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Digital natives and digital immigrants: teaching with technology

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DIGITAL NATIVES AND DIGITAL IMMIGRANTS:
TEACHING WITH TECHNOLOGY

A Dissertation presented

by

Ellen Marie (Peterson) Martin

to

The School of Education

In partial fulfillment of the requirements for the degree of
Doctor of Education

in the field of

Education

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ABSTRACT OF DISSERTATION

Submitted in partial fulfillment of the requirements
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Education is witnessing an increasing demand for technology use in the classroom. At the same time, new teachers are entering the profession in high numbers, some being labeled as “Digital Natives” while others are labeled “Digital Immigrants”. This qualitative case study investigated the technology practices of Digital Native and Digital Immigrant new teachers and examined the role of Situated Learning in technology integration learning and practices among new teachers. The sample population included six Digital Native teachers and six Digital Immigrant teachers who were full-time, core content area, K-12 classroom teachers with one to five years of teaching experience. Data collection consisted of artifacts, surveys, individual interviews, and focus group interviews. Data analysis revealed three themes: (a) there are more similarities than differences between Digital Natives and Digital Immigrants in regards to background experience and classroom technology use, (b) accessibility and time are factors that influence classroom

technology use by both Digital Natives and Digital Immigrants, and (c) Situated Learning is a vital part of technology learning and use by all new teachers regardless of whether they can be characterized as Digital Natives or Digital Immigrants. The data provided useful information that suggests opportunities for professional development and teacher preparation programs.

Additional research could include the following questions: (a) How do Digital Native teachers and Digital Immigrant teachers have their students utilize technology?, (b) What impact do teacher preparation programs have on classroom technology integration and what are characteristics of successful programs?, and (c) What districts provide ample access to technology and provide time to learn how to integrate it, and what impact does this have on teacher use of technology, student use of technology, and/or student achievement?

Key words: Digital Natives/Immigrants, New Teachers, Technology, Situated Learning

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Chapter 1

Introduction

Purpose of the Study

The purpose of this study was to investigate the variations in use of technology for classroom teaching practice by Digital Native new teachers and Digital Immigrant new teachers. This study attempted to answer the following primary research question: *In what ways do the district's Digital Native new teachers vary in how they use technology in their classroom teaching when compared to the district's Digital Immigrant new teachers?* A supporting question was also examined: *How have these new teachers learned to use technology in their classroom teaching and has Situated Learning been a component to this learning?*

The study utilized a qualitative case study method to investigate differences and similarities among these two groups of new teachers, and also looked at the role of Situated Learning in technology integration learning and practices among new teachers.

It is the researcher's hope that this study has resulted in a better understanding of teacher perspectives and practices regarding technology use for classroom teaching and has illuminated professional development needs of both Digital Native and Digital Immigrant new teachers.

Statement of Problem and Significance

The world cannot seem to live without technology (Mosenson & Johnson, 2008) and education is witnessing an increasing demand for technology use in the classroom (NETS Project, 2008.). At the same time, new teachers are entering the profession in high numbers (National Commission on Teaching and America's Future, 2008). Some of these new teachers,

born in 1980 and more recently, are considered Digital Natives while others, although new to the teaching profession, are labeled as Digital Immigrants (Prensky, 2001). It is crucial that we investigate both groups of beginning teachers and their technology use in the classroom in order to ensure that our students graduate with the necessary skills to compete in today's society. Therefore, the purpose of this study was to compare and contrast the use of technology in the classroom among these two groups of new teachers. It also examined the role of Situated Learning in technology integration learning and practices of new teachers.

Like other districts, this suburban, southeastern Massachusetts school district acquired a generous amount of technology over the past ten years. In 2001, the town allotted funds for their "2001 Project", a project dedicated to the renovation of each building to accommodate more students and to make the space more conducive to teaching and learning. Also incorporated into the plan was money to purchase technology resources to bring the district into the 21st century. Upon completion of the project, each classroom had a teacher computer, printer, and scanner, as well as four computers in each elementary and middle school classroom. Each elementary school was fitted with one computer lab, and the middle school with four labs – one for each grade level and one for the library. The high school not only received computers for two complete library computer labs, but also enough hardware to form four "flex labs" for students to filter in and out as needed, consisting of 12-16 computers in each (C.Jackson, personal communication, February 18, 2011). A massive amount of technology hardware and infrastructure was purchased at a price tag of approximately \$2 million, and the entire 2001 Project cost the district \$54 million (D. Beaudette, personal communication, n.d.).

More recently, the district invested in interactive whiteboard technology, and over 75 interactive whiteboards were distributed since 2008 (C.Jackson, personal communication, February 18, 2011). Along with the purchase of each board, a teacher laptop computer with docking station was distributed as well (E. Peterson, personal communication, December 30, 2008). The plan was to continue to outfit all district classrooms with interactive whiteboards while updating teachers' computers, and then to migrate the older computers down for student use (E. Peterson, personal communication, December 15, 2010). The district also began to implement netbook carts for students, and recently invested in a small number of iPads to pilot in both elementary schools (E. Peterson, personal communication, March 10, 2011). At the time of this study, the high school hosted a wireless platform, and the other three buildings were soon to follow (E. Peterson, personal communication, October 25, 2010). Again, the changes in technology have brought bigger and bigger price tags, as well as further costs for increased bandwidth, virtualized environments, and teacher training.

Although the district has invested vast amounts of money and time to distribute technology in all five of its buildings (four schools plus the administration building), the actual integration of technology has been mixed. For example, on a recent faculty survey to gather information for their annual Technology Plan, approximately 90% of teachers reported they use technology nearly every day to prepare for lessons, complete administrative tasks, communicate, and collaborate, yet only 45% reported they use technology nearly every day for student activities. In addition, when eighth grade students were surveyed, only 14% reported using computers in their classrooms and 38% used computer labs more than once per week, with the most use reported in their English classes. Only 44% reported using computers for math classes,

and only 9% for art (E. Peterson, personal communications, March 21, 2011, January 11, 2011; Peterson, 2011a; Peterson, 2011b). Although the hardware available may not have been the most current model, there were still approximately 1100 computers across the district, and students and teachers had access to all technology that was available (E. Peterson, personal communication, February 18, 2011). The gap between actual usage and the amount of technology available supports the assertion of Hokanson and Hooper (2004) that “The real need for change is not with access to the machines, support or software; the ‘problem’ is from within. It is pedagogical, curricular, and methodological” (p. 3).

Since the district had acquired this massive amount of technology over the past ten years, they were not only seeking ways to implement the hardware, but ways to increase actual integration into teaching and learning. As Smith and Owens (2010) state, “If students are to become technologically literate within the public education system, the mere existence of technology in the elementary classroom will not be enough” (p. 59). Knowing this, the district had begun to incorporate technology expectations and projects into their curriculum documents, while department and faculty meetings had started to become platforms for sharing ideas with colleagues about technology integration ideas. Over the past three years, 29 workshops, two graduate courses, and numerous informal meetings allowed teachers time and opportunities to learn more about technology and improve their skills in using these powerful tools (K. Chase, personal communications, June 20, 2008; E. Peterson, personal communications, September 5, 2008, October 30, 2008, November 25, 2008, January 6, 2009, February 26, 2009, April 3, 2009, April 16, 2009, April 27, 2009, May 22, 2009, June 5, 2009, August 10, 2009, March 18, 2010,

July 6, 2010, August 23, 2010). However, it was still mixed as to the extent that technology had been integrated into teaching practice, including by their newest teachers.

In the past five years, the school district hired 50 new teachers who were still working in the district at the time of the study, making approximately 35% of the district's teachers new to the district (E. Peterson, personal communication, January 27, 2011). In 2001, Marc Prensky defined and codified the terms Digital Native and Digital Immigrant. His definitions, accepted by many (Bennett, Maton, & Kervin, 2008; Gaston, 2006; Long, 2005; McHale, 2005), describe Digital Natives as "native speakers of technology, fluent in the digital language of computers, video games, and the Internet" (Prensky, 2005, p. 8) and Digital Immigrants as not being born into the digital world but who may have later "adopted many or most aspects of technology" (Prensky, 2001, pp. 1-2). For the purpose of this study, Digital Native new teachers were K-12 in-district teachers who were in their first five years of full-time public school teaching in the United States and were born in 1980 or more recently, while Digital Immigrant new teachers were K-12 in-district teachers who were in their first five years of full-time public school teaching in the United States and were born prior to 1980. While 42% of these new teachers were considered Digital Natives, the other 58% were Digital Immigrants (E. Peterson, personal communication, January 27, 2011).

If Digital Native new teachers have more experience with technology in their personal lives, as is suggested by Prensky (2001, 2005), the question remains as to how they actually integrate technology into their teaching practice as they enter the field of education (Dutt-Doner, Allen, & Corcoran, 2005; Russell, Bebell, O'Dwyer, & O'Connor, 2003; Strudler, McKinney, & Jones, 1999; Webb, 2005). It is also uncertain if these Digital Native new teachers integrate

technology differently than their non-Digital Native peers. Since all K-12 students need to emerge with technology skills, educators must fully utilize technology in the classroom regardless of their background (Williamson & Redish, 2009).

In order to look more closely at this issue, education's newest teachers must be at the forefront of this conversation. Strudler, et al. (1999) recommend research that "documents specifics of current practices, levels of preparation, and approaches that promote effective implementation of technology by beginning teachers" (p. 115). Therefore, the goal of this research study was to investigate the differences and similarities between Digital Native new teachers and Digital Immigrant new teachers in regards to technology use in the classroom, and to examine the ways in which teachers learn to integrate technology in their teaching practice.

Practical and Intellectual Goals

Studying the use of technology by one school district's Digital Natives and Digital Immigrants new teachers has brought light to a better understanding of teacher perspectives and practices regarding technology use for classroom teaching. As a Curriculum and Technology Director, the researcher was aware that technology integration varies among individuals. However, investigating the similarities and differences among these two groups of new teachers was a specific realm that had not yet been investigated thoroughly, but proved to be useful in the school district involved in the study.

This study exposed professional development needs of both Digital Native and Digital Immigrant new teachers and highlighted the importance of Situated Learning, which has had an impact on the mentoring and induction program as well. However, the research may also be of

great interest to other districts grappling with the same types of issues, so it is hoped that other districts may find the information useful. In addition, suggestions for teacher preparation programs in regards to technology training were also revealed, thus carrying over into the world of higher education institutions.

Research Questions

Through this study, the researcher sought to identify similarities and differences in technology use among the two groups, Digital Native new teachers and Digital Immigrant new teachers. Therefore, the specific research question for this specific study was:

- In what ways do the district's Digital Native new teachers vary in how they use technology in their classroom teaching when compared to the district's Digital Immigrant new teachers?

One sub-question based upon theoretical framework for this research was also asked:

- How have these new teachers learned to use technology in their classroom teaching and has Situated Learning been a component to this learning?

Definitions for the purpose of this study:

Technology: internet resources, web-based applications, interactive whiteboards, student response systems, software programs, hardware peripherals such as document cameras, scanners, and other technology tools.

Digital Native new teachers: K-12 in-district teachers who were in their first five years of full-time public school teaching in the United States and were born in 1980 or more recently.

Digital Immigrant new teachers: K-12 in-district teachers who were in their first five years of full-time public school teaching in the United States and were born prior to 1980.

Classroom teaching: delivery of instruction, student use, and assessment of learning.

Theoretical Framework

For the purpose of this study, Situated Learning Theory is most directly related to the research because it addresses the issue of learning in context for future application (Collins, 1998; Dennen, 2004; Online Learning Laboratory, n.d.; Stein, 1998) and connects to the importance of training teachers for classroom technology use in an authentic setting (Swan, et al., 2002). In addition, it also discusses the culture in which learning takes place, relationships with peers, and the importance of authentic activities, all of which are important to both Digital Native and Digital Immigrant new teachers entering a classroom, school building, or school district for the first time.

