	.851	-.209	.193
q0014_0002_recoded	.883	.007	-.224
q0014_0003_recoded	.873	-.268	.153
q0014_0004_recoded	.893	.032	.141
q0015_0001_recoded	.839	-.342	-.025
q0015_0002_recoded	.890	-.214	-.209
q0015_0003_recoded	.861	-.232	-.114
q0015_0004_recoded	.849	-.182	-.205

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Table 9

Percentage of awareness level responses in Facilitate and Inspire Student Learning and Creativity by sub category.

Sub-category	Awareness Level	Percentage of Respondents
I can promote, support, and model creative and innovative thinking and inventiveness	Awareness	8.1
	Literacy	21.0
	Integration	24.2
	Leadership	12.9
	I have not learned this	6.5
	No response	27.4
I can engage students in exploring real-world issues and solving authentic problems using digital tools and resources	Awareness	11.3
	Literacy	21.0
	Integration	19.4
	Leadership	14.5
	I have not learned this	6.5
	No response	27.4
	Awareness	12.9

I can promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative processes	Literacy	19.4
	Integration	17.7
	Leadership	12.9
	I have not learned this	8.1
	No response	29.0
I can model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments	Awareness	12.9
	Literacy	21.0
	Integration	17.7
	Leadership	14.5
	I have not learned this	4.8
	No response	29.0

Table 10

Percentage of awareness level responses in Design and Develop Digital-Age Learning Experiences and Assessments by sub category.

Sub-category	Awareness Level	Percentage of Respondents
I can design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity	Awareness	12.9
	Literacy	19.4
	Integration	17.7
	Leadership	12.9
	I have not learned this	8.1
	No response	29
I can develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational	Awareness	9.7
	Literacy	19.4
	Integration	21.0
	Leadership	9.7
	I have not learned this	11.3
	No response	29.0

goals, managing their own learning, and assessing their own progress		
	Awareness	11.3
I can customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources	Literacy	17.7
	Integration	19.4
	Leadership	16.1
	I have not learned this	6.5
	No response	29.0
	Awareness	16.1
I can provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching	Literacy	19.4
	Integration	16.1
	Leadership	9.7
	I have not learned this	9.7
	No response	29.0

Table 11

Percentage of awareness level responses in Model Digital-Age Work and Learning by sub category.

Sub-category	Awareness Level	Percentage of Respondents
I can demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations	Awareness	8.1
	Literacy	17.7
	Integration	21.0
	Leadership	17.7
	I have not learned this	8.1
	No response	27.4
I can collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation	Awareness	9.7
	Literacy	14.5
	Integration	22.6
	Leadership	21.0
	I have not learned this	4.8
	No response	27.4

	Awareness	8.1
I can communicate relevant information and ideas effectively to students, parents, and peers using a variety of digital-age media and formats	Literacy	22.6
	Integration	16.1
	Leadership	19.4
	I have not learned this	6.5
	No response	27.4
	Awareness	11.3
I can model and facilitate effective use of current and emerging digital tools to locate,analyze, evaluate, and use information resources to support research and learning	Literacy	22.6
	Integration	21.0
	Leadership	11.3
	I have not learned this	6.5
	No response	27.4

Table 12

Percentage of awareness level responses in Model Digital-Age Work and Learning by sub category.

Sub-category	Awareness Level	Percentage of Respondents
I can advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources	Awareness	12.9
	Literacy	14.5
	Integration	17.7
	Leadership	22.6
	I have not learned this	4.8
	No response	27.4
I can address the diverse needs of all learners by using learner-centered strategies and providing equitable access to appropriate digital	Awareness	12.9
	Literacy	8.1
	Integration	21.4
	Leadership	24.2
	I have not learned this	4.8
	No response	29

tools and resources		
	Awareness	8.1
I can promote and model	Literacy	22.6
digital etiquette and	Integration	16.1
responsible social	Leadership	19.4
interactions related to the use	I have not learned this	6.5
of technology and	No response	27.4
information		
	Awareness	12.9
I can develop and model	Literacy	17.7
cultural understanding and	Integration	19.4
global awareness by	Leadership	16.1
engaging with colleagues	I have not learned this	6.5
and students of other	No response	27.4
cultures using digital-age		
communication and		
collaboration tools		

Table 13

Percentage of awareness level responses in Model Digital-Age Work and Learning by sub category.

Sub-category	Awareness Level	Percentage of Respondents
I can participate in local and global learning communities to explore creative applications of technology to improve student learning	Awareness	12.9
	Literacy	19.4
	Integration	21.0
	Leadership	8.1
	I have not learned this	11.3
	No response	27.4
I can exhibit leadership by demonstrating a vision of technology infusion, participating in shared decision making and community building, and developing the leadership	Awareness	14.5
	Literacy	21.0
	Integration	19.4
	Leadership	9.7
	I have not learned this	6.5
	No response	29

and technology skills of others		
	Awareness	17.7
I can evaluate and reflect on	Literacy	12.9
current research and	Integration	25.8
professional practice on a	Leadership	19.4
regular basis to make	I have not learned this	11.3
effective use of existing and	No response	9.7
emerging digital tools and resources in support of student learning		
	Awareness	12.9
I can contribute to the	Literacy	17.7
effectiveness, vitality, and	Integration	19.4
self-renewal of the teaching	Leadership	16.1
profession and of their	I have not learned this	6.5
school and community	No response	27.4

Table 14

Courses previously or currently enrolled by class standing

	Freshman	Sophomore	Junior	Senior	Graduate
BLE 220: Foundations of Structured English Immersion	0	1	14	13	0
ECD 418: Instructional Methods for Young Children: Integrating Digital Media	0	0	0	1	0
EDT 180: Computer Literacy (CS) OR	3	1	9	7	0
EDT 321: Computer Literacy (CS)	3	0	2	3	0
EDP 311: Educational Psychology for Future Teachers (SB)	0	0	5	3	0
EDP 313: Childhood and Adolescence (SB)	0	0	6	3	0
MTE 280: Investigating Quantity: Number, Operations & Numeration Systems	4	1	2	4	0
SPE 222: Orientation to Education of Exceptional Children (SB & C)	13	3	17	15	1
TEL 215: Introduction to Child and Adolescent Development (SB)	4	1	2	5	0
TEL 311: Instruction and Management in the Inclusive Classroom	0	1	5	9	0
USL 216: Service Learning	0	0	0	2	0

Table 15

Courses currently or previously enrolled by education specialty

	ELE	SED	ECH	ESL	SPED
BLE 220: Foundations of Structured English Immersion	8	14	3	0	3
ECD 418: Instructional Methods for Young Children: Integrating Digital Media	0	0	1	0	0
EDT 180: Computer Literacy (CS) OR	6	7	2	0	4
EDT 321: Computer Literacy (CS)	3	2	2	0	0
EDP 311: Educational Psychology for	7	1	0	0	0

Future Teachers (SB)					
EDP 313: Childhood and Adolescence (SB)	2	7	0	0	0
MTE 280: Investigating Quantity: Number, Operations & Numeration Systems	6	0	3	0	1
SPE 222: Orientation to Education of Exceptional Children (SB & C)	12	15	5	0	10
TEL 215: Introduction to Child and Adolescent Development (SB)	2	5	1	0	3
TEL 311: Instruction and Management in the Inclusive Classroom	1	12	1	0	1
USL 216: Service Learning	0	0	1	0	1

Table 16

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
q0011_0001_recoded	1.265	4	39	.300
q0011_0002_recoded	5.344	4	39	.002
q0011_0003_recoded	2.681	4	38	.046
q0011_0004_recoded	3.082	4	38	.027
q0012_0001_recoded	2.450	4	38	.063
q0012_0002_recoded	3.176	4	38	.024
q0012_0003_recoded	2.939	4	38	.033
q0012_0004_recoded	.837	4	38	.510
q0013_0001_recoded	1.550	4	39	.207
q0013_0002_recoded	3.773	4	39	.011
q0013_0003_recoded	1.472	4	39	.229
q0013_0004_recoded	.984	4	39	.427
q0014_0001_recoded	.876	4	39	.487
q0014_0002_recoded	1.218	4	38	.319
q0014_0003_recoded	2.083	4	38	.102
q0014_0004_recoded	1.894	4	39	.131
q0015_0001_recoded	2.043	4	39	.107
q0015_0002_recoded	2.352	4	38	.071
q0015_0003_recoded	.659	4	38	.624
q0015_0004_recoded	1.573	4	39	.201

Table 17

ANOVA results: Awareness level and Class standing

		Sum of Squares	df	Mean Square	F	Sig.
I can promote, support, and model creative and innovative thinking and inventiveness	Between Groups	6.859	4	1.715	1.303	.286
	Within Groups	51.323	39	1.316		
	Total	58.182	43			
I can engage students in exploring real-world issues and solving authentic problems using digital tools and resources	Between Groups	6.766	4	1.691	1.170	.339
	Within Groups	56.394	39	1.446		
	Total	63.159	43			
I can promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative processes	Between Groups	0.422	4	0.105	0.061	.993
	Within Groups	65.439	38	1.722		
	Total	65.860	42			
I can model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments	Between Groups	7.341	4	1.835	1.289	.291
	Within Groups	54.101	38	1.424		
	Total	61.442	42			
I can design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity	Between Groups	6.578	4	1.644	1.009	.415
	Within Groups	61.934	38	1.630		
	Total	68.512	42			

I can develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress	Between Groups	8.388	4	2.097	1.364	.264
	Within Groups	58.403	38	1.537		
	Total	66.791	42			
I can customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources	Between Groups	6.656	4	1.664	1.070	.385
	Within Groups	59.112	38	1.556		
	Total	65.767	42			
I can provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching	Between Groups	5.062	4	1.265	.777	.547
	Within Groups	61.915	38	1.629		
	Total	66.977	42			
I can demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations	Between Groups	7.522	4	1.881	1.124	.359
	Within Groups	65.273	39	1.674		
	Total	72.795	43			
I can collaborate with students, peers, parents,	Between Groups	4.730	4	1.182	.770	.551

and community members using digital tools and resources to support student success and innovation	Within Groups	59.906	39	1.536		
	Total	64.636	43			
I can communicate relevant information and ideas effectively to students, parents, and peers using a variety of digital-age media and formats	Between Groups	6.786	4	1.697	1.103	.369
	Within Groups	60.009	39	1.539		
	Total	66.795	43			
I can model and facilitate effective use of current and emerging digital tools to locate,analyze, evaluate, and use information resources to support research and learning	Between Groups	2.669	4	.667	.452	.770
	Within Groups	57.581	39	1.476		
	Total	60.250	43			
I can advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources	Between Groups	7.154	4	1.789	1.093	.374
	Within Groups	63.823	39	1.636		
	Total	70.977	43			
I can address the diverse needs of all learners by using learner-centered strategies and providing equitable access to appropriate digital tools and resources	Between Groups	3.400	4	.850	.586	.675
	Within Groups	55.112	38	1.450		
	Total	58.512	42			
I can promote and model digital etiquette	Between Groups	3.268	4	0.817	0.451	.771

and responsible social interactions related to the use of technology and information	Within Groups	68.779	38	1.810		
	Total	72.047	42			
I can develop and model cultural understanding and global awareness by engaging with colleagues and students of other cultures using digital-age communication and collaboration tools	Between Groups	7.965	4	1.991	1.303	.286
	Within Groups	59.581	39	1.528		
	Total	67.545	43			
I can participate in local and global learning communities to explore creative applications of technology to improve student learning	Between Groups	2.042	4	0.511	.302	.875
	Within Groups	65.958	39	1.691		
	Total	68.000	43			
I can exhibit leadership by demonstrating a vision of technology infusion, participating in shared decision making and community building, and developing the leadership and technology skills of others	Between Groups	1.251	4	0.313	.205	.934
	Within Groups	57.912	38	1.524		
	Total	59.163	42			
I can evaluate and reflect on current research and professional practice on a regular basis to make effective use of existing and emerging digital tools and resources in support of student		1.084	4	0.271	.169	.953
		60.823	38	1.601		
		61.907	42			

learning

I can contribute to the effectiveness, vitality, and self-renewal of the teaching profession and of their school and community	Between Groups	2.505	4	0.626	.366	.831
	Within Groups	66.677	39	1.710		
	Total	69.182	43			

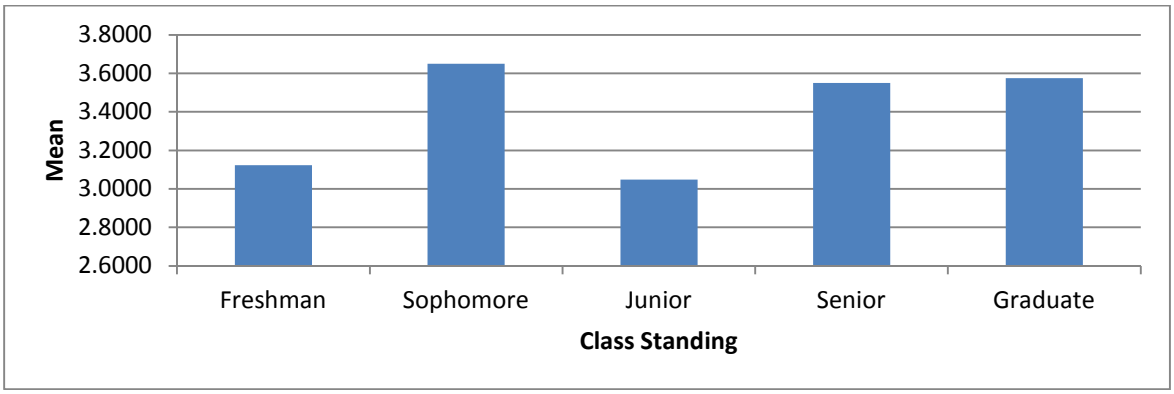

Figure 6: Awareness level means across class standing

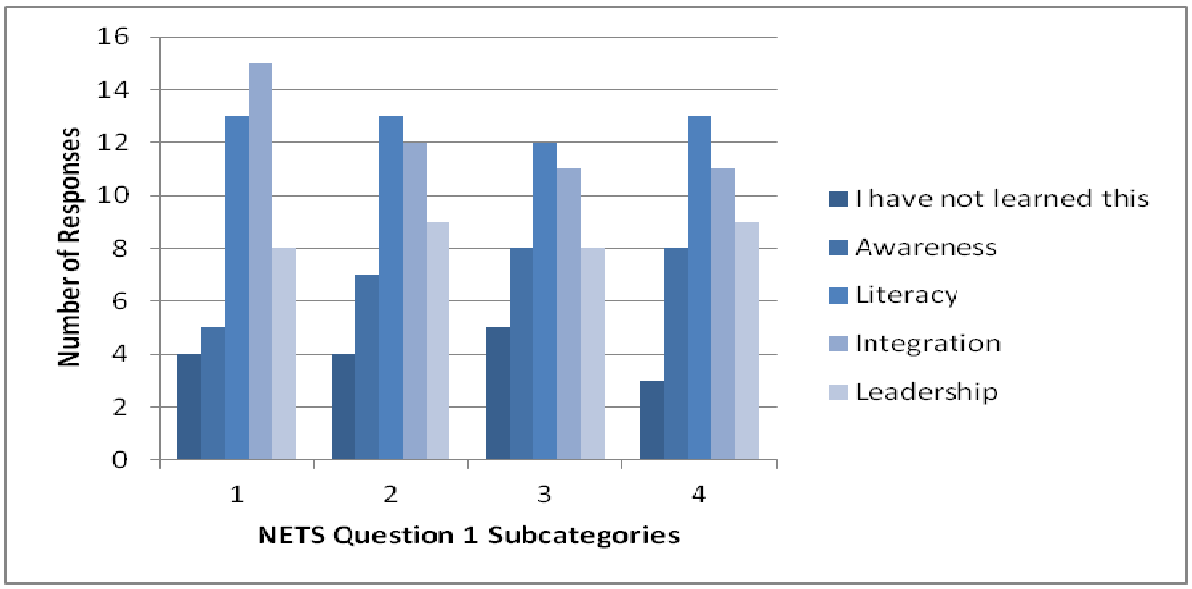

Figure 7: Number of awareness level responses across NETS question category 1

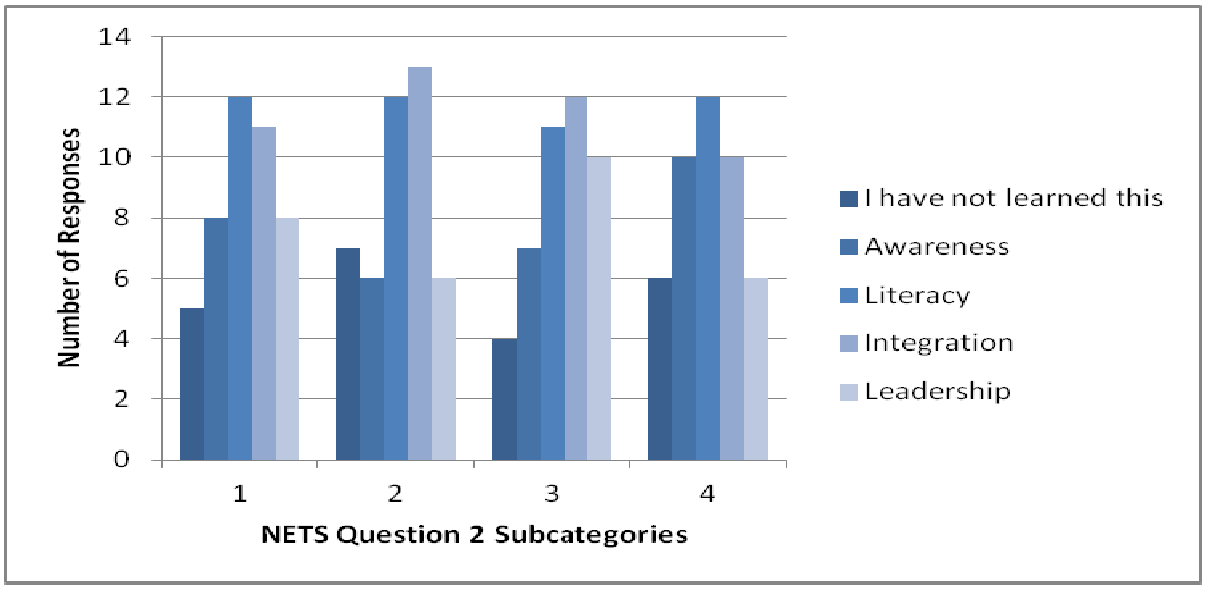

Figure 8: Number of awareness level responses across NETS question category 2

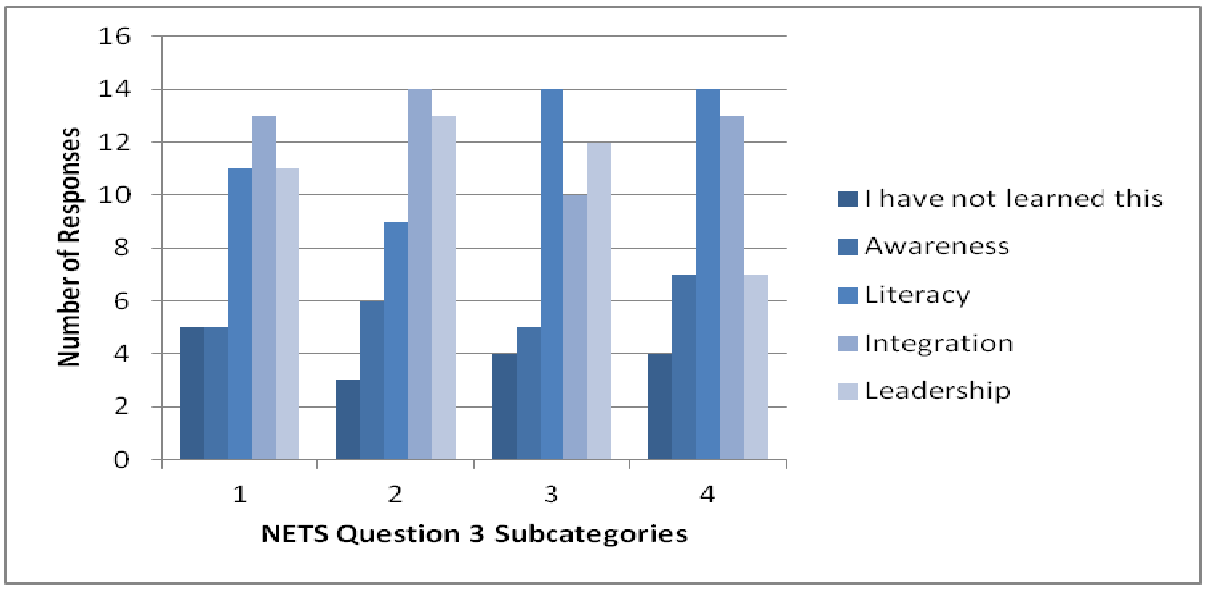

Figure 9: Number of awareness level responses across NETS question category 3

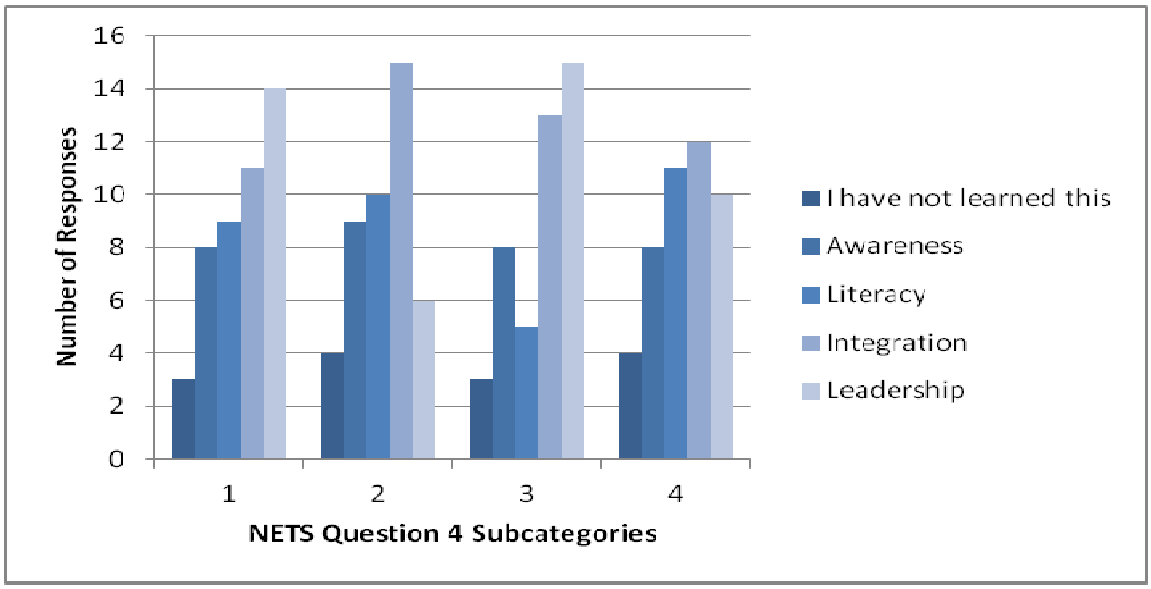

Figure 10: Number of awareness level responses across NETS question category 4

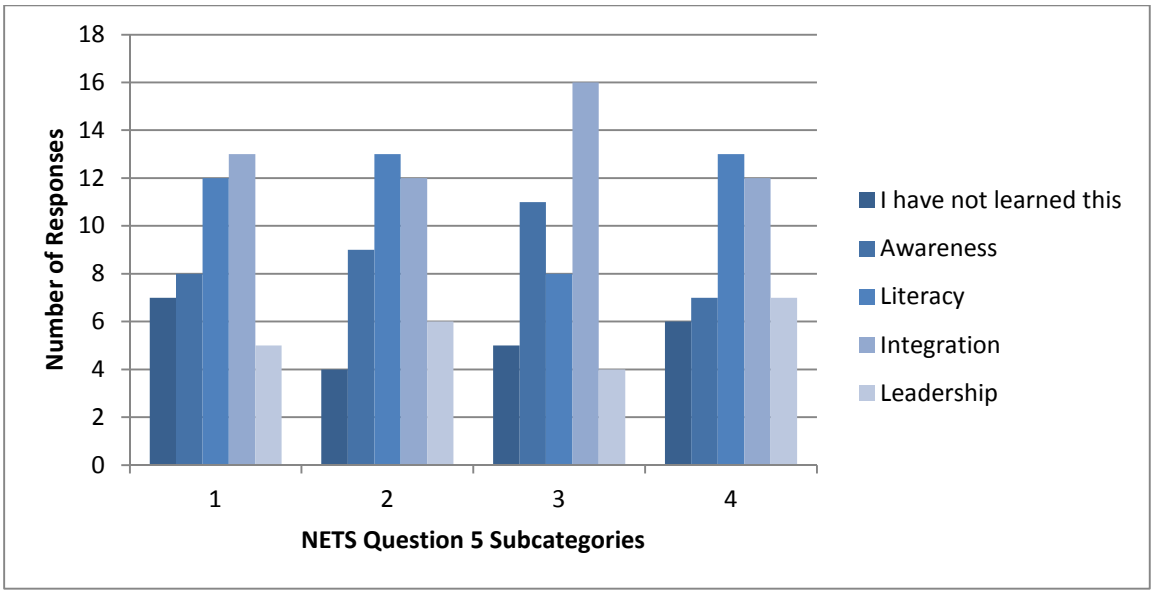

Figure 11: Number of awareness level responses across NETS question category 5

Table 18

ANOVA results: Awareness level and Education Specialty

		Sum of Squares	df	Mean Square	F	Sig.
I can promote, support, and model creative and innovative thinking and inventiveness	Between Groups	3.278	4	0.819	0.570	.686
	Within Groups	57.522	40	1.438		
	Total	60.800	44			
I can engage students in exploring real-world issues and solving authentic problems using digital tools and resources	Between Groups	0.978	4	0.244	0.150	.962
	Within Groups	65.022	40	1.626		
	Total	66.000	44			

I can promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative processes	Between Groups	4.639	4	1.160	0.701	.596
	Within Groups	64.520	39	1.654		
	Total	69.159	43			
I can model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments	Between Groups	2.080	4	0.520	0.339	.850
	Within Groups	59.807	39	1.534		
	Total	61.886	43			
I can design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity	Between Groups	1.637	4	0.409	.236	.916
	Within Groups	67.522	39	1.731		
	Total	69.159	43			
I can develop technology-enriched learning environments that enable all students	Between Groups	8.792	4	2.198	1.391	.255
	Within Groups	61.640	39	1.581		

to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress	Total	70.432	43			
I can customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources	Between Groups	5.943	4	1.486	0.927	.458
	Within Groups	62.489	39	1.602		
	Total	68.432	43			
I can provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching	Between Groups	1.963	4	0.491	.290	.883
	Within Groups	66.037	39	1.693		
	Total	68.000	43			
I can demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and	Between Groups	9.015	4	2.254	1.406	.249
	Within Groups	64.096	40	1.602		
	Total	73.111	44			

situations

I can collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation	Between Groups	3.159	4	.790	.498	.737
	Within Groups	63.419	40	1.585		
	Total	66.578	44			
I can communicate relevant information and ideas effectively to students, parents, and peers using a variety of digital-age media and formats	Between Groups	8.202	4	2.051	1.345	.270
	Within Groups	60.998	40	1.525		
	Total	69.200	44			
I can model and facilitate effective use of current and emerging digital tools to locate,analyze, evaluate, and use information resources to support research and learning	Between Groups	7.532	4	1.883	1.414	.247
	Within Groups	53.268	40	1.332		
	Total	60.800	44			
I can advocate, model, and teach safe, legal, and ethical use of digital information and	Between Groups	6.327	4	1.582	.947	.447
	Within Groups	66.784	40	1.670		

technology, including respect for copyright, intellectual property, and the appropriate documentation of sources	Total	73.111	44			
I can address the diverse needs of all learners by using learner-centered strategies and providing equitable access to appropriate digital tools and resources	Between Groups	4.717	4	1.179	.807	.528
	Within Groups	57.010	39	1.462		
	Total	61.727	43			
I can promote and model digital etiquette and responsible social interactions related to the use of technology and information	Between Groups	5.075	4	1.269	.719	.584
	Within Groups	68.811	39	1.764		
	Total	73.886	43			
I can develop and model cultural understanding and global awareness by engaging with colleagues and students of other cultures using digital-age communication and collaboration tools	Between Groups	4.299	4	1.075	.651	.629
	Within Groups	66.012	40	1.650		
	Total	70.311	44			

I can participate in local and global learning communities to explore creative applications of technology to improve student learning	Between Groups	4.236	4	1.059	.654	.627
	Within Groups	64.742	40	1.619		
	Total	68.978	44			
I can exhibit leadership by demonstrating a vision of technology infusion, participating in shared decision making and community building, and developing the leadership and technology skills of others	Between Groups	3.599	4	0.900	0.623	.649
	Within Groups	56.287	39	1.443		
	Total	59.886	43			
I can evaluate and reflect on current research and professional practice on a regular basis to make effective use of existing and emerging digital tools and resources in support of	Between Groups	7.955	4	1.989	1.414	.247
	Within Groups	54.841	39	1.406		
	Total	62.795	43			

student learning

I can contribute to the effectiveness, vitality, and self-renewal of the teaching profession and of their school and community	Between Groups	3.535	4	0.884	0.533	.712
	Within Groups	66.376	40	1.659		
	Total	69.911	44			

Table 19

ANOVA results: Awareness level and National Technology Plan Familiarity

		Sum of Squares	df	Mean Square	F	Sig.
I can promote, support, and model creative and innovative thinking and inventiveness	Between Groups	6.253	3	2.084	1.539	.219
	Within Groups	54.179	40	1.354		
	Total	60.432	43			
I can engage students in exploring real-world issues and solving authentic problems using digital tools and resources	Between Groups	5.241	3	1.747	1.186	.327
	Within Groups	58.940	40	1.474		
	Total	64.182	43			
I can promote student	Between	8.438	3	2.813	1.808	.162

reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative processes	Groups					
	Within Groups	60.679	39	1.556		