Situated Learning Theory

Stein (1998) outlines four major premises which guide a situated learning experience: learning is grounded in authentic situations, knowledge is acquired situationally, learning is result of social relationships, and learning exists in complex environments made up of situations, people and activities. According to the theory, people learn best by being immersed in the environment and culture in which they will utilize their knowledge (Hansman, 2001; Lave, 1996; Stein, 1998). Therefore, one could infer that teachers will best learn technology integration skills by learning to use technology specifically in a school and classroom setting. In addition, one can

best learn these skills by working with peers (Ertmer, 1999; Persky, 1990), again inferring that professional conversation and activities will provide the best platform for learning. Although new teachers may utilize technology outside of their professional environment, such as the case with social networking and communication, they “need to understand the complexity of teaching in a technology-enriched environment, because students bring different background knowledge and different technology skills to the classroom” (Dutt-Doner, et al., 2005, p.72).

Jean Lave, a well-known Situated Learning theorist, argues that authentic setting and activity help to transfer one’s learning to the appropriate context. She asserts that the activity, context, and culture in which learning is situated will solidify learning and make it applicable to real life (Ho, n.d.; Lave, 1991), and that “learning, thinking, and knowing are relations among people engaged in activity *in, with, and arising from the socially and culturally structured world*” (Lave, 1991, p. 67). This addresses the need for professional communications and learning among peers since participants create their own knowledge through the experience, activities, relationships, and environment in which learning takes place (Stein, 1998, p. 1).

Context.

One major component in Situated Learning is the importance of learning taking place in an authentic setting (Anderson, Reder, & Simon, 1996; Berryman, 1991; Herrington & Oliver, 1995; Stein, 1998) since learning is closely linked to the circumstances in which it is acquired (Billett, 1996, p. 2). In 1989, Smylie investigated the sources of learning reported by 1,789 teachers belonging to the National Education Association (p. 544). He found that teachers perceived actual classroom experience as their most effective source of learning, followed by consultation with other teachers, personal study and research, and observation of other teachers

(p. 549). In most cases, the least effective source reported was undergraduate education courses (p. 549). Putnam and Borko (2002) also assert that situated experiences in a teacher's own classroom may be better suited to facilitating specific instructional practices (p. 7). Both examples support the conclusion that the only certain way to learn how to use technology in teaching practice is to learn it in the same context in which it will be used (Hansman, 2001; Lave, 1996).

The further an activity is removed from the actual application, the less likely knowledge will transfer to new circumstances (Royer, 1979). For example, a study by Lei (2009) found that although digital native preservice teachers utilize social-networking sites, they lacked experience or expertise in using some technologies in the classroom setting (p. 91). In the case of new teachers, although they may be familiar with technology, the context for learning to teach with it would be the classroom itself (Russell, Bebell, O'Dwyer, & O'Connor, 2003, p. 308).

The context of learning is crucial in order to carry the skills over into the "real world" (Berryman, 1991; Brown, Collins & Duguid, 1989; Collins, 1998; Lave, 1996). In a 2002 study comparing and contrasting technology discussion and use by novice and expert teachers, Meskill, Mossop, DiAngelo, and Pasquale found that novice teachers who had received "state of the art" training in technology were less comfortable than the experienced teachers with no formal computer training when implementing the tools in the classroom (p. 54). Teacher development, including developing the use of technology with students, continues beyond teacher education programs into contexts the new teachers enter (Clausen, 2007, p. 259). Situated learning also pays attention to the interaction among people, tools, and context within a learning situation (Hansman, 2001, p. 43) and makes it clear that what we do and think directly relates to the

context at hand (Putnam & Borko, 2000, p. 6). Therefore, a subtext of the question for this research was that although some new teachers may have utilized technology throughout their lives and others not, all new teachers must be given opportunities to practice and utilize it in the context in which it will be used: the classroom.

Culture.

In Situated Learning Theory, equally important to the physical environment and context is the culture in which learning takes place. “A person’s intentions to learn are engaged and the meaning of learning is configured through the process of becoming a full participant in a socio-cultural practice” (Lave & Wenger, 1991, p. 29). Learning is inherently social in nature and includes interactions among learners, the tools they use, the activity, and the context in which the activity takes place (Brown, et al., 1989, p. 3), and learning is meaningful only if it is embedded in both the social and physical context within which it will be used (Brown, et al., 1989; Collins, 1987; Collins, Brown, and Newman, 1987; Hansman, 2001). In addition, teacher professional development may also be influenced by school, district, and community cultures (Swan et al., 2002).

Once in the classroom, new Digital Native teachers and new Digital Immigrant teachers are all immersed in the culture of their learning environments while interacting with other teachers. Conversations and projects with colleagues and experts allow teachers access to a network that can assist them in curriculum development and classroom management as well as in utilizing technology effectively (Ertmer, 1999, p. 55). One factor found to be conducive to learning how to integrate technology is collaboration among teachers, and another is training for principals to encourage best practices for using technology in the classroom (Ash, 2011). Toledo

(2007) asserts that teachers, including Digital Immigrants, can share their experiences with technology to help peers create technology-rich environments as well (p. 89). Learning will then transfer to a new situation, such as a classroom, as a result of influences by the community and culture (Billett, 1996, p. 10). Through the social nature of situated learning, all new teachers regardless of category will not only learn from their prior experiences, but from colleagues as well.

Activity.

Not only is an authentic context important in Situated Learning, but also are authentic activities, access to experts and models, coaching, scaffolding, and reflection (Brown, et al., 1989, p. 33; Herrington & Oliver, 1995, p. 3). Lei (2009) found that Digital Native preservice teachers did not have experience using technology tools such as interactive whiteboards, content-related technology, and assistive technology (p. 91). Even though they are familiar with technology, these Digital Natives have not been exposed to the activities using these types of hardware found in classrooms today.

Although they have grown up in a digital age, they are not being exposed to different ideas about actually teaching with technology (Lei, 2009, p. 92). In 2006, Brown and Warschauer found that teacher preparation courses placed emphasis on basic hardware and software functionality rather than on integrating technology into teaching (p. 607). However, situated learning takes into account the specific technologies directly available to teachers in their schools and not simply this overall hardware and software introduction (Swan, et al., p. 176). Even schools with an abundance of technology are not effectively integrating it (Ash, 2011; Brown & Warschauer, 2006). Therefore, technology must be learned through an

integrated experience and “cannot be taught as a separate and independent domain” (Lei, 2009, p. 93).

Activities such as personal technology use, preparing technology lessons, and experiences with technology use with students offer the opportunity to discuss technology use with both new Digital Native teachers and new Digital Immigrant teachers. It also allows the researcher to examine if the Digital Natives’ familiarity with technology provides a better foundation for incorporating technology tools in the classroom. Since technology can be more familiar to Digital Native teachers (Prensky, 2005), this research posits that authentic activities which utilize technology in the classroom allow a new teacher to use his/her existing knowledge while showing the importance of acquiring new and authentic knowledge. If Stein (1998) is correct, although Digital Natives may bring their technology knowledge and background to the classroom, both groups must re-experience technology from the perspective of a teacher. Thus, “application rather than retention” is the goal behind situated learning (Stein, 1998).

Communities of Practice/Cognitive Apprenticeship.

Two other aspects of Situated Learning Theory that can be applied to this study are Communities of Practice and Cognitive Apprenticeships. Communities of Practice are groups of people who share a common practice, work together to improve that practice by interacting with one another on a regular basis regarding a concern or passion for something they do, and learning how to do it better as they interact (Rogoff, n.d.; Wenger, et al, 2002; Wenger, 2006). Such a community requires three components: a shared domain of interest, a community of the domain members in which they interact and share information, and a practice in which all members are engaged (Gillespie, 2000; Ho, n.d.; Online Learning Laboratory, n.d.; Wenger,

2006; Wenger, et al., 2002). Also in a Community of Practice, all learners accept that no one person holds all knowledge on a subject so they can collectively share their expertise (Atherton, 2011; Collins, et al., 1987). This is especially important to Digital Natives, as they may seem more qualified at first glance, but may be on the same plane as Digital Immigrants when it comes to utilizing technology for classroom practice. Although Digital Natives may bring more technology history to the community, only by interacting with others will they gain a deeper understanding of how to use it effectively in all aspects of their teaching practice since people learn through participation, involvement, and interaction with a community (Hansman, 2001, p. 46).

Cognitive apprenticeships can also occur within a situated learning context. Characteristics of such apprenticeships include: tasks embedded in familiar activity, activation of apprentice knowledge, scaffolding of tasks, problem-solving; and opportunities for apprentices to become acclimated through immersion into the authentic culture (Ho, n.d.; Lave, 1996). Apprentices learn the many complexities of practice and are immersed in a Community of Practice from the beginning. Therefore, they are able to have a broader view of the entire context rather than only isolated, individual tasks (Lave, 1996). In addition, observation, modeling, mentoring, coaching, and reflection are the core of cognitive apprenticeship (Collins, et al., 1987; Dennen, 2004), and modeling and guidance by mentors allows learners to become more confident specifically in classroom technology use (Swan, et al.). Since there is often a disconnect between school and real world situations, and therefore a failure to transfer that knowledge, it is crucial to utilize apprenticeship-like experiences (Ho, n.d.). Colleagues and mentors who can provide such cognitive apprenticeship opportunities are crucial to the growth of

all incoming teachers, whether or not they are Digital Natives or Digital Immigrants. “The best teacher preparation occurs through collaborative apprenticeship, and the modeling of effective classroom technology practices by both methods teachers and school-based mentors is thus critical to preservice teachers’ own professional development in the educational use of information and communication technologies” (Brown & Warschauer, 2006, p. 619).

Although components of Communities of Practice and cognitive apprenticeships may have been touched upon during the research process, these two aspects were not studied in depth during the study.

Research Design

This qualitative case study examined the ways Digital Native new teachers vary in how they use technology in their classroom teaching when compared to Digital Immigrant new teachers within one suburban, southeastern Massachusetts school district. It also investigated how both groups of new teachers learned to integrate technology in the classroom and whether situated learning has been a component to this learning. This approach involved the collection of artifacts, surveys completed by participants, individual interviews, and a focus group interview. Multiple sources of information allowed the researcher to triangulate the data to strengthen the findings of the study.

Limitations of the Study

This research project was limited to 16 K-12 district educators in their first five years of public school teaching. The limitations in this study were as follows:

1. **Sample size:** The sample size for this study was limited due to the size of the district and the number of teachers who qualified for the purposefully selected sample.
2. **Single district:** Data was collected from a single school district. This could limit full generalization of the findings to other districts.
3. **Bias:** The researcher was a district level administrator at the time of data collection, which could possibly have influenced participants' responses. However, it was known that the researcher had notified the district of her resignation, therefore reducing any fear of the use of acquired data for evaluative or other purposes in the future.
4. **Discussion among participants:** Participants may have talked with one another between scheduled interviews so may have anticipated the questions asked by the researcher. However, the questions did not have specific answers and were based upon individual experiences and survey data, limiting the risk of skewed data.

Summary

Situated Learning Theory is built on the premise that the applicable context, culture, and activities in which one is immersed in during the learning process allows for transfer of this learning to real-world situations (Ho, n.d.; Lave, 1991; Putnam & Borko, 2000). This theory has implications for both preservice and inservice teacher learning (Putnam & Borko, 2000, p. 5), and directly relates to the topic of technology integration in the classroom (Swan, et al., 2002). When exploring professional development for technology integration, Swan, et al. (2002) suggest that the training which takes place outside of the classroom does little to model and support technology integration. In their study of a situated professional development model

focused on technology integration by teachers, they found that a situated model where learning took place in the authentic classroom practice was more successful than the traditional model of outside professional development delivered by “experts”. They reported an increase in technology knowledge, a higher level of confidence in technology use, and more creative use of technology in the classroom, directly supporting a situated experience for teacher learning in the area of technology integration (p. 11).