	Total	69.116	42			
I can model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments	Between Groups	3.672	3	1.224	.822	.490
	Within Groups	58.095	39	1.490		
	Total	61.767	42			
I can design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity	Between Groups	11.071	3	3.690	2.506	.073
	Within Groups	57.440	39	1.473		
	Total	68.512	42			
I can develop technology-enriched learning environments that enable all students to	Between Groups	15.645	3	5.215	3.713	.019
	Within Groups	54.774	39	1.404		
	Total	70.419	42			

pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress						
I can customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources	Between Groups	9.941	3	3.314	2.286	.094
	Within Groups	56.524	39	1.449		
	Total	66.465	42			
I can provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching	Between Groups	6.893	3	2.298	1.492	.232
	Within Groups	60.083	39	1.541		
	Total	66.977	42			
I can demonstrate fluency in technology	Between Groups	5.831	3	1.944	1.161	.337

systems and the transfer of current knowledge to new technologies and situations	Within Groups	66.964	40	1.674		
	Total	72.795	43			
I can collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation	Between Groups	5.908	3	1.969	1.302	.287
	Within Groups	60.524	40	1.513		
	Total	66.432	43			
I can communicate relevant information and ideas effectively to students, parents, and peers using a variety of digital-age media and formats	Between Groups	6.540	3	2.180	1.398	.257
	Within Groups	62.369	40	1.559		
	Total	68.909	43			
I can model and facilitate effective use of current and emerging digital tools to locate,analyze, evaluate, and use information resources to support research and learning	Between Groups	6.897	3	2.299	1.760	.170
	Within Groups	52.262	40	1.307		
	Total	59.159	43			

I can advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources	Between Groups	7.101	3	2.367	1.490	.232
	Within Groups	63.536	40	1.588		
	Total	70.636	43			
I can address the diverse needs of all learners by using learner-centered strategies and providing equitable access to appropriate digital tools and resources	Between Groups	5.805	3	1.935	1.388	.261
	Within Groups	54.381	39	1.394		
	Total	60.186	42			
I can promote and model digital etiquette and responsible social interactions related to the use of technology and information	Between Groups	6.456	3	2.152	1.299	.288
	Within Groups	64.614	39	1.657		
	Total	71.070	42			
I can develop and model cultural understanding and global awareness by	Between Groups	3.777	3	1.259	.779	.513
	Within Groups	64.655	40	1.616		

engaging with colleagues and students of other cultures using digital-age communication and collaboration tools	Total	68.432	43			
I can participate in local and global learning communities to explore creative applications of technology to improve student learning	Between Groups	4.766	3	1.589	1.006	.400
	Within Groups	63.143	40	1.579		
	Total	67.909	43			
I can exhibit leadership by demonstrating a vision of technology infusion, participating in shared decision making and community building, and developing the leadership and technology skills of others	Between Groups	2.631	3	0.877	.612	.611
	Within Groups	55.881	39	1.433		
	Total	58.512	42			
I can evaluate and reflect on current		8.699	3	2.900	2.137	.111
		52.929	39	1.357		

research and professional practice on a regular basis to make effective use of existing and emerging digital tools and resources in support of student learning		61.628	42			
I can contribute to the effectiveness, vitality, and self-renewal of the teaching profession and of their school and community	Between Groups	2.665	3	0.888	.539	.658
	Within Groups	65.881	40	1.647		
	Total	68.545	43			

Table 20

ANOVA results: Awareness level and Integration of Technology in Lesson Planning

		Sum of Squares	df	Mean Square	F	Sig.
I can promote, support, and model creative and innovative thinking and inventiveness	Between Groups	10.657	3	3.552	3.152	.036
	Within Groups	43.948	39	1.127		
	Total	54.605	42			
I can engage students in exploring real-world issues and	Between Groups	18.083	3	6.028	5.821	.002
	Within	40.382	39	1.035		

solving authentic problems using digital tools and resources	Groups Total	58.465	42			
I can promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative processes	Between Groups	18.230	3	6.077	5.032	.005
	Within Groups	45.889	38	1.208		
	Total	64.119	41			
I can model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments	Between Groups	9.946	3	3.315	2.729	.057
	Within Groups	46.173	38	1.215		
	Total	56.119	41			
I can design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity	Between Groups	14.040	3	4.680	3.587	.022
	Within Groups	49.579	38	1.305		
	Total	63.619	41			

I can develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress	Between Groups	10.391	3	3.464	2.374	.085
	Within Groups	55.442	38	1.459		
	Total	65.833	41			
I can customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources	Between Groups	18.548	3	6.183	5.603	.003
	Within Groups	41.929	38	1.103		
	Total	60.476	41			
I can provide students with multiple and varied formative and	Between Groups	11.470	3	3.823	2.831	.051
	Within Groups	51.315	38	1.350		

summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching	Total	62.786	41			
I can demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations	Between Groups	16.149	3	5.383	4.149	.012
	Within Groups	50.595	39	1.297		
	Total	66.744	42			
I can collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation	Between Groups	9.071	3	3.024	2.341	.088
	Within Groups	50.371	39	1.292		
	Total	59.442	42			
I can communicate relevant information and ideas effectively to students, parents, and peers using a variety of digital-age media and formats	Between Groups	14.849	3	4.950	4.031	.014
	Within Groups	47.895	39	1.228		
	Total	62.744	42			

I can model and facilitate effective use of current and emerging digital tools to locate,analyze, evaluate, and use information resources to support research and learning	Between Groups	12.539	3	4.180	3.954	.015
	Within Groups	41.228	39	1.057		
	Total	53.767	42			
I can advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources	Between Groups	8.492	3	2.831	1.997	.130
	Within Groups	55.276	39	1.417		
	Total	63.767	42			
I can address the diverse needs of all learners by using learner-centered strategies and providing equitable access to appropriate digital tools and resources	Between Groups	18.541	3	6.180	6.446	.001
	Within Groups	36.435	38	0.959		
	Total	54.976	41			

I can promote and model digital etiquette and responsible social interactions related to the use of technology and information	Between Groups	15.405	3	5.135	4.047	.014
	Within Groups	48.214	38	1.269		
	Total	63.619	41			
I can develop and model cultural understanding and global awareness by engaging with colleagues and students of other cultures using digital-age communication and collaboration tools	Between Groups	23.176	3	7.725	7.641	.000
	Within Groups	39.429	39	1.011		
	Total	62.605	42			
I can participate in local and global learning communities to explore creative applications of technology to improve student learning	Between Groups	13.685	3	4.562	3.562	.023
	Within Groups	49.942	39	1.281		
	Total	63.628	42			
I can exhibit leadership by demonstrating a vision of technology	Between Groups	14.690	3	4.897	4.780	.006
	Within Groups	38.929	38	1.024		

infusion, participating in shared decision making and community building, and developing the leadership and technology skills of others	Total	53.619	41			
I can evaluate and reflect on current research and professional practice on a regular basis to make effective use of existing and emerging digital tools and resources in support of student learning		9.579 47.564 57.143	3 38 41	3.193 1.252	2.551	.070
I can contribute to the effectiveness, vitality, and self-renewal of the teaching profession and of their school and community	Between Groups Within Groups Total	4.446 59.228 63.674	3 39 42	1.482 1.519	.976	.414

Table 21

Dunnett C Post-Hoc Test Awareness Level and Integration of Technology in Lesson Planning

Dependent Variable			Mean Difference (I-J)	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
q0011_0001_recoded	Always	Often	.83333	.53726	-10.1642	11.8309
		Seldom	1.10000	.56667	-9.5299	11.7299
		Never	2.07143	.79003	-6.9115	11.0543
	Often	Always	-.83333	.53726	-11.8309	10.1642
		Seldom	.26667	.33130	-.7262	1.2596
		Never	1.23810	.64249	-.9443	3.4204
	Seldom	Always	-1.10000	.56667	-11.7299	9.5299
		Often	-.26667	.33130	-1.2596	.7262
		Never	.97143	.66728	-1.3023	3.2451
	Never	Always	-2.07143	.79003	-11.0543	6.9115
		Often	-1.23810	.64249	-3.4204	.9443
		Seldom	-.97143	.66728	-3.2451	1.3023
q0011_0002_recoded	Always	Often	.12500	.20245	-.4352	.6852
		Seldom	.90000*	.23333	.1716	1.6284
		Never	1.85714	.55328	-.0582	3.7725
	Often	Always	-.12500	.20245	-.6852	.4352
		Seldom	.77500	.30892	-.1424	1.6924
		Never	1.73214	.58916	-.2591	3.7233
	Seldom	Always	-.90000*	.23333	-1.6284	-.1716
		Often	-.77500	.30892	-1.6924	.1424
		Never	.95714	.60047	-1.0907	3.0050
	Never	Always	-1.85714	.55328	-3.7725	.0582
		Often	-1.73214	.58916	-3.7233	.2591

		Seldom	-.95714	.60047	-3.0050	1.0907
q0011_0003_recoded	Always	Often	-.25000	.54590	-11.1209	10.6209
		Seldom	.61111	.58794	-9.7776	10.9998
		Never	1.50000	.73193	-7.7778	10.7778
	Often	Always	.25000	.54590	-10.6209	11.1209
		Seldom	.86111	.37906	-.2977	2.0199
		Never	1.75000	.57769	-.1921	3.6921
	Seldom	Always	-.61111	.58794	-10.9998	9.7776
		Often	-.86111	.37906	-2.0199	.2977
		Never	.88889	.61757	-1.2088	2.9866
	Never	Always	-1.50000	.73193	-10.7778	7.7778
		Often	-1.75000	.57769	-3.6921	.1921
		Seldom	-.88889	.61757	-2.9866	1.2088
q0011_0004_recoded	Always	Often	-.29167	.53494	-11.3241	10.7408
		Seldom	.50000	.60093	-9.7465	10.7465
		Never	.92857	.81961	-7.9312	9.7884
	Often	Always	.29167	.53494	-10.7408	11.3241
		Seldom	.79167	.38375	-.3963	1.9796
		Never	1.22024	.67670	-1.0852	3.5257
	Seldom	Always	-.50000	.60093	-10.7465	9.7465
		Often	-.79167	.38375	-1.9796	.3963
		Never	.42857	.72999	-2.0590	2.9161
	Never	Always	-.92857	.81961	-9.7884	7.9312
		Often	-1.22024	.67670	-3.5257	1.0852
		Seldom	-.42857	.72999	-2.9161	2.0590
q0012_0001_recoded	Always	Often	-.16667	.54728	-11.0178	10.6845
		Seldom	.61111	.61111	-9.5293	10.7516
		Never	1.35714	.74574	-7.8436	10.5578
	Often	Always	.16667	.54728	-10.6845	11.0178
		Seldom	.77778	.41590	-.5023	2.0578
		Never	1.52381	.59636	-.4829	3.5306

	Seldom	Always	-.61111	.61111	-10.7516	9.5293
		Often	-.77778	.41590	-2.0578	.5023
		Never	.74603	.65542	-1.4740	2.9661
	Never	Always	-1.35714	.74574	-10.5578	7.8436
		Often	-1.52381	.59636	-3.5306	.4829
		Seldom	-.74603	.65542	-2.9661	1.4740
q0012_0002_recoded	Always	Often	-.04167	.54831	-10.8780	10.7947
		Seldom	.72222	.64070	-9.1351	10.5795
		Never	1.21429	.78571	-7.7880	10.2166
	Often	Always	.04167	.54831	-10.7947	10.8780
		Seldom	.76389	.45950	-.6596	2.1874
		Never	1.25595	.64653	-.9277	3.4396
	Seldom	Always	-.72222	.64070	-10.5795	9.1351
		Often	-.76389	.45950	-2.1874	.6596
		Never	.49206	.72653	-1.9657	2.9498
	Never	Always	-1.21429	.78571	-10.2166	7.7880
		Often	-1.25595	.64653	-3.4396	.9277
		Seldom	-.49206	.72653	-2.9498	1.9657
q0012_0003_recoded	Always	Often	-.50000	.53501	-11.5314	10.5314
		Seldom	.50000	.62361	-9.5165	10.5165
		Never	1.21429	.72257	-8.1184	10.5470
	Often	Always	.50000	.53501	-10.5314	11.5314
		Seldom	1.00000	.41847	-.3024	2.3024
		Never	1.71429	.55528	-.1626	3.5912
	Seldom	Always	-.50000	.62361	-10.5165	9.5165
		Often	-1.00000	.41847	-2.3024	.3024
		Never	.71429	.64109	-1.4488	2.8774
	Never	Always	-1.21429	.72257	-10.5470	8.1184
		Often	-1.71429	.55528	-3.5912	.1626
		Seldom	-.71429	.64109	-2.8774	1.4488
q0012_0004_recoded	Always	Often	.04167	.54831	-10.7947	10.8780

		Seldom	.83333	.64550	-8.9813	10.6480
		Never	1.35714	.71309	-8.0336	10.7478
	Often	Always	-.04167	.54831	-10.8780	10.7947
		Seldom	.79167	.46617	-.6539	2.2372
		Never	1.31548	.55601	-.5460	3.1770
	Seldom	Always	-.83333	.64550	-10.6480	8.9813
		Often	-.79167	.46617	-2.2372	.6539
		Never	.52381	.65205	-1.6671	2.7147
	Never	Always	-1.35714	.71309	-10.7478	8.0336
		Often	-1.31548	.55601	-3.1770	.5460
		Seldom	-.52381	.65205	-2.7147	1.6671
q0013_0001_recoded	Always	Often	.91667	.40341	-1.3457	3.1791
		Seldom	1.33333	.44096	-1.0176	3.6843
		Never	2.38095	.69171	-.5704	5.3323
	Often	Always	-.91667	.40341	-3.1791	1.3457
		Seldom	.41667	.36737	-.6987	1.5320
		Never	1.46429	.64728	-.7210	3.6496
	Seldom	Always	-1.33333	.44096	-3.6843	1.0176
		Often	-.41667	.36737	-1.5320	.6987
		Never	1.04762	.67133	-1.2441	3.3394
	Never	Always	-2.38095	.69171	-5.3323	.5704
		Often	-1.46429	.64728	-3.6496	.7210
		Seldom	-1.04762	.67133	-3.3394	1.2441
q0013_0002_recoded	Always	Often	.79167	.39462	-1.4719	3.0553
		Seldom	1.22222	.44444	-1.1325	3.5770
		Never	1.80952	.74839	-1.2959	4.9149
	Often	Always	-.79167	.39462	-3.0553	1.4719
		Seldom	.43056	.36198	-.6750	1.5361
		Never	1.01786	.70256	-1.3701	3.4058
	Seldom	Always	-1.22222	.44444	-3.5770	1.1325
		Often	-.43056	.36198	-1.5361	.6750
		Never	.58730	.73171	-1.9150	3.0896

	Never	Always	-1.80952	.74839	-4.9149	1.2959
		Often	-1.01786	.70256	-3.4058	1.3701
		Seldom	-.58730	.73171	-3.0896	1.9150
q0013_0003_recoded	Always	Often	.87500	.41110	-1.3873	3.1373
		Seldom	1.44444	.40062	-.8719	3.7607
		Never	2.23810	.62452	-.5406	5.0167
	Often	Always	-.87500	.41110	-3.1373	1.3873
		Seldom	.56944	.32753	-.4025	1.5414
		Never	1.36310	.58035	-.5766	3.3028
	Seldom	Always	-1.44444	.40062	-3.7607	.8719
		Often	-.56944	.32753	-1.5414	.4025
		Never	.79365	.57297	-1.1675	2.7548
	Never	Always	-2.23810	.62452	-5.0167	.5406
		Often	-1.36310	.58035	-3.3028	.5766
		Seldom	-.79365	.57297	-2.7548	1.1675
q0013_0004_recoded	Always	Often	1.12500	.39766	-1.1381	3.3881
		Seldom	1.55556	.38889	-.7544	3.8655
		Never	2.23810	.62452	-.5406	5.0167
	Often	Always	-1.12500	.39766	-3.3881	1.1381
		Seldom	.43056	.29521	-.4455	1.3066
		Never	1.11310	.57091	-.8060	3.0322
	Seldom	Always	-1.55556	.38889	-3.8655	.7544
		Often	-.43056	.29521	-1.3066	.4455
		Never	.68254	.56483	-1.2543	2.6194
	Never	Always	-2.23810	.62452	-5.0167	.5406
		Often	-1.11310	.57091	-3.0322	.8060
		Seldom	-.68254	.56483	-2.6194	1.2543
q0014_0001_recoded	Always	Often	-.29167	.39994	-2.5544	1.9711
		Seldom	.11111	.50308	-2.3228	2.5451
		Never	.95238	.72531	-2.0895	3.9942
	Often	Always	.29167	.39994	-1.9711	2.5544