Situated Learning Theory has been used in conjunction with teacher learning (Putnam & Borko, 2000) as well as technology integration learning because of the importance of authentic context and practice (Swan, 2002). To reiterate the importance of this type of learning for all new teachers, Duran, Fossum, and Luera (2006) quote one student teacher as saying, “It is one thing to learn and use a program or tool, but it’s another thing to teach it to a room full of six year olds”” (p. 43). Because it relates to these two main areas of this research study, Situated Learning Theory lays the foundation for successful technology use in teaching practice.

Chapter 2

Literature Review

Introduction

In addition to Situated Learning Theory, three streams of literature are important to better understand the issue of new teachers and technology use in practice. The first stream explores Digital Natives, the origin of the phrase, its meaning, and the impact that technology has had on people around the globe. Since these Digital Natives are now entering the classroom as teachers, this literature is critical to better understand their perspectives, practices, and needs, and whether they truly differ from Digital Immigrants when it comes to teaching with technology. This then demonstrates the need to examine the second stream, Digital Immigrants, and the literature that surrounds this term. The third stream of literature goes on to investigate teacher technology use in the classroom. This section addresses how teachers utilize technology, how they are prepared to do so, and why or why not they utilize technology for specific areas of practice. This stream also looks at what is necessary in order to be a successful technology integrator.

Digital Natives

The actual term “Digital Natives” was introduced by Marc Prensky in 2001, and has been used by many others as well (Bennett, et al., 2008; Gaston, 2006; Long, 2005; McHale, 2005). According to Prensky, Digital Natives are “native speakers of technology, fluent in the digital language of computers, video games, and the Internet” (Prensky, 2005, p. 8). In 2001, these students to whom he was referring were in the K-12 school system. However, these same students are now in colleges as well as in the work force, entering our classrooms as both

preservice and new teachers. “Today’s young people – both students in our schools and those entering teacher education programs – are digital natives who grew up in a world of computers, Internet, cell phones, MP3 players, and social networking” (Levine, 2010, p. 20). Although Prensky’s definition has been accepted by many (Bennett, et al., 2008; Gaston, 2006; Long, 2005; McHale, 2005), the term “Digital Natives” is only one way to describe the group of students who have grown up with technology as the name of this group seems to change from article to article ¹. For the purpose of this research study, the term Digital Native was utilized since it has been used by other educational experts in recent years, including the Director of the Office of Education Technology for the U.S. Department of Education (Levine, 2010, Sherer, 2011).

The years of birth of the generation in question also differ according to various researchers, ranging anywhere from 1977 to 2002². In utilizing Prensky’s term of Digital Natives, Dr. Arthur Levine (2010), former president of Columbia Teachers College, writes, “Today’s traditional undergraduates, aged 18 to 25, are digital natives” (p. 20), and Palfrey and Gasser (2008) agree that a Digital Native is “A person born in the digital age (after 1980) who has access to networked digital technologies and strong computer skills and knowledge” (p. 346). While the date of birth of a Digital Native also varies in the literature, the beginning year

¹ This group can also be known as “Generation Next, the Net Generation, the Boomerang Generation, Generation M, and the Digital Natives” (Experiential eLearning, n.d., p. 1). Another term used is “Millennials” (Dede, 2005; Experiential eLearning, n.d.; Kane, n.d.; Thielholdt & Scheef, 2004).

² Heathfield (n.d.) defines this generation as having been born between 1980 and 2000, or 1981 and 1999 (p. 1). According to Thielholdt & Scheef (2004), the millennials encompass the generation born between 1977 and 1998. Havenstein (2008) refers to “Generation Y” as the group born roughly between 1982 and 2002, and Kane (n.d.) refers to Generation Y, or Millennials, as those born in the mid-1980’s and later. Dede (2005) writes that Millennial students are those born after 1982 (p. 2), while Experiential eLearning (n.d.) states that the Millennials, following Generation X, were born between roughly 1980 and 2000.

of birth for use in this study was 1980 due to the fact that it lies within several definitions found in the literature (Experiential eLearning, n.d.; Heathfield, 2002; Thieffoldt & Scheef, 2004).

Regardless of which term is used or the exact birth year, this generation is the fastest growing sector of today's workforce (Kane, n.d., p. 1), growing from 14% of the workforce to 21% or nearly 32 million workers (Armour, 2010). They are "tech-savvy" since they grew up with technology and rely on it to perform their jobs better (Kane, n.d., p. 1). Researchers and authors note that technology (including computers, the Internet, cell phones, and pagers) has always been part of Digital Natives' lives (Theilfoldt & Scheef, 2004, p.2). According to Havenstein (2008), this generation has a constant desire to learn new skills and to have access to new technology (p. 2). They are "the most connected generation in history" (Heathfield, n.d., p. 1). In 2002, Jones found that college students were among the first in our country to use the Internet for multiple purposes such as communication and recreation (p. 5). And, according to Rainie (2006), some other technology advances this generation has been able to witness since birth include: the beginning of the World Wide Web in 1990; the Palm Pilot which first shipped in 1996; the Napster file-sharing service beginning in 1999; the creation of Wikipedia in 2001; RSS feeds and social network sites beginning in 2002; the iPod being patented in 2002; free online phone calling (Skype software was made available in 2003); the first camera phone in early 2003; and the online video explosion, including YouTube which went live in 2005 (p. 1).

Prensky (2001) asserts that the Digital Native generation learns differently, both in K-12 classrooms and higher education institutions. This generation also learns through experimentation, collaboration and peer-to-peer connection (Experiential eLearning, pp. 1-2). Dede (2005) refers to the "Neomillennial" learning style in higher education and claims that

these new students look for shared learning that involves diverse, situated experiences (p. 1). They also seek a “balance among experiential learning, guided mentoring, and collective reflection” (p. 1), components of Situated Learning Theory. Even more, their learning is based on more active, social experiences and collective knowledge rather than simply individual information (pp. 4-5), which is again tied to the socialization and culture aspects of situated learning experiences.

In 2002, when looking more closely at these Digital Natives, Jones found that 20% of the college students in his study began using computers between the ages of five and eight, and before they were 18 years old, many had begun using computers and the Internet was an everyday resource (p. 2). In addition, nearly half of the students reported that they used the Internet mainly to communicate socially and 72% said most of their online communication was with friends (p. 3). Since these statistics were reported in 2002, and members of this group are now some of our newest teachers, it is clear that Digital Natives have had a great deal of access to technology and have used it both as a resource and in a social context. “Today’s college student will be well prepared to work in a wired world. Virtually all of them will have experience with email and the Web, and most will be familiar with a wide variety of software packages” (p. 19).

Even so, although Digital Natives may be familiar with these applications, and familiar with digital socialization, technology is changing at an exponential rate, thus changing our world (Caruso & Salaway, 2007, p. 1). In a later publication, Prensky (2005) quotes eSchool News that 86% of U.S. teachers say computer technology has affected the way they teach to some extent, while 55.6% say it has affected their teaching a great deal (p. 13). In their research two years later, Caruso & Salaway (2007) found that undergraduate students “perceive technology’s

persistence in their lives. These students, many of whom have never known a world without personal access to information technologies, often take them for granted and integrate them seamlessly into their daily lives” (p. 1). In 2008, another study focused on 2,000 incoming first-year Australian university students found that they were tech-savvy students, but there were variations in skills with different technologies, especially those beyond the most well-known technologies and tools such as computers, cell phones, and email (Kennedy, Judd, Churchward, Gray, & Krause, 2008 p. 108). Even more recently, Chen, Lim, and Tan (2010) published findings from a study of 1554 pre-service teachers born after 1980 that found that a gap between everyday information communication technology and the use of it for teaching and learning still exists for this age group (p. 637), again alluding to the importance of learning in context that situated learning experiences offer.

In light of these studies, Digital Natives are fairly new to the professional workplace today and are still in need of mentoring, regardless of experience or confidence (Theilfoldt & Scheef, 2004, p. 3), which the social aspect of Situated Learning addresses. And since this generation is now entering classrooms as new teachers, it is important to note that, even though they are more comfortable with technology and have more experience using it in their everyday lives, “it may take longer than we think for the teacher corps to be savvy and effective users of electronic and online instructional tools...” (Manzo, 2009, p. 1). The current new teacher corps is composed of more than this new generation, so this applies to both Digital Natives and Digital Immigrants.

Digital Immigrants

Just as Prensky describes Digital Natives, he describes Digital Immigrants as people who were not born into the digital world (Prensky, 2001, p. 1). Even though some may have later adopted many aspects of technology (p. 2), Digital Immigrants are immersed in an unfamiliar culture of technology use, language, and behaviors (Toledo, 2007, p. 88). Whether writers are in agreement or in dispute with Prensky, many have also utilized this term to describe the group opposite of Digital Natives (Toledo, 2007; VanSlyke, 2003). Educational institutions also make use of the term, with the Australian National University directly acknowledging that many of its students are still of the Digital Immigrant generation (Visser, n.d.).

One identifying characteristic of Digital Immigrants is their accent (Prensky, 2001, p. 2; Toledo, 2007). This so-called accent can be construed as the level of one's comfort with technology, so accents can vary among the Digital Immigrant group (p. 86). Another difference between the Digital Natives and Digital Immigrants, other than age, is the "intuitive acceptance of rapid digital change" (Woods, 2006, p. 2). The Immigrants, not having been exposed to technology as much as their counterparts, may have a more difficult time with the constant changes that often come with technology (p. 2).

On the other hand, there may be some similarities between the two groups when it comes to technology. For example, some Digital Immigrants prefer information in print format, while only traces of this desire remain in others (Visser, n.d., p. 2). Another similarity is that both Digital Immigrants and Digital Natives are being overwhelmed with information today (VanSlyke, 2003, p. 3). VanSlyke (2003) goes on to write that perhaps it is not a difference in learning styles between the Digital Natives and Digital Immigrants, or that one is unresponsive

to the teaching and learning forms of the other, but it could be a manner of cultural assimilation and the need to retain elements of both (p. 4).

While Prensky (2001) asserts that Digital Immigrant teachers, with their pre-digital language and accent, are having difficulty teaching the new Digital Native population (p. 2), Toledo (2007) asserts that many Digital Immigrant teachers have the ambition to experiment and utilize technology, and that some even become experts in the eyes of their colleagues (p. 89). Good teaching is the necessary component, however, and it is not necessarily the amount of technology used, but how it is used (VanSlyke, 2003, p. 6). And, if Brown, et al. (1989) are correct in their assumptions of Situated Learning, both Digital Natives and Digital Immigrants should learn to use technology tools in the culture and context in order to effectively utilize them.

In a study of over 2,000 preservice teachers, Guo, Dobson, and Petrina (2008) found no statistically significant difference between Digital Natives and Digital Immigrants in regards to information and communication technologies (p. 251). One conclusion could be that some Digital Natives and Digital Immigrants could be on the same level with a variety of technologies; therefore a possible extrapolation is that they are on the same level when becoming new teachers. This demonstrates the need for the same type of Situated Learning experiences in order to successfully incorporate technology into the teaching practices of both groups.

Technology Integration

Whether or not Digital Native and Digital Immigrant new teachers possess technology skills, and whether or not the technology is present in schools, researchers agree that K-12

classroom technology implementation in schools has been very slow and below expectations (Inan, 2007; Smith and Owens, 2010). Knowledge of technology is only one critical component to a teacher's use of technology in their practice; they have to also learn how to use it for teaching and student learning (Guha, 2000, p. 3), again demonstrating the need for situated learning for successful technology integration by both groups.