		Seldom	.40278	.43682	-.9474	1.7530
		Never	1.24405	.68103	-1.0637	3.5518
	Seldom	Always	-.11111	.50308	-2.5451	2.3228
		Often	-.40278	.43682	-1.7530	.9474
		Never	.84127	.74628	-1.6928	3.3754
	Never	Always	-.95238	.72531	-3.9942	2.0895
		Often	-1.24405	.68103	-3.5518	1.0637
		Seldom	-.84127	.74628	-3.3754	1.6928
q0014_0002_recoded	Always	Often	.26087	.20096	-.2972	.8189
		Seldom	1.00000*	.23570	.2452	1.7548
		Never	2.00000*	.53452	.1496	3.8504
	Often	Always	-.26087	.20096	-.8189	.2972
		Seldom	.73913	.30974	-.1973	1.6756
		Never	1.73913	.57105	-.1892	3.6675
	Seldom	Always	-1.00000*	.23570	-1.7548	-.2452
		Often	-.73913	.30974	-1.6756	.1973
		Never	1.00000	.58418	-.9976	2.9976
	Never	Always	-2.00000*	.53452	-3.8504	-.1496
		Often	-1.73913	.57105	-3.6675	.1892
		Seldom	-1.00000	.58418	-2.9976	.9976
q0014_0003_recoded	Always	Often	.58333	.38346	-1.6835	2.8502
		Seldom	1.16667	.53822	-1.3619	3.6952
		Never	2.09524	.72999	-.9594	5.1499
	Often	Always	-.58333	.38346	-2.8502	1.6835
		Seldom	.58333	.46314	-.9076	2.0743
		Never	1.51190	.67653	-.7932	3.8170
	Seldom	Always	-1.16667	.53822	-3.6952	1.3619
		Often	-.58333	.46314	-2.0743	.9076
		Never	.92857	.77482	-1.7187	3.5758
	Never	Always	-2.09524	.72999	-5.1499	.9594
		Often	-1.51190	.67653	-3.8170	.7932
		Seldom	-.92857	.77482	-3.5758	1.7187

q0014_0004_recoded	Always	Often	0.00000	.19964	-.5525	.5525
		Seldom	1.33333*	.28868	.4089	2.2578
		Never	1.71429	.52164	-.0915	3.5201
	Often	Always	0.00000	.19964	-.5525	.5525
		Seldom	1.33333*	.35098	.2588	2.4079
		Never	1.71429	.55854	-.1697	3.5982
	Seldom	Always	-1.33333*	.28868	-2.2578	-.4089
		Often	-1.33333*	.35098	-2.4079	-.2588
		Never	.38095	.59619	-1.6466	2.4085
	Never	Always	-1.71429	.52164	-3.5201	.0915
		Often	-1.71429	.55854	-3.5982	.1697
		Seldom	-.38095	.59619	-2.4085	1.6466
q0015_0001_recoded	Always	Often	.95833	.39690	-1.3049	3.2215
		Seldom	1.77778	.52997	-.7005	4.2561
		Never	2.04762	.61905	-.7175	4.8128
	Often	Always	-.95833	.39690	-3.2215	1.3049
		Seldom	.81944	.46495	-.6260	2.2649
		Never	1.08929	.56439	-.8073	2.9859
	Seldom	Always	-1.77778	.52997	-4.2561	.7005
		Often	-.81944	.46495	-2.2649	.6260
		Never	.26984	.66473	-1.9650	2.5047
	Never	Always	-2.04762	.61905	-4.8128	.7175
		Often	-1.08929	.56439	-2.9859	.8073
		Seldom	-.26984	.66473	-2.5047	1.9650
q0015_0002_recoded	Always	Often	.37500	.17869	-.1195	.8695
		Seldom	1.37500	.41993	-.0150	2.7650
		Never	1.71429	.52164	-.0915	3.5201
	Often	Always	-.37500	.17869	-.8695	.1195
		Seldom	1.00000	.45636	-.4727	2.4727
		Never	1.33929	.55140	-.5293	3.2079
	Seldom	Always	-1.37500	.41993	-2.7650	.0150

		Often	-1.00000	.45636	-2.4727	.4727
		Never	.33929	.66966	-1.9390	2.6176
	Never	Always	-1.71429	.52164	-3.5201	.0915
		Often	-1.33929	.55140	-3.2079	.5293
		Seldom	-.33929	.66966	-2.6176	1.9390
q0015_0003_recoded	Always	Often	1.11594	.39796	-1.1482	3.3801
		Seldom	1.11111	.52116	-1.3522	3.5744
		Never	2.04762	.61905	-.7175	4.8128
	Often	Always	-1.11594	.39796	-3.3801	1.1482
		Seldom	-.00483	.45580	-1.4203	1.4107
		Never	.93168	.56513	-.9674	2.8307
	Seldom	Always	-1.11111	.52116	-3.5744	1.3522
		Often	.00483	.45580	-1.4107	1.4203
		Never	.93651	.65773	-1.2771	3.1501
	Never	Always	-2.04762	.61905	-4.8128	.7175
		Often	-.93168	.56513	-2.8307	.9674
		Seldom	-.93651	.65773	-3.1501	1.2771
q0015_0004_recoded	Always	Often	-.12500	1.22126	-8.4260	8.1760
		Seldom	.22222	1.26320	-8.0835	8.5279
		Never	.76190	1.33078	-7.6075	9.1313
	Often	Always	.12500	1.22126	-8.1760	8.4260
		Seldom	.34722	.44526	-1.0327	1.7272
		Never	.88690	.61119	-1.1754	2.9492
	Seldom	Always	-.22222	1.26320	-8.5279	8.0835
		Often	-.34722	.44526	-1.7272	1.0327
		Never	.53968	.69121	-1.7963	2.8757
	Never	Always	-.76190	1.33078	-9.1313	7.6075
		Often	-.88690	.61119	-2.9492	1.1754
		Seldom	-.53968	.69121	-2.8757	1.7963

*. The mean difference is significant at the 0.05 level.

Coding Template Data Tables

Table 22

SPE 222 Syllabus Technology Themes

Technology Theme	Definition	Course Instructor	Preservice Teacher (student)
Planning for student use of technology	In class technology use by students	Venn Diagram assignment, PD workshop, website article review	Venn Diagram assignment, PD workshop
Using technology for teacher presentation of information	Display of information		Venn Diagram assignment, PD workshop
Using technology to Facilitate and Inspire Student Learning and Creativity	Facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments	Venn Diagram assignment, PD workshop, website article review	PD workshop
Using technology to Design and Develop Digital-Age Learning Experiences and Assessments	Design, develop, and evaluate authentic learning experiences and assessments	Venn Diagram assignment, PD workshop, website article review	PD workshop
Using technology to Engage in Professional Growth and Leadership	Continuously improve professional practice by promoting and demonstrating the effective use of digital tools and resources	PD workshop, website article review	PD workshop, website article review

Table 23

BLE 220 Syllabus Technology Themes

Code Label	Code Definition	Instructors will…	Preservice teachers will…
Using technology for teacher presentation of information	Display of information		Use Blackboard as a resource website and for online readings

Table 24

EDT 180 Syllabus Technology Themes

Code Label	Code Definition	Instructors will…	Preservice teachers will…
Use of technology for productivity purposes	Planning to teach	Communicate via email	
Use of technology for pedagogy purposes	Technology Assists with teaching		In class content exploration assignments: Inspiration exercises, Group Publisher exercise
Planning for student use of technology	In class technology use by students	Acceptable use statement, technology services information	
Using technology for teacher presentation of information	Display of information	All materials on Blackboard	
Using technology to Facilitate and Inspire Student Learning and Creativity	Facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments	Course assignments: in-class productivity assignments	
Using technology to Design and Develop Digital-Age Learning	Design, develop, and evaluate authentic learning experiences		Course assignments: create budgets, resumes, financial

Experiences and Assessments	and assessments		statements
Using technology to Model Digital-Age Work and Learning	Exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society.		Course objective: "Empowered with computer-based technology"
Using technology to Promote and Model Digital Citizenship and Responsibility	Local and global societal issues and responsibilities in an evolving digital culture and legal and ethical behavior in professional practices.		Course objective: "analyze some social and ethical issues related to the increased use of technology in education, business, or society"
Using technology to Engage in Professional Growth and Leadership	Continuously improve professional practice by promoting and demonstrating the effective use of digital tools and resources		Action research project: How technology is used in the student's major

Table 25

EDT 321 Syllabus Technology Themes

Code Label	Code Definition	Instructors will…	Preservice teachers will…
Use of technology for productivity purposes	Planning to teach	Communicate via email	
Use of technology for pedagogy purposes	Technology Assists with teaching	Receive assignments via Blackboard	Online discussions held on Blackboard
Planning for student use of technology	In class technology use by students	Acceptable use statement, technology services information	Skills-based training exercises
Using technology for	Display of	All materials on	

teacher presentation of information	information	Blackboard	
Using technology to Facilitate and Inspire Student Learning and Creativity	Facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments		Unit-level projects
Using technology to Design and Develop Digital-Age Learning Experiences and Assessments	Design, develop, and evaluate authentic learning experiences and assessments		Course objective: demonstrate your ability to use computer applications for productivity, data analysis, and problem solving Eportfolio assignment, final project
Using technology to Model Digital-Age Work and Learning	Exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society.		Course objective: “Empowered with com be able to discuss issues surrounding, software, and the use of technology in the classroom and workplace fluently puter-based technology”
Using technology to Promote and Model Digital Citizenship and Responsibility	Local and global societal issues and responsibilities in an evolving digital culture and legal and ethical behavior in professional practices.		Course objective: “analyze and discuss social and ethical issues related to the increased use of technology in education, business and society”
Using technology to Engage in Professional Growth	Continuously improve professional practice by promoting and		Prior computer competency statement, technology

and Leadership	demonstrating the effective use of digital tools and resources	talks

Table 26

PPE 310 Syllabus Technology Themes

Code Label	Code Definition	Instructors will…	Preservice teachers will…
Use of technology for pedagogy purposes	Technology Assists with teaching	Receive assignments via Blackboard	Online interactions held on Blackboard, assignments submitted on Blackboard and TK20
Planning for student use of technology	In class technology use by students		Video recording of teaching lesson, accessing materials and resources on Blackboard
Using technology for teacher presentation of information	Display of information	All materials on Blackboard	

Table 27

NETS.T Standards aligned with PPE 310 Course Objectives

Standard	Performance Indicator
1. Facilitate and Inspire Student Learning and Creativity: Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.	d. Model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments

3. Model Digital Age Work and Learning: Teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society.	a. Demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations d. Model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning
4. **Promote and Model Digital Citizenship and Responsibility**: Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices.	a. Advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources c. Promote and model digital etiquette and responsible social interactions related to the use of technology and information

Table 28

PPE 310 Course objectives aligned to NETS.T

PPE 310 Course Objective	NETS.T Alignment
Understand the current health of the children in the U.S	3a,d;4a,c
Understands a variety of models for coordinated school health and can teach school-wide events promoting health and active schools	3a,d;4a,c
Understands safety and management issues of teaching physical activity and health promotion	3a,d

in early childhood, elementary, secondary and special education classes	
Knows and can teach academic knowledge integrating physical activity in students with and without special needs	3a,d
Thoroughly understands how health affects students shown through a written research paper	3a,d;4a,c

Table 29

ELL 515 Syllabus Technology Themes

Code Label	Code Definition	Instructors will…	Preservice teachers will…
Use of technology for productivity purposes	Planning to teach	Communicate with students via email	
Use of technology for pedagogy purposes	Technology Assists with teaching	Set appointments with students via Blackboard	
Planning for student use of technology	In class technology use by students		Use TK20, maintain an IDEAL subscription, use Blackboard to submit assignments and complete quizzes
Using technology for teacher presentation of information	Display of information	Class materials posted on Blackboard	
Using technology to Design and Develop Digital-Age Learning Experiences and Assessments	Design, develop, and evaluate authentic learning experiences and assessments		Complete a wiki and blog assignment

Table 30

ELL 516 Syllabus Technology Themes

Code Label	Code Definition	Instructors will…	Preservice teachers will…
Planning for student use of technology	In class technology use by students		Upload assignments to Blackboard and TK20.
Using technology for teacher presentation of information	Display of information	Upload webcasts, videos and hold discussions on Blackboard	Access videos on Blackboard

Student Interviews

Table 31

Where did you first learn about the National Educational Technology Standards? (During a course, during a practicum, outside resource, at work)

Answer	Percentage of Total Responses
No knowledge at all	26.6%
Honors Research Project	6.7%
During time as substitute teacher	6.7%
Previous course	20.0%
From this study (survey, interview, solicitation email)	33.3%
No response given	6.7%

Table 32

To what extent is your choice to integrate technology in your lesson planning based on familiarity with the National Educational Technology Standards?