In order to investigate technology use by teachers, Boston College conducted the Use, Support, and Effect of Instructional Technology (USEIT) study in 2004 (Bebell, Russell, & O'Dwyer, 2004a). This study examined practices in 22 Massachusetts school districts, identifying ways in which teachers use technology for professional purposes and the extent to which new teachers are comfortable with technology and use technology for professional purposes. Since the definition of technology use has changed as more complex technology has surfaced, Bebell, Russell, and O'Dwyer (2004b) summarized the categories of technology use by teachers identified in the USEIT study. They identified seven scales of use: preparation; professional mail; delivering instruction; accommodation; student use; student products; and grading. In general, teachers reported using technology most for preparation and email rather than student products (pp. 52-53), and when looking at overall technology use, there was little difference between new teachers and those in the profession for 11 or more years (Bebell, et al., 2004a, p. 14). Within the statistics, however, newer teachers actually reported utilizing technology more for preparation and accommodation than their more experienced colleagues and less often for delivery and student use during class time (p. 56). "The distribution of responses for the seven separate technology measures, however, suggest that the distribution of use varies dramatically across the separate categories of use" (p. 53). This demonstrates that, although

teachers may use technology in their practice, the ways in which they use it varies and specific usage does not necessarily depend on the age of the user.

In her study of 1,382 Tennessee public school teachers, Inan (2007) also demonstrated that technology is used in different ways in classrooms and can be grouped into categories: technology for instructional preparation, technology for instructional delivery, and technology as a learning tool. A more recent U.S. Department of Education report (Gray, Thomas, & Lewis, 2010) shows that technology use by students in classrooms also ranges by activity. Only 13% of teachers report that they have students use technology “sometimes or often” to design and produce a product, 25% to conduct experiments or perform measurements, and 31% to correspond with others. On the other hand, use by students to only prepare written text is 61% and to learn or practice basic skills is 69%. If Franklin and Molebash (2007) are correct, “Most often teachers are using technology for administrative or preparatory tasks and only sporadically for classroom instruction” (p. 156). Studies looking at the technology use by teachers provide valuable information into how teachers in general are using it in practice.

Do technology integration practices among new teachers vary according to when they were born as the distinction of Digital Natives and Digital Immigrants implies? Perhaps not. According to Webb (2005), although new teachers have entered the field of education with more advanced technology skills as compared to their veteran colleagues, “their integration of technology and use of it with their students has not been apparent” (p. 5). By identifying the similarities and/or differences in the practices of Digital Native and Digital Immigrant new teachers, professional development can be provided to this new generation in order to fully prepare them for working many years in a profession where technology integration is necessary

for student success (Vitale, 2005). The U.S. Department of Education (2010) reports that, of those teachers who have interactive whiteboards available for use, only 57% use them sometimes or often, student response systems only 35%, and videoconferencing only 13%. “Professional development programs for technology integration that focus on the acquisition of skills, as well as those that “show how” technology can be used in an instructional context, might be necessary pre-requisites to becoming a technology integrator” (Vitale, 2005, p. 13).

Even prior to becoming full-fledged inservice teachers, Bansavich (2005) studied preservice teachers’ perceptions of the readiness to integrate technology, how program features influence their readiness, and the status of technology integration in teacher preparation programs, noting that the literature on technology background and how it influences preservice teachers’ readiness to teach with IT is still small. He found little evidence to show that background experiences with technology have an impact on preservice teachers’ use of technology in their teaching (p. 14), thus carrying over to inservice teaching. Although Digital Native new teachers may utilize technology more than Digital Immigrants outside of the classroom, all new teachers “will also require an understanding of how to develop curriculum and pedagogy that incorporates technology” (p. 21).

Studies on preservice teachers, new teachers and technology use have been ongoing, many with an emphasis on preparedness. As far back as 1999, in their study on first-year teachers’ use of technology, Strudler, McKinney, and Jones found that beginning teachers were not being prepared to teach with technology, and Glazewski, Brush, Ku, and Igoe (2002) continued to assert that teacher training institutions are not adequately preparing preservice teachers to effectively integrate technology into their practice (p. 3). Several years later, a 2009

study by Jing Lei also showed limited technology use by preservice teachers. And, even if preservice teachers would have technology integration experience, Stein (1998) asserts that, through situated learning, knowledge is acquired by acting in the same conditions one would encounter on the job (p. 4). These findings affect all new teachers, regardless of whether they fall in the Digital Native or Digital Immigrant categories, and continue to impact the preparation of new teachers today. “Pre-service teachers have “grown up digital,” but being comfortable with technology is not adequate preparation for understanding how to meaningfully integrate technology.” (Dutt-Doner, et al., 2005, p. 63).

In a 2010 issue of *Kappan*, Dr. Arthur Levine, former president of Columbia Teacher’s College, makes the point that the job of a teacher has changed, and that “the preparation of the next generation of teachers and the professional development of current teachers will have to change if our children and schools are to succeed in this new world” (p. 20). As early as 2001, Whetstone and Carr-Chellman (2001) presaged Levine: “If PSTs [preservice teachers] are not learning computer skills in self-contained courses, it is important to consider where these skills are being built” (p. 12). In the situated learning approach, learning is a sociocultural activity rather than simply individual (OTEC, n.d.), which allows teachers to learn these technology skills from one another practicing in context. Teacher preparation programs and school districts can both play a role in building integration skills in order to stress to new teachers the importance of utilizing technology effectively in practice.

Perhaps it is the actual integration piece that poses a problem for both Digital Native and Digital Immigrant new teachers more than the knowledge of technology itself. When proposing an extended-time, multi-course technology integration model for preservice teachers, Pierson

(2004) suggested that new teachers possibly believe that “doing” technology means presenting students with “a shimmering, animated, masterpiece of an electronic presentation for every new lesson” rather than consistent, applicable integration (p. 85). By expecting Digital Native teachers to effectively utilize technology in the classroom without specifically learning how to do so in the applicable environment, the importance of the social and physical context of using technology tools is ignored (Brown, et al., 1989; Ertmer, 1999; Stein, 1998; Swan, et al., 2007), thus working against the foundations of Situated Learning Theory. Therefore, Smith and Owens (2010) contend that “technology will fail to meet its educational promise if we neglect to equip teachers with the skills they need to understand and use it and transmit this knowledge and skills to their future students” (p. 73).

Simply the exposure to and knowledge of technology is not enough to ensure integration of it into the classroom. “If new teachers do not have a powerful vision of the types of learning and teaching they wish to support with technology, they will have a difficult time making intelligent choices about technology use in their professional lives as teachers” (Pellegrino, Goldman, Bertenthal & Lawless, 2007, pp. 83-84). Although teacher preparation and preservice teachers have received attention in the research, “New teacher development following the completion of their formal teacher preparation has received little emphasis in the technology adoption literature” (Clausen, 2007, p. 246), demonstrating the need for technology research involving new teachers after they begin their careers.

Summary

In summary, when examining barriers related to technology integration by K-12 schools, Hew and Brush (2007) note the importance of opportunities for teachers to engage in active learning (p. 233), and Brown, et al. (1989) note that learning must involve specific and authentic activity, concept, and culture (p. 33), all components of Situated Learning Theory. Ertmer (1999) also suggests that an embedded, authentic approach provides both a vision and model of teaching with technology (p. 56). According to Situated Learning Theory, the simple knowledge of technology is not enough for Digital Native teachers to fully learn how to utilize technology in professional practice. If technology is used only for personal use, then it remains to be seen whether the knowledge and previous experiences with technology will or will not carry over into everyday use as a classroom teacher.

Although some have made a point to distinguish between Digital Natives and Digital Immigrants, Director of the Office of Education Technology for the U.S. Department of Education³ Karen Cator believes we “need to get beyond calling teachers digital immigrants, as if technology holds a certain code only young people can decipher. We can let that go.” (Scherer, 2011, p. 17). This, coupled with the acknowledgement that new teacher technology integration research has received little emphasis in the literature (Clausen, 2007, p. 246), provides a basis for studying Digital Native and Digital Immigrant new teachers’ technology use in the classroom.

³ The Office of Educational Technology (OET) provides leadership for technology use in education at all levels. OET develops national educational technology policy and oversees Department educational technology programs (About OET, 2011).

Chapter 3

Research Design

Research Questions

The world has become a competitive environment with a global economy, and students need to enter this world with information, media, and technology skills (Vockly, 2007). In order for students to emerge with the skills necessary to compete in today's society, we need to better understand how technology tools are being used by both Digital Native new teachers and Digital Immigrant new teachers in the classroom. Through this study, the researcher has identified similarities and differences in technology use among the two groups. Thompson (2005) suggests that "Researchers should be encouraged to identify important new questions about technology in teacher education" (p. 334). Therefore, the primary research question for this specific study was:

- In what ways do the district's Digital Native new teachers vary in how they use technology in their classroom teaching when compared to the district's Digital Immigrant new teachers?

One sub-question based upon theoretical framework for this research was also proposed:

- How have these new teachers learned to use technology in their classroom teaching and has Situated Learning been a component to this learning?

Definitions for the purpose of this study:

Technology: internet resources, web-based applications, interactive whiteboards, student response systems, software programs, hardware peripherals such as document cameras, scanners, and other technology tools.

Digital Native new teachers: K-12 in-district teachers who were in their first five years of full-time public school teaching in the United States and were born in 1980 or more recently.

Digital Immigrant new teachers: K-12 in-district teachers who were in their first five years of full-time public school teaching in the United States and were born prior to 1980.

Classroom teaching: delivery of instruction, student use, and assessment of learning.

Methodology

A qualitative case study approach was utilized for this research study in order to investigate the ways Digital Native new teachers vary in how they use technology in their classroom teaching when compared to Digital Immigrant new teachers within one suburban, southeastern Massachusetts town. Since situated learning experiences were a key component in investigating whether there is a difference between the two groups, the importance of personal experience could not be overlooked, thus calling for a case study method. Since this was also an exploration of a possible divide between two recently-identified groups of people, a case study was appropriate as it “investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (Yin, 2003, p. 13). It also uncovered how both groups of new teachers were learning to integrate technology in the classroom and whether situated learning had been a component to this learning.

There were 16 available participants who qualified for this study, and 12 of the 16 chose to participate. This case study approach involved the collection of artifacts, informational surveys completed by participants, and interviews of the participants. First, artifacts such as

participants' coursework and workshop attendance records were accumulated. Next, informal questionnaires were used to gather information regarding the amount of time teachers utilized for technology for various activities involved in one's classroom teaching practice and demonstrated how each teacher was utilizing specific technologies for different activities. Interviews of four Digital Natives and four Digital Immigrants were then utilized in order to further investigate not only the use of technology in practice, but also to inquire as to situated learning experiences in which the participants had participated as new teachers. The findings from all data collection methods were reviewed to identify themes, similarities, and differences regarding technology use in teaching practice by both groups of new teachers. This information was shared with a four-person focus group made up of two Digital Native and two Digital Immigrant participants who had not been individually interviewed. The focus group was utilized to gather feedback, which was then coded with the previous data. This process aligned with a qualitative research approach since it involved emerging questions and procedures, data collected in the participant's setting, data analysis building from specifics to general themes, and the researcher making interpretations of the data (Creswell, 2009, p. 4).

Site and Participants

“The idea behind qualitative research is to purposefully select participants or sites (or documents or visual material) that will best help the researcher understand the problem and the research question” (Creswell, 2009, p. 178). Therefore, participants in this study were purposefully selected based upon their:

- number of years teaching,

- date of hire by the school district,
- position in the district, and
- year of birth.

After sharing the purpose of the study, data collection procedures, and timeline for the entire study, the Superintendent of Schools granted permission to conduct this research study and recruit these participants (Appendix A). This information was also provided to all participants during on-site meetings for those who qualified (Appendix B), accompanied by a consent letter (Appendix C) outlining the non-evaluative nature of this study.