Answer	Percentage of Total Responses
No knowledge at all	26.6%
Increased availability of technology options	33.3%
Personal preference towards technology use	6.7%
Seen technology in use	6.7%
Practicum course experience	6.7%
Doesn't apply	13.3%
No response given	6.7%

Table 33

*How do your instructors require you to integrate standards based technology into your homework or lesson planning? Can you give an example? **

Answer	Percentage of Total Responses
Use of technology tools (Prezi, Poplet, PowerPoint, Smartboard)	38.9%
Requires online research	16.7%
Uses LMS for coursework/assignments	16.7%
Not at all	5.6%
Models use	5.6%
Doesn't apply	11.1%

*Three respondents gave more than one response

Table 34

How do your program faculty integrate technology into the classroom? **Can you give an example?**

Answer	Percentage of Total Responses
Use of technology tools (PowerPoint, online, videos, outlines, overheads, computers, smartboards, Canvas, movies, multimedia, clickers)	93.3%
Cannot give example	6.7%

Table 35

In your opinion, what role does technology integration have in your program as a whole? Is it primarily to present information and provide organization for assignments? Or do you use it to explore content and complete activities?

Answer	Percentage of Total Responses
Both present information and provide organization and explore content and complete activities	46.7%
Presentation of Information	13.3%
Explore content and complete activities	6.7%
Technology plays a large part, a lot is used	20.0%
Preparation and setup	6.7%
All information is at your fingertips	6.7%

Table 36

What does the term digital citizenship mean to you?

Answer	Percentage of Total Responses
Nothing	46.7%
Doing something online	20.0%
Recognize term but not meaning	6.7%
How you are supposed to behave in an online class	6.7%
Held accountable even though online	6.7%
Social networking	13.3%

Table 37

*Do you have concerns about integrating technology in future lesson plans? If so, what are your concerns?******

Answer	Percentage of Total Responses
No	62.5%
Having access to technology	12.5%
Not knowing enough about technology	12.5%
Too much reliance on technology/lose skills	12.5%
Technology is advancing too quickly	6.3%
Students will break it	6.3%

*One respondent gave more than one response

Table 38

Do you feel that you have access to resources (your instructor, library, a mentor, etc) that would allow you to explore technology topics that you are unfamiliar with?

Answer	Percentage of Total Responses
Yes	93.3%

Not really	6.7%

Faculty Interviews

Table 39

Are you familiar with the National Educational Technology Standards (NETS)?

Answer	Percentage of Total Responses
Yes	83.3%
No	16.7%

Table 40

*How do you integrate technology into the classroom as an instructor?**

Answer	Percentage of Total Responses
Technology Tools (Prezi, PowerPoint, Web 2.0, laptops)	43.0%
Mentions it	14.3%
Follows AZ common core	14.3%
Student Use	14.3%

*One respondent gave more than one response

Table 41

In your opinion, what role does technology integration have in the program for which you teach as a whole?

Answer	Percentage of Total Responses
Emphasis on integration	50.0%
None	16.7%
Presentation of information	16.7%
Enhance education and learning	16.7%

Table 42

Are you familiar with the term digital citizenship? If so, what does it mean to you?

Answer	Percentage of Total Responses
Yes	83.0%
No	16.7%

Table 43

*Do you have concerns about integrating technology in the classroom? If so, what are your concerns?**

Answer	Percentage of Total Responses
No	33.3%
Availability	33.3%
Bredth of knowledge	11.1%
Safety	11.1%
Older generation comfort with technology	11.1%

*Three respondents gave more than one response

Table 44

*What areas of technology use would you describe as your strengths?**

Answer	Percentage of Total Responses
Software	50.0%
Productivity	25.0%
Exploring	12.5%
Pedagogy	12.5%

*Two respondents gave more than one response

Table 45

Do you feel that you have access to resources (your administrator, tech support, etc) that would allow you to explore technology topics that you are unfamiliar with?

Answer	Percentage of Total Responses
Yes	66.7%
No	33.3%

Table 46

To what extent do you model standards-based technology integration in your classroom?

Answer	Percentage of Total Responses
Quite a bit	66.7%
Not at all	16.7%
Try	16.7%

Table 47

*To what extent do you include direct instruction of standards-based technology integration in your classroom?**

Answer	Percentage of Total Responses
Students explore on their own	43.0%
Quite a bit	43.0%
Not at all	14.3%

*One respondent gave more than one response

Table 48

To what extent is your choice to integrate technology into your lesson planning based on familiarity with the National Educational Technology Standards?

Answer	Percentage of Total Responses
Very much	50.0%
None	33.3%
Mention	16.7%

Table 49

If we consider the following definitions of the degree of National Educational Technology Standards knowledge, to what degree do you require your students to integrate technology into their lesson planning in accordance with National Educational Technology Standards? (Awareness, Literacy, Integration, Leadership)

Answer	Percentage of Total Responses
Integration	33.3%
Literacy	33.3%
TPACK	16.7%
N/A	16.7%

Table 50

How do your require your students to integrate standards based technology into their homework or lesson planning?

Answer	Percentage of Total Responses
At 1 Lesson Plan	50.0%
Presentation	16.7%
N/A	16.7%

Administrator Interviews

Table 51

*To what extent are you familiar with the National Educational Technology Standards (NETS)?**

Answer	Percentage of Total Responses
Vaguely	50.0%
Required on undergraduate syllabi	25.0%
Pretty familiar	25.0%

*One respondent gave more than one response

Table 52

*What expectations does the program have that students graduating from this program will be able to integrate technology in future classrooms in accordance with the NETS standards?**

Answer	Percentage of Total Responses
Minimal	25.0%
That it is possible	25.0%
Not as applicable to the PhD program	25.0%
Students should be self-motivated to use technology	25.0%

*One respondent gave more than one response

Table 53

*What role does technology integration have in your education program?**

Answer	Percentage of Total Responses
Presence of technology infusion specialist	25.0%
Technology used in every subject area	25.0%

ELL and Graduate programs still have stand alone Ed Tech Course	25.0%
Used in MAED in Ed Tech program	25.0%

*One respondent gave more than one response

Table 54

*Are you familiar with the term digital citizenship? If so, what does it mean to you?**

Answer	Percentage of Total Responses
Yes	30.0%
Ethics of using technology/internet	30.0%
Knowing how and when to be engaged	10.0%
Digital Citizenship modules required	10.0%
Understand copyright	20.0%

*Three respondents gave more than one response

Table 55

*Do you have concerns about university instructors integrating technology in the classrooms? If so, what are your concerns?**

Answer	Percentage of Total Responses
Not a priority	16.7%
Technology instructors/infusion specialists are coaches/mentors	16.7%
Overwhelmed instructors	16.7%
Knowing how to improve	16.7%
Instructors unaware of resources	16.7%
Lack of training	16.7%

*Three respondents gave more than one response

Table 56

*Do you feel that your instructors have access to resources that would allow them to hone their skills/knowledge about technology topics that they are unfamiliar with? What resources are available?**

Answer	Percentage of Total Responses
Yes	75.0%
Not used to their full potential	25.0%

*One respondent gave more than one response

Table 57

*To what extent do you require standards-based technology integration by faculty in the university classrooms?**

Answer	Percentage of Total Responses
Undergrad classes must integrate	33.3%
New for teacher prep programs	33.3%
Not at all	33.3%

*One respondent gave more than one response

Table 58

*What are the expectations of the department/program for the faculty in terms of technology integration in the university classroom?**

Answer	Percentage of Total Responses
Modeling, integration, students required to use	16.7%
Technology is a tool to explore content	16.7%
Update grades online	16.7%
Know copyright law	16.7%
Unspoken technology rule	16.7%
Professional development	16.7%

*Three respondents gave more than one response

APPENDIX B

RECRUITMENT SCRIPTS

Faculty recruitment script for survey link posting

Dear Professor

I am a doctoral candidate under the direction of Professor Brian Nelson in the Department of Educational Technology at Arizona State University. I am conducting a dissertation research study to determine the extent to which preservice teachers can recognize the National Education Technology Standards (NETS) published by the International Society for Technology in Education (ITSE) and to what extent preservice teachers are exposed to technology integration in accordance with the NETS standards in their preparation curriculum. I am currently asking instructors of XXXX if they would be willing to post the link to my participant survey in their course website and notify their students of its purpose. The students have the opportunity to elect to participate in a follow-up interview with me by phone at their discretion.

I am also recruiting individual faculty members to participate in a telephone interview which will take approximately 10-15 minutes.

Your participation in this study is voluntary as is the participation of the students. All responses will be kept anonymous and confidential. This study has been approved by the Institutional Review Board at Arizona State University.

If you are willing to post the survey link in your course website, it is: https://www.surveymonkey.com/s/Lewis_ASU

If you have any questions concerning the research study, please email or call me at (480) 495-9614.

Student survey cover letter

Dear Participant

I am a graduate student under the direction of Professor Brian Nelson in the Department Educational Technology at Arizona State University.

I am conducting a research study to determine the extent to which preservice teachers can recognize the National Education Technology Standards (NETS) published by the International Society for Technology in Education (ITSE) and to what extent preservice teachers are exposed to technology integration in accordance with the NETS standards in their preparation curriculum. I am inviting your participation, which will involve completing an anonymous survey with the opportunity to complete a voluntary phone interview.

Your participation in this study is voluntary. You can skip questions if you wish. If you choose not to participate or to withdraw from the study at any time, there will be no penalty, for example, it will not affect your grade. You must be 18 or older to participate in the study.

Although there is no benefit to you directly at this time, possible benefits of your participation are increased awareness of the methods that foster technology awareness, which could lead to curriculum change or increase technology integration in teacher preparation programs. There are no foreseeable risks or discomforts to your participation.

Your responses will be anonymous. No identifying data will be collected during the course of this survey. The results of this study may be used in reports, presentations, or publications but your name will not be known.

If you have any questions concerning the research study, please contact the research team at: Dr. Brian Nelson at brian.nelson@asu.edu or Carrie Lewis at cevoy@asu.edu If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

Return of the questionnaire will be considered your consent to participate.

Student interview information letter/script

Dear Participant

I am a graduate student under the direction of Professor Brian Nelson in the Department Educational Technology at Arizona State University.

I am conducting a research study to determine the extent to which preservice teachers can recognize the National Education Technology Standards (NETS) published by the International Society for Technology in Education (ITSE) and to what extent preservice teachers are exposed to technology integration in accordance with the NETS standards in their preparation curriculum. I am inviting your participation, which will involve completing an anonymous survey with the opportunity to complete a voluntary phone interview.