Qualifying participants included this district's new teachers consisting of K-12 in-district teachers who were hired within the past five years and were still in their first five years of full-time public school teaching in a core content area (English, math, science, or social studies) in the United States. In total, 16 K-12 teachers in the district qualified to participate: eight Digital Native new teachers (two Grade 5 teachers, three high school math teachers, one high school history teacher, two high school English teachers) and eight Digital Immigrant new teachers (one kindergarten teacher, one grade 2 teacher, one middle school science teacher, one middle school English teacher, two high school foreign language teachers, one high school English teacher, and one high school science teacher). Of those who qualified, 12 elected to participate; six were in the Digital Native category and six were in the Digital Immigrant category. "Selecting those times, settings, and individuals that can provide you with the information that you need in order to answer your research questions is the most important consideration in qualitative selection decisions" (Maxwell, 2005, p. 88). The selected participants and setting all met the necessary requirements to conduct this study.

All 12 of the aforementioned subjects were asked to participate in the beginning informal survey (Appendix F). Four of the six Digital Native new teachers and four of the six Digital Immigrant new teachers were then identified for individual interviews (Appendix E). Since the researcher was looking to gain the most insight into technology use across the district, these eight participants were selected based upon their survey results, varying grade levels, and contrasting content areas in order to look through the widest lens possible. After the interview data was transcribed and preliminarily coded, the four remaining participants were asked to participate in a follow-up focus group session. These four participants included one Digital Native new teacher who reflected little technology use in the classroom on the informal survey, one Digital Immigrant new teacher who reflected little technology use in the classroom, one Digital Native new teacher who reflected a medium to high level of technology use in the classroom, and one Digital Immigrant new teacher who reflected a medium to high level of technology use in the classroom. The researcher included a comparable number of teachers in each category to ensure balance throughout the study.

Data Collection

Using multiple sources of evidence in case studies allows an investigator to address a broader range of issues. However, “the most important advantage presented by using multiple sources of evidence is the development of *converging lines of inquiry*, a process of triangulation...” (Yin, 2003, p. 98). In order to best investigate the topic of Digital Native new teachers and Digital Immigrant new teachers and their use of technology for teaching practice, documents regarding workshop participation and coursework were compiled, and teacher

observation and evaluation reports were examined. Surveys and interviews were then conducted to investigate previous and current technology use, preparation for technology use, and influences on technology use in the classroom. Interviews also identified any situated learning experiences of participants, and whether participants found these opportunities to be beneficial. A follow-up focus group interview was also conducted in order to share the information back with participants, gather feedback regarding preliminary findings, and to triangulate the data.

Utilizing more than one method of data collection allowed the researcher to depict a more accurate portrayal of the school district. In addition, triangulation reduced the risk that conclusions reflect the limitations of a single specific source or method, and allowed the researcher to gain a better understanding of the issues being investigated (Maxwell, 2005, pp. 93-94).

Artifacts.

Data and documentation were collected regarding both groups of participants' date of birth, date of hire, and previous teaching experience. Individual college transcripts were used to identify previous coursework in the area of technology. Attendance documents and emails were examined to determine participation in the workshops and courses offered by the school district. An inventory of technology was also used to determine each teacher's accessibility to technology for their classroom. Observation and evaluation reports were examined to identify if technology use was referenced as a strength or weakness for each teacher, and what types of technology integration activities, if any, have occurred during administrator observations. This information was clarified during the interview process if necessary.

Informal surveys.

Each participant completed an informational survey prior to the interview to determine how often they used technology for delivery of instruction, student use, and assessment (Appendix F). The survey, which took approximately 20 minutes to complete, also revealed how each participant used various pieces of hardware such as computers, interactive whiteboards, interactive response systems, document cameras, scanners, projectors, and digital cameras to do each of these activities, and also showed use of various tools such as web-based applications, content-based software, and websites. To minimize vulnerabilities, the researcher based interview questions on survey questions already established in other studies. It should be noted that the information gathered was used to inform the interview questions and was used as a starting point for discussions. The researcher did not replicate a quantitative survey and the information was not analyzed in a quantitative manner.

One survey developed by Educause Center for Applied Research entitled *Students and Information Technology in Higher Education Survey Questionnaire* (Caruso & Salaway, 2007) was considered for use in this study. Although this survey asks the number of hours per week subjects utilize specific technologies and application, it was developed for students in higher education facilities and not for inservice classroom teachers. Therefore, it was not used.

Permission was granted to utilize more applicable questions from the Use, Support, and Effect of Instructional Technology (USEIT) survey from Boston College (Bebell, et al., 2004a), and questions were developed using this survey as a foundation. This survey used a five-point likert scale on many of the questions which includes the options of never, once or twice a year, several times a year, several times a month, and several times a week. Some questions utilizing

this scale asked teachers how often they use certain devices in their classroom (LCD projectors, digital camera, scanner, etc.), and how often students performed activities involving computers such as research, writing, games, record data, communicate with other students, and consulting with experts. Other questions probed how often teachers used computers for different purposes (delivering instruction, creating assessments, communicating with administrators and parents, etc.), and how often teachers asked students to produce different types of assignments using technology such as reports, projects, stories, graphs, or videos. Another survey question asked about influences to use computers in teaching (sharing from other teachers, access to hardware, administrator demonstrations, collaboration with colleagues, professional development), using a three-point scale: great influence, some influence, no influence. Other individual questions from this study were useful as well; questions regarding how many years ago they first used computers for various purposes, how many devices they had access to, and how often they used these devices were applicable to the research topic. It should be noted, however, that the USEIT study did not specifically focus on classroom technology use, on differences in use between Digital Native and Digital Immigrant groups, or on new teachers. In addition, the USEIT study (Bebell, Russell, & O'Dwyer, 2004a) also utilized surveys to measure administrative and student technology use and opinions as well.

Questions from the USEIT survey were amended to fit the goals of this study, and additional questions were formulated. The survey responses were used to identify beginning patterns in participant responses and the initial findings from the survey were used to inform the interview questions. The preliminary information gathered from the surveys was important in order to triangulate the data. Once the final survey data was compiled, any questions that arose

from the survey responses were clarified in the participant interviews and during the focus group session.

Interviews.

Interviews are a significant factor in case study analysis (Yin, 2003). Therefore, eight participants were interviewed for approximately 20-40 minutes each, and each interview took place in the participants' classroom in order to provide a comfortable and convenient setting. A semi-structured interview process was followed, and a list of questions was utilized for all interviews (Appendix E). These open-ended questions to gather information and beliefs regarding technology use guided each interview (Yin, 2003, p. 90). Each interview was used to gather data regarding participants' experiences with technology and views on the use of technology for teaching practice. Information was also obtained on their preparation for utilizing technology in the classroom. Due to the semi-structured nature of the interviews, follow-up or clarifying questions regarding artifacts, the survey, or interview responses were added as necessary.

During the interviews, the researcher concentrated on the participant and his/her responses. Although some notes were taken during the process, interviews were audio taped and transcribed prior to analysis, and then shared with the individual participant to ensure accuracy of the information.

Focus Group.

Following the analysis of interview responses (see Data Analysis section below), the researcher conducted a one-hour focus group with four participants who completed the data-gathering surveys but were not interviewed individually. The environment was semi-informal as

to provide a comfortable atmosphere for sharing and reflection, and participants were reminded once again of the confidentiality of their responses. Protocols were identified and followed, including speaking one at a time and not criticizing others' responses.

In this focus group meeting, initial results from the interviews were shared, such as the emerging themes that related to the literature, Situated Learning Theory, and other themes that emerged throughout the study, thus providing another platform for member-checking (Guba and Lincoln, 1982, p. 247). Responses from both the surveys and the interviews informed additional questions for the group. Feedback from participants was recorded, and this data was again coded and analyzed to identify reactions and underlying themes.

Data Analysis

Data collected from artifacts, participant surveys, and interviews was the basis of all analysis (Creswell, 2009, p. 184). Survey information was referenced prior to interviews and during the analysis process, and broad categories of anticipated responses were identified to begin the organization of information. The researcher took brief notes during the interviews, but also listened to the audiotapes following each interview. Each tape was then transcribed in order to gather additional details about each response.

A main categorizing strategy in qualitative research is coding, and MAXQDA 10 software was used to transcribe and code participant responses. Using a thematic coding approach, broad categories based on the literature review, such as background technology experience, teacher preparation, professional development, and technology integration, were identified. In addition, the tenets of Situated Learning Theory also informed one layer of the

coding, based upon themes such as authentic context and activity, in order to identify both the uses of technology in the classroom and how integration techniques were learned. After transcription was completed, interview information was thoroughly analyzed and recurring words or phrases were highlighted to identify these and other themes, and data was coded accordingly. Categories were refined or added as necessary since themes emerged through the data analysis process (Creswell, 2009; Maxwell, 2005). Comparisons among these categories were made between the two groups as well as among individuals within each group. It should also be noted that, although some categories were identified prior to interviews, any unexpected themes that emerged during data collection changed follow-up questions during the individual or focus group interviews. Although the scripted questions were followed as closely as possible, this may have occurred when appropriate.

In addition to the above forms of data collection, an audit trail was documented throughout the data collection process. These assisted the researcher in identifying themes that emerged and spurred thoughts for later analysis.

Validity and Credibility

Limitations to this study included the small sample size. In addition, information was gathered from only one district, possibly limiting full generalization of the findings. Areas of vulnerability also include the fact that the researcher was a district level administrator (Director of Teaching, Learning and Technology), which could possibly have influenced participants' responses on surveys or during interviews. However, it was known that the researcher had notified the district of her resignation, therefore reducing any fear of the use of acquired data for

evaluative purposes in the future. In order to show the positive impact this research could have, on the other hand, participants were reminded that they were contributing to knowledge development that would be for their benefit in terms of future professional development offerings planned by the incoming administrator. Participants may have talked with one another between scheduled interviews so may have anticipated questions to be asked. However, the questions were based upon individual experiences and did not have specific answers, which limited the risk of skewed data.

To minimize vulnerabilities, the researcher triangulated the data using multiple sources, and based survey and interview questions on those already established in other studies. Validity tests included collection of rich data through interviews, respondent feedback on the data and conclusions, and triangulation of data (Maxwell, 2005). Participants were asked to review manuscripts of interviews, and direct citations from interviews were used to demonstrate neutrality of the researcher. In addition, triangulation of artifacts, survey results, and both individual and focus group interview responses ensured that analysis and conclusions were accurate. “With data triangulation, the potential problems of construct validity also can be addressed because the multiple sources of evidence essentially provide multiple measures of the same phenomenon” (Yin, 2003, p. 99). Thick description was also used for external validity, and applicable details were included in order to assess whether conclusions may be transferrable to other settings and people (Lincoln & Guba, 1985). In addition, as mentioned previously, the researcher kept an audit trail of the research steps taken throughout the process.

All interview and observation tapes, notes, and transcriptions were held by the researcher. Upon completion of the research study, this information was destroyed. Consent forms,

however, will be kept for the required three years in a locked cabinet in the researcher's home, and will then be destroyed. Responses and observation data were anonymous in the analysis and writing of the findings. Participants were notified and reminded of this throughout the study in order to build trust between the participants and the researcher (Maxwell, 2005).

Through the methods outlined in this study, including direct subject participation, triangulation of data, and member-checking, the researcher established a trustworthiness and credibility of the findings (Guba & Lincoln, 1982, p. 246). By utilizing multiple forms of data, it is hoped that any discoveries will be of interest to a greater audience, including those districts looking at the same issues of technology integration practices by new teachers.

Education is witnessing an increasing demand for technology use in the classroom (NETS Project, 2008) and new teachers are entering classrooms in high numbers (National Commission on Teaching and America's Future, 2008). By studying the use of technology by Digital Native and Digital Immigrant new teachers, it is anticipated that the documentation from this research will also lead to application in other venues as well, such as teacher preparation programs and professional development as it relates to new teachers and technology use in the classroom.

Protection of Human Subjects

Throughout the study, the well-being of participants was first and foremost, and the proposed study did not present any obvious risks to participants. Prior to and during the data collection process, the study and procedures were explained to all participants. Each participant signed a consent form and was provided with opportunities to ask questions at any time. All

information gathered throughout the study remained confidential and participants had the opportunity to withdraw from the study at any time without fear of retaliation or loss of rights, benefits, or services they would have otherwise received as an employee of the school district.

As written, the researcher was a district administrator employed by the school district. Participants were assured that any information provided during data collection would be kept confidential and would not be used to evaluate individuals.

The research process followed all guidelines as written by Northeastern University's Office of Human Subject Research. An application to conduct the research study with proposed participants was submitted and approved by the Institutional Review board.

Chapter 4

Report of Research Findings

Introduction

This study attempted to answer the following primary research question: *In what ways do the district's Digital Native new teachers vary in how they use technology in their classroom teaching when compared to the district's Digital Immigrant new teachers?* A supporting question was also examined: *How have these new teachers learned to use technology in their classroom teaching and has Situated Learning been a component to this learning?* Therefore, the purpose of this study was to investigate the variations in use of technology for classroom teaching practice by Digital Native new teachers and Digital Immigrant new teachers. The study utilized a qualitative case study method to investigate differences and similarities among these two groups of new teachers, and also looked at the role of Situated Learning in technology integration practices among new teachers.

Qualitative Approach

A qualitative case study research approach was used to conduct this study. As Creswell (2007) recommends, data collection drew on multiple sources of information, and artifacts, surveys, individual interviews, and a focus group interview were the primary sources of data. By investigating these multiple sources, the researcher was able to triangulate the data. "In effect, triangulation is a way to get to the finding in the first place – by seeing or hearing multiple *instances* of it from different *sources* by using different *methods* and by squaring the finding with others it needs to be squared with" (Miles & Huberman, 1994, p. 267).

Description of the Population

A total of 16 teachers in the school district qualified for the study, and 12 of these potential subjects signed a consent agreement to participate. These 12 subjects consisted of six Digital Native new teachers and six Digital Immigrant new teachers who were all core content classroom teachers in their first five years of full-time, permanent public school teaching in the United States.

Demographic data: Sex and status.

Table 4.1 provides a detailed distribution of research participants by sex and Digital Native/Digital Immigrant status used for the study. There were a total of 12 participants in the research study, and an analysis of the data show that of these 12 participants, ten were female and two were male. Data also show that of these 12 participants, six were Digital Natives and six were Digital Immigrants. All six of the Digital Natives were female, while four of the Digital Immigrants were female and two were male.⁴

This research study was open to all district core content teachers grades K-12 in their first five years of full-time, permanent employment in a United States public school district and currently employed by the school district referenced in chapter one. All potential participants were first notified of the study by email and then by a letter delivered by the researcher. All participants were invited to one of three initial informational meetings regarding the study. At these meetings, consent forms were provided, signed, and collected. Of the qualified

⁴ It should be noted that, for the purpose of reporting the findings and discussion, “she” will be the consistent pronoun used. All participants will be referenced as “she” throughout the paper regardless of their true female/male identify.

participants, one male Digital Native, one female Digital Native, and two female Digital Immigrant new teachers chose not to participate.

Table 4.1
Distribution of Respondents by Sex and Digital Native/Digital Immigrant Status

Characteristic	Digital Native (N=6)		Digital Immigrant (N=6)		Combined (N=12)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Sex						
Female	6	100.00	4	66.67	10	83.33
Male	0	0.00	2	33.33	2	16.67

Demographic data: Age range.

Table 4.2 provides an analysis of the age of the respondents for the research study. Data show the years of birth for Digital Natives ranged from 1980-1987, making the age range between 23 and 31 years old, while the year of birth for Digital Immigrants ranged from 1958-1978, making the age range between 32 and 52 years old.

Table 4.2
Distribution of Respondents by Age Range

Age Range	Digital Natives (N=6)		Digital Immigrants (N=6)		Combined (N=12)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
23 - 25	1	16.67	0	0	1	8.33
26 - 28	1	16.67	0	0	1	8.33
29 - 31	4	66.67	0	0	4	33.33
32 - 34	0	0	1	16.67	1	8.33
35 - 37	0	0	0	0	0	0
38 - 40	0	0	1	16.67	1	8.33
41 - 43	0	0	0	0	0	0
44 - 46	0	0	1	16.67	1	8.33
47 - 49	0	0	1	16.67	1	8.33
50 - 52	0	0	2	33.34	2	16.67

Demographic data: Content area and school level.

Table 4.3 provides an analysis of the content area and school level of participants in the Digital Native and Digital Immigrant categories. Data show that three out of the 12 participants were elementary school teachers, two were middle school teachers, and seven were high school teachers. The content areas ranged among participants. The elementary grade one teacher taught all core subjects while the grade five teachers concentrated in English Language Arts and science. The middle school teachers taught English and science while the high school teachers taught English, math, science, history, and foreign language.

Table 4.3
Distribution of Respondents by Content Area and School Level

Education	Digital Natives		Digital Immigrants		Combined	
	(N=6)		(N=6)		(N=12)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Elementary Grade 1	0	0	1	16.67	1	8.33
Elementary Grade 5	2	33.33	0	0	2	16.67
Middle School English	0	0	1	16.67	1	8.33
Middle School Science	0	0	1		1	8.33
High School English	1	16.67	0	0	1	8.33
High School Math	2	33.33	0	0	2	16.67
High School Science	0	0	1	16.67	1	8.33
High School History	1	16.67	0	0	1	8.33
High School Foreign Language	0	0	2	33.33	2	16.67

Demographic data: Years of teaching experience.

Table 4.4 provides an analysis of the years of teaching experience of the respondents for each group. In accordance with the definition of teacher being a core content, full-time permanent teacher in this public school district, the Digital Natives group had one participant with one year of teaching experience, four with two years of experience (making this the majority of the group), and one participant with four years of experience. This group had no teachers with either three or five years of experience. The Digital Immigrants group had zero teachers with one year of experience, one with one year of experience, two with two years of experience, one with four years of experience, and two with five years of experience.

Table 4.4
Distribution of Respondents by Years of Full-Time, Permanent U.S. Public School Teaching Experience

Teaching Experience	Digital Natives (N=6)		Digital Immigrants (N=6)		Combined (N=12)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
1 year	1	16.67	0	0	1	8.33
2 years	4	66.67	1	16.67	5	41.67
3 years	0	0	2	33.33	2	16.67
4 years	1	16.67	1	16.67	2	16.67
5 years	0	0	2	33.33	2	16.67

Artifact Analysis

The first steps in conducting this research study were to examine the literature as found in chapter two and to identify data to be examined in artifact documents. The literature first pointed to a debate regarding the possibility of a Digital Native/Digital Immigrant divide. This debate led to the examination of participants' backgrounds with technology training, prior technology use, and technology use in the classroom as shown by artifact data. Another main focus of the literature involved research and discussion on technology integration preparation and practices by teachers. This literature led to the investigation of artifacts which would provide information such as subjects' participation in technology training, coursework, and access to technology, as well as administrators' comments written in observation/evaluation reports. The examined artifacts pertaining to the study included college and course transcripts, attendance records from in-district technology workshops, the district technology inventory, and participants' observation and evaluation reports from their employment in the school district.

Demographic data: Artifact data.

Table 4.5 provides an analysis of the artifact data gathered on participants. According to district records, two out of the six Digital Natives had taken technology courses outside of the district since beginning their employment in the district, whereas four of the six Digital Immigrants had done so. Three Digital Natives had participated in at least one optional technology workshop offered by the district while four Digital Immigrants had participated. Three of the six Digital Natives had written references to their technology use in either observation or evaluation reports; four of the six Digital Immigrants had similar references. And in regards to interactive whiteboards⁵, which was a question on the survey and was referenced during the interviews, four out of the six Digital Natives had permanent boards in their classrooms while three of the Digital Immigrants had the same mounted boards. It should be noted that all schools also had at least one portable interactive whiteboard which could be moved to any location in the building.

⁵ For the purpose of this study, the following definitions will be used:

Interactive whiteboard/SMARTBoard: a device that, when used with a computer and some type of large video display, makes the surface of the display come touch sensitive in some manner and allows it to be used to control the computer (Criswell, 2008).

Student response system/SMART Response system: a wireless response system that allows faculty to request information and for students to respond by using a clicker, or hand-held response pad to send his or her information to a receiver. When presented with a question, the student presses a button on a hand-held response pad or clicker, which sends in either an infrared or radio signal to a receiver attached to a computer. The computer records and/or displays the response per the instructor's preference (*What are student response systems?*, n.d.).

Document camera: a desktop visual presenter that is a special video camera designed to display documents and 3-D objects on a plasma screen, television, projector, or monitor (From design to experience, 2005).

Table 4.5
Distribution of Artifact Information Gathered on Participants

Sources of Information	Digital Natives (N=6)		Digital Immigrants (N=6)		Combined (N=12)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Technology coursework (out of district)	2	33.33	4	66.67	6	50.00
Technology workshop (in district)	3	50.00	4	66.67	7	58.33
Use of technology written in observation/evaluation	3	50.00	4	66.67	7	58.33
Permanent interactive whiteboard in classroom	4	66.67	3	50.00	7	58.33

Informational Meeting

The next step in the study included direct interaction with participants. Therefore, prior to any discussion, participants were provided with invitations to attend an informational meeting regarding the research study. “Make sure your intentions are unequivocal for informants: why you are there, what you are studying, how you will be collecting information, what you will do with it...” (Miles & Huberman, 1994, p. 266). At this meeting, each participant was given a consent form with an explanation and details of the study, which the researcher reviewed with them. The researcher also answered questions and provided additional information as requested. Upon conclusion of the meeting, participants signed the consent form to participate if they so agreed.

Informal Survey

After signing the consent form, each participant then completed an informal, informational survey which was used to guide the researcher's questions throughout the interview process (Appendix F). Participants were allowed to ask clarification questions regarding the survey if necessary.

Technology integration.

The primary research question was first addressed using the informal survey that included, but was not limited to, questions based upon the Use, Support, and Effect of Instructional Technology (USEIT) survey from Boston College (Bebell, et al., 2004a). Questions from the USEIT survey were amended to fit the goals of this study, and additional questions were formulated relative to teacher technology use for teaching practice. In this section, the information from the participant surveys is presented to provide a background for the interview questions and discussion that followed.

Upon receiving all twelve completed participant surveys, it was found that four out of six Digital Natives and three out of six Digital Immigrants reported used technology for delivery daily or multiple times during the day. Four out of six Digital Natives reported having students use technology at least weekly, while two out of six Digital Natives reported having students use technology three times per week or more. Use of technology for assessment in both groups ranged from zero times per year to once per week. Four out of six Digital Natives reported using computers for delivery of instruction "always" or "almost always" while four out of six Digital Immigrants reported using computers for the same purpose as "always". Four out of six Digital Natives reported using the interactive whiteboard occasionally or frequently for delivery of

instruction while three out of the six Digital Immigrants reported using the interactive whiteboard frequently for this purpose.

For internet usage, five out of six Digital Natives reported using internet for delivery of instruction, while all six Digital Immigrants reported this use. However, five out of six Digital Natives reported having the students use the internet while only three out of the six Digital Immigrants did so, thus showing more use by Digital Natives for this purpose.

Situated Learning experiences.