I am inviting your participation, which will involve answering several questions regarding your familiarity with technology and technology integration concepts. You have the right not to answer any question, and to stop the interview at any time.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty, for example, it will not affect your grade. You must be 18 or older to participate in the study.

Although there is no benefit to you directly at this time, possible benefits of your participation are increased awareness of the methods that foster technology awareness, which could lead to curriculum change or increase technology integration in teacher preparation programs. There are no foreseeable risks or discomforts to your participation.

Your responses will be confidential. Only your responses to the questions will be analyzed in the course of this study. The data will not be used with any identifiable information. The results of this study may be used in reports, presentations, or publications but your name will not be used.

If you have any questions concerning the research study, please contact the research team at: Dr. Brian Nelson at brian.nelson@asu.edu or Carrie Lewis at cevoy@asu.edu If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

Faculty interview recruitment script

I am a graduate student under the direction of Professor Brian Nelson in the Department of Educational Technology at Arizona State University. I am conducting a research study to determine the extent to which preservice teachers can recognize the National Education Technology Standards (NETS) published by the International Society for Technology in Education (ITSE) and to what extent preservice teachers are exposed to technology integration in accordance with the NETS standards in their preparation curriculum. I am recruiting individual faculty members to participate in a telephone interview which will take approximately 10-15 minutes.

Your participation in this study is voluntary. If you have any questions concerning the research study, please call me at (480) 495-9614.

Faculty interview information letter/script

Dear Participant

I am a graduate student under the direction of Professor Brian Nelson in the Department Educational Technology at Arizona State University.

I am conducting a research study to determine the extent to which preservice teachers can recognize the National Education Technology Standards (NETS) published by the International Society for Technology in Education (ITSE) and to what extent preservice teachers are exposed to technology integration in accordance with the NETS standards in their preparation curriculum. I am inviting your participation, which will involve completing an anonymous survey with the opportunity to complete a voluntary phone interview.

I am inviting your participation, which will involve answering several questions regarding the techniques you use to integrate technology in the classroom and the emphasis the course objectives place on the National Educational Technology Standards. You have the right not to answer any question, and to stop the interview at any time.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty, for example, it will not affect your grade. You must be 18 or older to participate in the study.

Although there is no benefit to you directly at this time, possible benefits of your participation are increased awareness of the methods that foster technology awareness, which could lead to curriculum change or increase technology integration in teacher preparation programs. There are no foreseeable risks or discomforts to your participation.

Your responses will be confidential. Only your responses to the questions will be analyzed in the course of this study. The data will not be used with any identifiable information. The results of this study may be used in reports, presentations, or publications but your name will not be used.

If you have any questions concerning the research study, please contact the research team at: Dr. Brian Nelson at brian.nelson@asu.edu or Carrie Lewis at cevoy@asu.edu If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

Administrator recruitment script

I am a PhD candidate under the direction of Professor Brian Nelson in the Department of Educational Technology at Arizona State University. I am conducting a research study to determine the extent to which preservice teachers can recognize the National Education Technology Standards (NETS) published by the International Society for Technology in Education (ITSE) and to what extent preservice teachers are exposed to technology integration in accordance with the NETS standards in their preparation curriculum. I am recruiting individual program administrators to participate in telephone interviews which will take approximately 10-15 minutes.

Your participation in this study is voluntary. If you have any questions concerning the research study, please call me at (480) 495-9614.

Administrator interview information letter/script

Dear Participant

I am a graduate student under the direction of Professor Brian Nelson in the Department Educational Technology at Arizona State University.

I am conducting a research study to determine the extent to which preservice teachers can recognize the National Education Technology Standards (NETS) published by the International Society for Technology in Education (ITSE) and to what extent preservice teachers are exposed to technology integration in accordance with the NETS standards in their preparation curriculum. I am inviting your participation, which will involve completing an anonymous survey with the opportunity to complete a voluntary phone interview.

I am inviting your participation, which will involve answering several questions regarding your curriculum's emphasis on technology integration and the expectations you have for your program graduates regarding National Educational Technology Standards. You have the right not to answer any question, and to stop the interview at any time.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty, for example, it will not affect your grade. You must be 18 or older to participate in the study.

Although there is no benefit to you directly at this time, possible benefits of your participation are increased awareness of the methods that foster technology awareness, which could lead to curriculum change or increase technology integration in teacher preparation programs. There are no foreseeable risks or discomforts to your participation.

Your responses will be confidential. Only your responses to the questions will be analyzed in the course of this study. The data will not be used with any identifiable information. The results of this study may be used in reports, presentations, or publications but your name will not be used.

If you have any questions concerning the research study, please contact the research team at: Dr. Brian Nelson at brian.nelson@asu.edu or Carrie Lewis at cevoy@asu.edu If you have any questions about your rights as a subject/participant in this research, or if you feel you have

been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

APPENDIX C

INSTRUMENTS

NETS.S Knowledge Survey

Class Standing (Freshman, Sophmore, Junior, Senior, Master's)

Currently Student Teaching Y/N

Select courses taken:

University	Core Courses
Arizona State University	BLE 220: Foundations of Structured English Immersion ECD 418: Instructional Methods for Young Children: Integrating Digital Media EDT 180: Computer Literacy (CS) OR EDT 321: Computer Literacy (CS) EDP 311: Educational Psychology for Future Teachers (SB) EDP 313: Childhood and Adolescence (SB) MTE 280: Investigating Quantity: Number, Operations & Numeration Systems SPE 222: Orientation to Education of Exceptional Children (SB & C) TEL 215: Introduction to Child and Adolescent Development (SB) TEL 311: Instruction and Management in the Inclusive Classroom USL 216: Service Learning

List courses currently enrolled in ___

Education Speciality (Elementary Ed, Early Childhood, Art, ESL, etc) _____

GPA _____

Age _____

Are you?
o Male
o Female

What is your race? (Select one or more responses.)
- o American Indian or Alaska Native
- o Asian
- o Black or African American
- o Hispanic
- o Native Hawaiian or Other Pacific Islander
- o White

Choose the technology you use on a regular basis

- o Personal Computer
- o Smart Phone
- o Tablet Computer
- o Smart Board
- o Web 2.0 Applications
- o Blog
- o Social Networking
- o Video or Audio technology (Skype, Youtube, etc)

The following statements will benchmark your technology literacy knowledge:

Awareness: Learners are exploring technology and developing foundational skills but have not developed sufficient expertise to use the skills in daily life.

Literacy: Learners continue to explore technology and have developed the skills enabling them to use technology when prompted.

Integration: Learners select and apply appropriate technology to successfully complete tasks.

Leadership: Learners share new knowledge through proactive modeling, peer coaching, and mentoring.

I feel that the courses in my Teacher Prep program have prepared me to integrate the following into my lesson plans and my future classroom:

Facilitate and Inspire Student Learning and Creativity
Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.

	Awareness-	**Literacy**- I am	**Integration**-	**Leadership**- I have

	I am aware but do not use this in my practice	literate and integrate some of the indicators	I integrate this into my teaching	I am able to teach others	not learned this
Promote, support, and model creative and innovative thinking and inventiveness					
Engage students in exploring real-world issues and solving authentic problems using digital tools and resources					
Promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative processes					
Model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments					

Design and Develop Digital-Age Learning Experiences and Assessments
Teachers design, develop, and evaluate authentic learning experiences and assessments incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the NETS•S.

	Awareness-	**Literacy**- I am	**Integration**-	**Leadership**-	I have

	I am aware but do not use this in my practice	literate and integrate some of the indicators	I integrate this into my teaching	I am able to teach others	not learned this
Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity					
Develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress					
Customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources					
Provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform					

learning and teaching

Model Digital-Age Work and Learning
Teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society.

	Awareness- I am aware but do not use this in my practice	**Literacy-** I am literate and integrate some of the indicators	**Integration-** I integrate this into my teaching	**Leadership-** I am able to teach others	I have not learned this
Demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations					
Collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation					
Communicate relevant information and ideas effectively to students, parents, and peers using a variety of digital-age media and formats					
Model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning					

Promote and Model Digital Citizenship and Responsibility
Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices.

	Awareness- I am aware but do not use this in my practice	**Literacy-** I am literate and integrate some of the indicators	**Integration-** I integrate this into my teaching	**Leadership-** I am able to teach others	I have not learned this
Advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources					
Address the diverse needs of all learners by using learner-centered strategies and providing equitable access to appropriate digital tools and resources					
Promote and model digital etiquette and responsible social interactions related to the use of technology and information					
Develop and model cultural understanding and global awareness by engaging with colleagues and students					

of other cultures using digital-age communication and collaboration tools					

Engage in Professional Growth and Leadership
Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources.

	Awareness- I am aware but do not use this in my practice	**Literacy**- I am literate and integrate some of the indicators	**Integration**- I integrate this into my teaching	**Leadership**- I am able to teach others	I have not learned this
Participate in local and global learning communities to explore creative applications of technology to improve student learning					
Exhibit leadership by demonstrating a vision of technology infusion, participating in shared decision making and community building, and developing the leadership and technology skills of others					
Evaluate and reflect on current research and professional practice on a regular basis to make effective use of existing and emerging digital tools and resources in support of student					

learning

Contribute to the effectiveness, vitality, and self-renewal of the teaching profession and of their school and community

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21. How familiar are you with the National Technology Plan for 2010?
Very familiar, somewhat familiar, neutral, somewhat unfamiliar, very unfamiliar

22. I currently integrate technology into the lesson plans I create for my courses.

Always, often, seldom, never

23. What specific technologies have you learned about in your Education courses?

24. If you are currently student teaching, what technologies do you feel you would benefit from knowing more about?

25. I am a graduate student under the direction of Professor Brian Nelson in the Department of Educational Technology at Arizona State University. I am conducting a research study to determine the extent to which preservice teachers can recognize the National Education Technology Standards (NETS) published by the International Society for Technology in Education (ITSE) and to what extent preservice teachers are exposed to technology integration in accordance with the NETS standards in their preparation curriculum. I am recruiting individuals to participate in follow-up telephone interviews which will take approximately 10-15 minutes.

Your participation in this study is voluntary. If you have any questions concerning the research study, please call me at (480) 495-9614.

If you would like to participate in a follow-up phone interview, please email me at

cevoy@asu.edu with the best contact time and method for you.

Student interview questions

1. Where did you first learn about the National Educational Technology Standards? (During a course, during a practicum, outside resource, at work)
2. To what extent is your choice to integrate technology in your lesson planning based on familiarity with the National Educational Technology Standards?
3. How do your instructors require you to integrate standards based technology into your homework or lesson planning? Can you give an example?
4. How do your program faculty integrate technology into the classroom? Can you give an example?
5. In your opinion, what role does technology integration have in your program as a whole? Is it primarily to present information and provide organization for assignments? Or do you use it to explore content and complete activities?
6. What does the term digital citizenship mean to you?
7. Do you have concerns about integrating technology in future lesson plans? If so, what are your concerns?
8. Do you feel that you have access to resources (your instructor, library, a mentor, etc) that would allow you to explore technology topics that you are unfamiliar with?

Faculty interview questions

1. Are you familiar with the National Educational Technology Standards (NETS)?
2. How do you integrate technology into the classroom as an instructor?
3. In your opinion, what role does technology integration have in the program for which you teach as a whole?
4. Are you familiar with the term digital citizenship? If so, what does it mean to you?
5. Do you have concerns about integrating technology in the classroom? If so, what are your concerns?
6. What areas of technology use would you describe as your strengths?
7. Do you feel that you have access to resources (your administrator, tech support, etc) that would allow you to explore technology topics that you are unfamiliar with?
8. To what extent do you model standards-based technology integration in your classroom?
9. To what extent do you include direct instruction of standards-based technology integration in your classroom?
10. To what extent is your choice to integrate technology into your lesson planning based on familiarity with the National Educational Technology Standards?
11. If we consider the following definitions of the degree of National Educational Technology Standards knowledge, to what degree do you require your students to integrate technology into their lesson planning in accordance with National Educational Technology Standards?