When identifying factors that influence technology use, three Digital Natives reported some influence and three reported great influence from their teacher preparation program while two Digital Immigrants reported some influence and one reported great influence from this source. Three Digital Natives reported some influence and three reported great influence from in-district professional development while five Digital Natives reported some influence from this source. One Digital Native reported some influence and one reported great influence from outside professional development while three Digital Immigrants reported some influence and one reported great influence from this source. Two Digital Natives reported some influence and three reported great influence from their colleagues while three Digital Immigrants reported some influence and three reported great influence from this source. Two Digital Natives reported some influence and two reported great influence from their administration while five Digital Immigrants reported some influence from this source. One Digital Native reported great influence from adult family members, family members under 18, and friends while two Digital Immigrants reported some influence and one reported great influence from these sources. Five Digital Natives reported great influence from self-teaching while one Digital Immigrant reported

some influence and four reported great influence from this source. This information is shown in

Table 4.6 below.

Table 4.6

Technology Use Influence Information Gathered from Participant Surveys

Survey Question	Digital Natives (N=6)			Digital Immigrants (N=6)			Combined (N=6)		
	No	Some	Great	No	Some	Great	No	Some	Great
Teacher Prep Program	0	3	3	3	2	1	3	5	4
Professional Development (in-district)	0	3	3	1	5	0	1	8	3
Professional Development (outside district)	0	1	1	0	3	1	0	4	2
Colleagues	1	2	3	0	3	3	1	5	6
Administrators	0	2	2	1	5	0	1	7	2
Adult family members	0	0	1	0	2	1	0	2	2
Family members under 18	0	0	1	0	2	1	0	2	2
Friends	0	0	1	0	2	1	0	2	2
Self	1	0	5	1	1	4	2	1	9

Self-assessment of technology proficiency.

On the informal surveys, two Digital Natives reported an increase in their self-assessed technology proficiency level since beginning teaching, while the other four stayed the same.

Three Digital Immigrants reported an increase, two stayed the same, and one decreased in their technology proficiency according to the surveys.

Individual Interviews

Upon receiving each completed survey, the researcher analyzed the information to identify four Digital Natives and four Digital Immigrants for individual interviews, for a total of eight out of the twelve participants. Participants were selected to include a variety of grade levels, content areas, and reported use of technology. Once identified, the researcher scheduled individual interviews with the identified eight participants and traveled to their individual classrooms for each interview. Each interview lasted between 20 and 40 minutes and used the same interview protocol developed by the researcher according to recommendations by Creswell (2007). At the start of each interview, the participant received a list of 13 questions that was used to guide each interview (Appendix E). The researcher asked the questions in order; however, additional clarifying questions were asked when necessary throughout the interview. Each session was digitally recorded by the researcher, and subjects were notified that they were being recorded and were assured of confidentiality of their responses.

Prior technology experience.

During the individual interviews, participants were asked about their personal background with technology, and when they received their first computer, email account, and social networking account. Three out of four teachers in each category had computers in their homes during the 1980s decade. In the Native category, three out of four teachers had home computer access in the low- to mid-1980s and three out of four in the Immigrant category had this access in the mid- to high-1980s. Three out of four interviewed Digital Natives recalled having email accounts in the mid- to upper-90s while three out of four Digital Immigrants had email prior to 1990.

In the group of individual interviewees, all four Digital Natives had social networking accounts and three of out of the four Digital Immigrants had them. However, one of these Digital Immigrants admitted to only having an account to monitor her children's activity and did not generally use it for other personal use. Three of out the four Digital Natives and three out of the four Digital Immigrants worked with computers in a previous job. For some, this was in college and for others this experience came via the business world with positions in accounting, publishing, finance, entertainment, architecture, and web design.

My first job using a computer was probably in '86 when I was hired as a financial analyst, so I taught myself how to program on a mainframe and I did financial modeling on a PC and a mainframe. And I taught myself how to do desktop publishing with Pagemaker version 1.2 and I was one of the first people who desktop published a magazine...and then in the 90's I taught myself web design...so I was the web designer as part of my job. (Digital Immigrant Interviewee C)

Digital Natives also reported prior technology knowledge through other venues including office work, finance, and research assistant experiences.

I became probably the most proficient with computers when I had my first job and that was when I was constantly working on the computer. I worked for a private hedge fund and I was always on Outlook and I was using Excel and I was typing out documents and doing those kinds of things. (Digital Native Interviewee C)

For teacher preparation, all four Digital Native interviewees participated in a teacher preparation program through a college. On the other hand, one Digital Immigrant participated in

the same type of program while the other three did not. During their preparation programs, both Digital Native and Digital Immigrant new teachers recalled various levels of technology use and training. Digital Native Interviewee A stated, “We had overheads; that was about all the technology that they taught us to use...” However, one Digital Immigrant Interviewee commented:

I did my student teaching at the American International School in Vienna and they had a great technology department. They had about three in-house technology assistants, a head of technology, and two teachers that taught technology...So the technology director and his staff would always be giving these technology classes. (Digital Immigrant Interviewee A)

Technology integration.

When interviewed, Digital Natives referred to using teacher websites, Google, SMARTBoards, computers, internet, and the overhead for delivering instruction. Digital Immigrants referred to these resources as well, and one participant also added television as a piece of technology. All teachers who had a SMARTBoard in their classroom referenced this specific piece of technology, and those who did not have one in their classroom did not reference it. Digital Native Interviewee B commented, “In general I’d say I use [the SMARTBoard] still more for direct instruction and maybe a little bit more teacher centered.” Additional comments:

The thing I use the most is my laptop with a projector. That’s how I deliver notes...It’s helpful in a lot of ways because first of all, I know that every class is getting the exact same content because it’s prepared ahead of time and I’m not writing it by hand or from

memory or anything like that, it's already there and it's the same slide in all five classes.

It also makes it very easy to transmit to a student who has missed work... (Digital Immigrant Interviewee D)

I think it's great what we're doing with Google Docs, and what I can do with this [Smartboard] can link together with things like websites. Now I can project and manipulate a little bit easier. (Digital Native Interviewee D)

For student use, Digital Natives used teacher websites, webquests, Google, online quizzes and homework assignments, multi-media lessons, SMARTBoards, and PowerPoint. Three out of four of the Digital Native interviewees reported using the school computer labs and two of the four used them for research by students. The Digital Immigrant group was in agreement with the technology resources used by students and the same number in this group used the lab and had their students complete research.

I took them down to the library to use computers and they were doing research and then they were building a presentation. They used those computers to develop the whole thing. (Digital Native Interviewee C)

[They do] everything from typing up lab reports to more web-based assignments where I'll give them a topic and have them do research online, or this webquest where I'll send them to a webpage and they have instructions that they have to follow to complete the assignment and they can email or share it in Google docs or print things out. (Digital Immigrant Interviewee D)

When asked about their most successful lesson they've taught to date, one person in each group referred to using their teacher website, one person in each group discussed multi-media presentations on the SMARTBoard, and one in each group referred to lessons that involved accessing current events via the computer and SMARTBoard. One Digital Native discussed a student research project and presentation, and one Digital Immigrant referenced a comparison of two movies using a television he had brought in for his classroom.

I found a great Edgar Allen Poe online note taking [site] where the students could listen and they could take notes online and then print those notes which was great for those students with poor handwriting and who require the keyboard. The story was narrated to them and they could pause the story and respond to the story through the notes. (Digital Immigrant Interviewee A)

I bought this big screen TV, and I show the kids consecutively, first the Ben Hur chariot race. Then I show them the Star Wars pod race and it just blows their mind how these are the same event; it's the same thing just transposed. (Digital Immigrant Interviewee C)

When asked to identify the characteristics of a successful technology integrator, Digital Natives and Digital Immigrants were again in agreement. One participant from each category said that a successful integrator uses technology every day, while two interviewees in each group described this person as flexible and spontaneous. One example of the latter:

For me, it's flexibility. Like a great teacher, a successful integrator is one who has that flexibility and learns from their students and what their needs and how they can be

flexible to provide the students with what they need on the spot. (Digital Immigrant Interviewee B).

Two participants in each group also discussed focusing on the content while using technology as a tool. One teacher asserted, “It’s extending as well as enhancing the classroom” (Digital Immigrant Interviewee D). And another stated:

I think that somebody who’s good at integrating technology realizes that it’s not about the technology itself; it’s about the content that you are delivering and it’s not like your just using technology for technology sake...I think that somebody who is successful integrating technology realizes where it really belongs and where it’s best to do other methods. (Digital Native Interviewee C)

Technology inhibitors.

All teachers in both groups felt they could do more with technology and expressed interest in being given more technology to use. Digital Native Interviewee D summarized this when stating, “I think I’m getting to the beginning steps...I think I could do more...I could definitely do more.”

When asked about what types of technology they would use if they could gain access to it, the answers varied among all participants, but they all agreed they would use more technology if they had it in their classrooms, specifically referencing hardware such as SMARTBoards, SMART Response systems, and document cameras.

I think if I had [the SMART Response system] in my room maybe I would have gone through and created more assessments that could use those. I definitely think I would use

document camera...I think obviously the resources need to be available. There are plenty of teachers that don't have SMARTBoards and I really feel that I am a much better teacher with it this year than I was without it. (Digital Native Interviewee B)

I would definitely use the SMARTBoard and especially the SMART Response; that's the sort of thing that I could use every day for dipsticking and checking in if I had it. (Digital Immigrant Interviewee D)

Both Digital Natives and Digital Immigrants expressed gratitude for any technology provided in their classrooms. Digital Native Interviewee D stated, "My favorite thing is the TI-calculator program. When we got that, it was like Christmas. I was so excited!" Digital Immigrant Interviewee A added, "If you think about even the amount of time since I've been here between the websites and the new website and more use of X2 and the parent portal and now [the SMARTBoard], I feel very lucky."

When asked about both technology integration practices and participants' least successful lessons, the majority of both Digital Natives and Digital Immigrants cited technology issues as being an inhibitor to technology use in the classroom. Three out of four interviewees in both groups referenced technology not working as contributing to less technology use in the classroom, regardless of the type or currency of technology.

I really was sad that I couldn't use my scanner this year because I would have added so much more to my website if I could have scanned and posted it. [It would have] alleviated a lot of phone calls from parents. (Digital Immigrant Interviewee A)

The filters for web content have at times prevented me from doing things that I would like to do...even to the point where I've been able to do it one day and not the next because the filters are turned on or off...[Also] make sure that the infrastructure is in place before the technology is rolled out. I'm not saying we have or haven't done that but saying we're gonna do Google Docs and then not having access to the internet discourages people from using Google Docs because then they realize oh, if I don't have the internet I don't have anything. (Digital Immigrant Interviewee D)

Another technology inhibitor that became clear was lack of time. There was a slight difference between the Digital Native and Digital Immigrant individual interviewees on this issue during individual interviews, with two out of four Natives citing this as an inhibitor and all four Immigrants referencing it. Digital Immigrant Interviewee A remarked, "It's time... I really feel as though in this profession I am always at a loss for time and I have been amazed at that."

Motivation.

Another common theme that emerged was motivation for technology use. Both Digital Natives and Digital Immigrants referenced attitude and being comfortable in successfully incorporating technology. "I think people are apprehensive about using it if they don't feel comfortable using it" (Digital Native Interviewee A). Other comments included:

I think you can encourage it as much as you want. It's really up to the teacher. Do teachers have motivation to it? Because you can put all of this into somebody's classroom and have all of this accessible to them and...it's really a personal decision. (Digital Immigrant Interviewee A)

Individual interviewees also mentioned “selling” the use of technology to teachers by showing them the benefits of its use by demonstrating how it can help make their jobs easier. However, one Digital Immigrant summed up her personal motivation for utilizing technology in the classroom:

I’ve learned that, in order to keep current in whatever you do, you have to be on top of technology because it’s changing so quickly. I have three children and they are perfect examples of this. They are always changing their technology and communicating with me in a variety of ways, so in order for me to even communicate with my children I sometimes need to be current on technology and to speak the language that they’re speaking. So that’s part of it, but whether you’re in the business world or the educational world, I just think that it’s changing so you have to keep on top of it to meet the needs of, whether it’s in the business world, your clients, or here in the school, the students and the parents. (Digital Immigrant Interviewee A)

Situated Learning experiences.