Awareness: Learners are exploring technology and developing foundational skills but have not developed sufficient expertise to use the skills in daily life.

Literacy: Learners continue to explore technology and have developed the skills enabling them to use technology when prompted.

Integration: Learners select and apply appropriate technology to successfully complete tasks.

Leadership: Learners share new knowledge through proactive modeling, peer coaching, and mentoring.

12. How do your require your students to integrate standards based technology into their homework or lesson planning?

Administrator interview questions

1. To what extent are you familiar with the National Educational Technology Standards (NETS)?
2. What expectations does the program have that students graduating from this program will be able to integrate technology in future classrooms in accordance with the NETS standards?
3. What role does technology integration have in your education program?
4. Are you familiar with the term digital citizenship? If so, what does it mean to you?
5. Do you have concerns about university instructors integrating technology in the classrooms? If so, what are your concerns?
6. Do you feel that your instructors have access to resources that would allow them to hone their skills/knowledge about technology topics that they are unfamiliar with? What resources are available?
7. To what extent do you require standards-based technology integration by faculty in the university classrooms?
8. What are the expectations of the department/program for the faculty in terms of technology integration in the university classroom?

Coding Template

Course _____ University _____

Code Label	Code Definition	Instructors will…	Preservice teachers will…
Use of technology for productivity purposes	Planning to teach		
Use of technology for pedagogy purposes	Technology Assists with teaching		
Planning for student use of technology	In class technology use by students		
Using technology for teacher presentation of information	Display of information		
Using technology to Facilitate and Inspire Student Learning and Creativity	Facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments		
Using technology to Design and Develop Digital-Age Learning Experiences and Assessments	Design, develop, and evaluate authentic learning experiences and assessments		
Using technology to Model Digital-Age Work and Learning	Exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society.		

Using technology to Promote and Model Digital Citizenship and Responsibility	Local and global societal issues and responsibilities in an evolving digital culture and legal and ethical behavior in professional practices.
Using technology to Engage in Professional Growth and Leadership	Continuously improve professional practice by promoting and demonstrating the effective use of digital tools and resources

APPENDIX D

INSTITUTIONAL REVIEW BOARD APPROVAL

ASU Knowledge Enterprise Development

Office of Research Integrity and Assurance

To:	Brian Nelson EDB
From:	Mark Roosa, Chair Soc Beh IRB
Date:	05/31/2012
Committee Action:	**Exemption Granted**
IRB Action Date:	05/31/2012
IRB Protocol #:	1205007874
Study Title:	Preservice Teachers' Ability to Identify Technology Standards: Does Curriculum Matter?

The above-referenced protocol is considered exempt after review by the Institutional Review Board pursuant to Federal regulations, 45 CFR Part 46.101(b)(1) (2) .

This part of the federal regulations requires that the information be recorded by investigators in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects. It is necessary that the information obtained not be such that if disclosed outside the research, it could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.

You should retain a copy of this letter for your records.

APPENDIX E

ASU REQUIRED TEACHER CERTIFICATION COURSES BY MAJOR 2013-14

Table 59

Elementary Education Majors

Ele	Spe	ESL/BLE	ECH/ESE	SPE
BLE 220	BLE 220	BLE 220	BLE 220	BLE 220
BLE 408	EDT 180	BLE 322	ECD 211	EDP 311
EDP 311	EDT 321	BLE 324	ECD 220	EDT 180
EDT 180	EED 311	BLE 335	ECD 321	EDT 321
EDT 321	EED 324	BLE 396	ECD 396	EED 324
EED 324	EED 397	BLE 397	ECD 418	EED 397
EED 396	EED 411	BLE 400	ECD 478	EED 411
EED 397	EED 412	BLE 408	ECD 478	EED 412
EED 411	EED 433	BLE 411	ECS 310	EED 433
EED 412	EED 478	BLE 412	ECS 312	EED 478
EED 433	GCU 113	BLE 413	ECS 315	GCU 113
EED 478	GCU 114	BLE 478	ECS 316	GCU 114
GCU 113	MTE 301	BLE 478	ECS 397	HSC 310
GCU 114	PPE 310	BLE 481	ECS 411	MTE 280
HSC 310	RDG 322	EDP 311	ECS 412	MTE 281
MTE 280	RDG 334	EDT 180	ECS 413	MTE 301
MTE 281	SCN 494	EDT 321	ECS 420	PPE 310
MTE 301	SPE 222	GCU 113	ECS 430	RDG 291
PPE 310	SPE 317	GCU 114	ECS 431	RDG 322
RDG 291	SPE 321	MCE 447	ECS 478	SCN 400
RDG 322	SPE 323	MTE 280	EDT 180	SPE 222
RDG 413	SPE 396	MTE 281	EDT 321	SPE 317
SCN 494	SPE 423	MTE 301	GCU 113	SPE 321
SED 478	SPE 424	PPE 310	GCU 114	SPE 323
SPE 222	SPE 430	RDG 291	MTE 280	SPE 396
SPE 416	SPE 478	SCN 400	MTE 281	SPE 423
SPF 301	TEL 215	SPE 222	PPE 310	SPE 424
TEL 101	USL 216	SPE 416	RDG 291	SPE 430
TEL 215		TEL 101	SPE 222	SPE 478
USL 216		TEL 215	SPE 317	TEL 101
		USL 216	TEL 101	TEL 215
			USL 216	USL 216

Table 60

Secondary Education Majors

Art	Bio Sci	Bus	Chem	Dance
ARE 250	BIO 480	BLE 220	BLE 220	BLE 220
ARE 370	BLE 220	BLE 407	EDP 313	BLE 407
ARE 482	BLE 407	BUE 400	EDT 180	DCE 354
ARE 486	EDP 313	BUE 481	EDT 321	EDP 313
BLE 220	EDT 180	CIS 105	PPE 310	GCU 113
BLE 407	EDT 321	EDP 313	RDG 323	RDG 323
EDP 313	PPE 310	PPE 310	SED 322	SED 396
GCU 113	RDG 323	RDG 323	SED 396	SED 397
SPE 222	SED 322	SED 322	SED 397	SED 478
TEL 315	SED 396	SED 396	SED 464	
	SED 397	SED 397	SED 478	
	SED 464	SED 464	SED 482	
	SED 478	SED 478	SED 496	
	SED 482	SED 496	SLE 407	
	SED 496	SPE 222	SPE 222	
	SPE 222	SPE 417	SPE 417	
	SPE 417	TEL 101	TEL 101	
	TEL 101	TEL 311	TEL 311	
	TEL 311			

Earth and Space Sci	Econ	Eng	French	Geography
BLE 220	BLE 220	BLE 220	BLE 220	BLE 220
BLE 407	BLE 407	BLE 407	BLE 407	BLE 407
EDP 313	BUE 480	EDP 313	EDP 313	EDP 313
EDT 180	EDP 313	EDT 180	EDT 180	EDT 180
EDT 321	PPE 310	EDT 321	EDT 321	EDT 321
PPE 310	RDG 323	PPE 310	PPE 310	GCU 414
RDG 323	SED 322	RDG 323	RDG 323	PPE 310
SED 322	SED 396	SED 322	SED 322	RDG 323
SED 396	SED 397	SED 396	SED 396	SED 322
SED 397	SED 464	SED 397	SED 397	SED 396
SED 464	SED 478	SED 464	SED 464	SED 397
SED 478	SED 480	SED 478	SED 478	SED 464

SED 482	SED 496	SED 478	SED 496	SED 478
SED 496	SPE 222	SED 481	SLC 479	SED 480
SES 111	SPE 417	SPE 222	SLC 480	SED 496
SPE 222	TEL 101	SPE 417	SPE 222	SPE 222
SPE 417	TEL 311	TEL 101	SPE 417	SPE 417
TEL 101		TEL 311	TEL 101	TEL 101
TEL 311			TEL 311	TEL 311

German	History	Japanese	Mathematics	Music
BLE 220	BLE 220	BLE 220	BLE 220	BLE 220
BLE 407	BLE 407	BLE 407	BLE 407	MUE 110
EDP 313	EDP 313	EDP 313	EDP 313	MUE 413
EDT 180	EDT 180	EDT 180	MTE 483	MUE 415
EDT 321	EDT 321	EDT 321	MTE 484	MUE 480
PPE 310	GCU 414	PPE 310	PPE 310	MUE 481
RDG 323	HST 480	RDG 323	RDG 323	MUE 482
SED 322	HST 481	SED 322	SED 322	SED 396
SED 396	PPE 310	SED 396	SED 396	SED 397
SED 397	RDG 323	SED 397	SED 397	SED 478
SED 464	SED 322	SED 464	SED 464	SED 496
SED 478	SED 396	SED 478	SED 478	SLE 407
SED 496	SED 397	SED 496	SED 480	TEL 315
SLC 479	SED 464	SLC 479	SED 496	
SLC 480	SED 478	SLC 480	SPE 222	
SPE 222	SED 480	SPE 222	SPE 417	
SPE 417	SPE 222	SPE 417	TEL 101	
TEL 101	SPE 417	TEL 101	TEL 311	
TEL 311	TEL 101	TEL 311		
	TEL 311			

Phys Ed	Physics	Poli sci	Spanish
BLE 220	BLE 220	BLE 220	BLE 220
BLE 407	BLE 407	BLE 407	BLE 407
EDP 311	PHY 480	EDP 313	EDP 313
EDP 313	PPE 310	EDT 180	EDT 180
EDT 180	RDG 323	EDT 321	EDT 321
PPE 210	SED 322	HST 480	PPE 310
PPE 215	SED 396	PPE 310	RDG 323
PPE 220	SED 397	RDG 323	SED 322
PPE 225	SED 464	SED 322	SED 396

PPE 300	SED 478	SED 396	SED 397
PPE 310	SED 482	SED 397	SED 464
PPE 315	SED 496	SED 464	SED 478
PPE 365	SPE 222	SED 478	SED 496
PPE 396	SPE 417	SED 480	SLC 479
PPE 397	TEL 101	SPE 222	SLC 480
PPE 450	TEL 311	SPE 417	SPE 222
PPE 455		TEL 101	SPE 417
PPE 460		TEL 311	TEL 101
PPE 477			TEL 311
PPE 478			
PPE 480			
RDG 323			
SED 322			
SED 464			
SPE 222			
TEL 101			
TEL 111			
USL 210			

Table 61

Masters in Education Majors

Med in Sec	Med in SPE	Med ECH	Med in Phy Ed	Med in ele
ELL 515	EED 537	ECD 503	ELL 515	EED 511
ELL 516	EED 576	ECD 504	ELL 516	EED 521
RDG 507	EED 578	ECD 505	PPE 474	EED 524
SED 501	ELL 515	ECD 520	PPE 480	EED 529
SED 522	ELL 516	ECD 525	PPE 484	EED 531
SED 533	RDG 531	ECD 527	PPE 530	EED 537
SED 544	SPE 524	ECD 541	PPE 535	EED 576
SED 576	SPE 534	ECD 549	PPE 550	EED 576
SED 576	SPE 535	ECD 565	PPE 551	EED 578
SED 578	SPE 540	ECD 570	PPE 555	EED 593
SED 578	SPE 541	ECD 571	PPE 556	ELL 515
SED 593	SPE 575	ECD 578	PPE 560	ELL 516
SED 593	SPE 576	ECD 580	PPE 565	RDG 531
SPE 555	SPE 578	ECD 593	PPE 593	RDG 532
TEL 504	SPE 593	ELL 515	PPE 598	TEL 505
TEL 505	TEL 501	ELL 516	RDG 507	
			SED 544	
			TEL 501	
			TEL 504	