Interviewees reported that all three aspects of Situated Learning Theory influenced their technology use, and the context, culture, and activity conversations overlapped. Context discussions addressed teacher preparation programs, professional development and learning in the school environment, culture discussions referenced the influence of colleagues and mentors, and activities included those things that directly impact technology use in the classroom.

Context.

Learning in the same context in which a skill will be used is one major component of Situated Learning Theory. All interviewees referenced in-district professional development where they were learning in an applicable context as having a positive impact on their learning.

The way we've done Google Docs has been fairly successful in terms of the training...everybody got the training and it was talked about a long time before it happened...and I definitely think things like having expert users trained ahead of time is very helpful because those are the people who go and say oh, yeah, this is great, this is what I'm doing with it, and you could do this too. (Digital Immigrant Interviewee D)

Culture: Colleagues and mentors.

All interviewed participants, both Digital Natives and Digital Immigrants, reported that they talked once a week or more with colleagues regarding technology use. These conversations took place in a variety of arenas, and more than one reference was made to common planning times, department meetings, and informal discussions. Topics involved school-related technology use, specifically SMARTBoards, SMART Response, Google, teacher websites, and technology integration ideas.

There is not a day that goes by without somebody talking about a site or the game that they created or this test that they want to put on the site or different things. (Digital Immigrant Interviewee B)

[We use] common planning and I think everyone in our department has a SMARTBoard now so we discuss it and share lesson plans that can be done or implemented using the

SMARTBoard. My mentor teacher, other teachers in my department and the training that was offered have all been very influential. (Digital Native Interviewee B)

Mentors were referenced by both groups as being influential on participants' technology use. Three out of four interviewees in each group commented that their mentors were influential in their technology use, and they spoke with their mentors more often than any other colleagues regarding the subject of technology.

I talk with my colleagues at least once a week about technology use...My mentor and I have done a lot of talking about using blogs and we talk about Google docs every time our department gets together, about different ways that we can use it and just kind of learning how to make that a part of what we are doing. (Digital Native Interviewee C)

My mentor [and I] certainly collaborated in terms of things like Google Docs. We're both pretty savvy with the technology, so she has been helpful...and we do use a lot of the same materials so that's been very helpful. And then things like websites and things that either of us have used, we've exchanged a lot of that so that's been very helpful.

(Digital Immigrant Interviewee D)

Of the two individual interviewees who did not report their mentor as being influential, the Digital Native felt she helped her mentor more with technology and the Digital Immigrant felt her mentor was "not into technology." However, neither interviewee spoke negatively about the situation.

Self-teaching in context.

All four Digital Natives that were interviewed reported they used self-teaching as a strategy to learn technology, while three out of the four Digital Immigrants did so.

I more self-taught with a lot of different software programs...and in general I would just play around with something and that's how I would learn it...I might try it on my own before I would go to a class because I feel like a lot of things I can pick it up enough on my own... (Digital Native Interviewee B)

I've always been self taught, I've taught myself how to do stuff, programming, web design, desk top publishing, all those things, so I really haven't had anybody else at any point, you know, mentoring me. (Digital Immigrant Interviewee C)

Activity.

Activities are interconnected with the other two components of Situated Learning. However, participants discussed what types of activities have occurred with regards to technology and technology learning, and offered suggestions for activities that would enhance teachers' technology integration skills.

When we got together and learned about Google with [the lead technology teacher], that was very helpful, and also common planning time and just giving the teachers some time together so that they can learn from each other and develop lessons. (Digital Immigrant Interviewee A)

I just think in general it would be helpful to observe other teachers more often. Maybe give teachers or even assign teachers a period where they have to go observe someone

else who has been doing it longer...for some people that might encourage them to use it more than just having the training. They can see how it's used in action and they can see students' responses first hand. (Digital Native Interviewee B)

As noted, according to the informal surveys, two Digital Natives reported an increase in their self-assessed technology proficiency level since beginning teaching, while the other four stayed the same. Three Digital Immigrants reported an increase, two stayed the same, and one actually decreased. When clarifying this last response in an individual interview, the teacher responded that she felt she was able to learn and do more previously in the business world than now in teaching, so she felt that her proficiency level had decreased.

Data Analysis

Upon conclusion of each interview, the researcher's questions and participants' responses were transcribed directly from the recording, and each transcript was shared with the individual participant to ensure accuracy of the information. Transcripts were then loaded into MAXQDA 10 software to allow for more accurate coding of text. According to Miles and Huberman (1994), "*Codes* are tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study" (p. 56). Therefore, data was sorted and categorized into codes for analysis of the information, which also followed recommendations by Creswell (2007). As Miles and Huberman (1994) suggest, these categories each related to the research questions, the theoretical framework foundation, and the literature review conducted as prior to the study. Primary categories and sub-categories were identified and utilized for the initial coding process

in order to further analyze participant responses. Through the use of the MAXQDA 10 software, the researcher highlighted these reoccurring codes throughout the interview transcripts:

- background technology use,
 - work, teacher preparation program, personal experiences;
- family influence;
- technology use,
 - teacher use, student use;
- technology integration,
 - unsuccessful experience, successful experience;
- access to technology;
- professional development,
 - in-district, courses;
- self-teaching;
- attitude/motivation;
- inhibitors to technology use,
 - no access, time, technology issues; and
- Situated Learning experiences,
 - mentors, context, culture, activity.

These findings were compiled for presentation to the focus group as detailed below.

Focus group

Following the original coding process as referenced above, the researcher compiled data within these codes into five categories in order to share the information with a final focus group:

- prior technology experience,
- technology integration
- technology use inhibitors,
- motivation, and
- Situated Learning experiences.

The focus group consisted of the remaining two Digital Native new teacher participants and two Digital Immigrant new teacher participants who had not yet been interviewed and who represented various grade levels, content areas, and levels of technology use as reported on their surveys. The purpose of this focus group was to present initial findings and garner responses and reactions to the data collected to date. “Feeding findings back to informants is a venerated, but not always executed, practice in qualitative research... When a finding begins to take shape, the researcher may check it out with new informants and/or with key informants, often called “confidants” (Miles & Huberman, 1994, p. 275).

The focus group interview was scheduled at the group’s convenience. Prior to beginning the session, focus group subjects were notified that they were being recorded and were assured of confidentiality of their responses. During the meeting, the researcher reviewed each of the categories and data with the focus group, requesting feedback regarding their reactions to this preliminary data. All participants were given time to comment on the presented data, offer insights, and discuss among the group their perceptions of the information provided. This focus

group meeting lasted approximately 60 minutes and was digitally recorded. The researcher took notes throughout the session and also transcribed the recording to compare the information. The transcription was also shared with the focus group to ensure accuracy of the information.

Prior technology experience.

During the individual interviews, participants had been asked about their personal background with technology, when they received their first computer, email account, and social networking account. When presented with the initial findings, focus group members were surprised that the Immigrants had access to computers at home in a similar time frame as the Natives and said they would not have expected this considering Natives are known for their earlier relationship with technology.

It surprised me that Immigrants still received computers in the same decade. I would think that that would've been later – 1990s or even later...because that to me would be what makes them a Digital Immigrant because they came into it later. (Focus Group Interviewee C – Native)

In regards to three out of four interviewed Digital Natives having email accounts in the mid- to upper-90s while three out of four Digital Immigrants had accounts prior to 1990, one focus group member observed that was that perhaps this was not so much an age issue but an issue of where an individual was in school.

Maybe when we went to college, we had email in college our school gave us...that's what puts me into prior to 1990, and maybe the Natives were too young to get it before 1990...It's not necessarily how old you are, but more what was the school circumstance;

where were you in school when school started to use them. (Focus Group Interviewee A - Immigrant)

Other focus group members agreed with this statement and added that they also had their first email accounts in high school or college.

In the focus group, one of the two Digital Natives had a social networking account and both Digital Immigrants had them. However, one of these Digital Immigrants again admitted to only having an account to monitor their children's activity and did not have it for other personal use. Neither of the Digital Natives worked with technology in previous jobs, but one Digital Immigrant from the focus group had worked with technology in a previous job.

For teacher preparation, both Digital Native focus group interviewees participated in a teacher preparation program through a college, while one of the Digital Immigrants participated in the same type of college program. The Focus Group noted that this may have been the reason that three Digital Natives reported some influence and three reported great influence from their teacher preparation program while two Digital Immigrants reported some influence and one reported great influence from this source. Like the individual interviewees, both Digital Native and Digital Immigrant new teachers recalled various levels of technology use and training during their preparation programs and concurred with the individual interview results regarding teacher preparation during their meeting:

There wasn't actual direct SMARTBoard instruction or the calculator. There wasn't really direct teacher instruction on how to integrate technology ...I mean it was stressed

but when I think back I can't remember actually physically learning how to do technology-based lessons. (Focus Group Interviewee C – Native)

I remember having a college class, Technology in Education, but it really was a textbook telling us how to use technology in education... then, in grad school within the last five years, I feel like I've had a lot more integration and actual playing around with new technology. (Focus Group Participant D - Native)

Part of my teaching program was a [math/science] technology course... it was online as well as the fact that we got a whole bunch of computer software for classroom use and we had to use it, figure it out, and then reflect on it and then reflect on it on a Blackboard, so I thought it was a very useful course. (Focus Group Interviewee A- Immigrant)

Table 4.7 shows the distribution of background technology use by all participants after the Focus Group information was added.

Table 4.7
Distribution of Background Technology Use by All Participants

Sources of Use	Digital Natives (N=6)		Digital Immigrants (N=6)		Combined (N=12)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Social networking account	5	83.33	5	83.33	10	83.33
Prior work experience	3	50.00	4	66.67	8	66.67
Traditional teacher preparation program	6	100.00	3	50.00	9	75.00

Technology integration.

It should be noted that, during the individual interviews, two participants, one Digital Native, and one Digital Immigrant had answered ‘yes’ to the question, “Do you think you are a successful technology integrator?” before adding that they could always do more. However, the focus group noted that these two interviewees were two teachers who did not have SMARTBoards in their classrooms and used technology less than the majority of the other participants according to their surveys. The focus group speculated about the possible reasoning behind their response:

Of course, they’re proud of what they have done, but they don’t have a SMARTBoard, so there’s less frequent use. (Focus Group Interviewee A – Immigrant)

I think that’s exactly it...I give myself a pat on the back when I incorporate anything technology related just because of not having resources. (Focus Group Interviewee C – Native)

I feel the same way. We don’t do it every day because we don’t have a SMARTBoard. (Focus Group Interviewee B – Immigrant)

Technology use inhibitors.

The focus group corroborated with the individual interviewees’ inhibitors to technology use. One Digital Immigrant (Focus Group Interviewee B) referenced not having sound on her

computer, so when she wanted to access a video clip for science, she had to take her students to another teacher's room to watch it. Other comments on this topic were added by the group:

It really hinders your whole thinking about how you present it... I also had a lot of frustrations this year with the technology...I'd find perfect videos at home and little clips of things and then at school they just wouldn't play on the SMARTBoard, or the clicker system had a lot of little glitches in them, so I think that made me more apt to just say forget it and not keep persisting as much as I should. (Focus Group Interviewee D – Native)

The focus group also agreed that time was an inhibitor to integrating technology into classroom teaching:

I think that the thing with time, and especially with Digital Immigrants, rather than incorporating their lessons into the technology, they think of it as a separate added-on thing. (Focus Group Interviewee B – Immigrant)

I'm surprised I guess that only half of the Digital Natives said that time was an issue. I would've thought more or I would've thought fewer for Digital Immigrants. (Focus Group Interviewee D – Native)

Table 4.8 shows the reporting of technology inhibitors by all participants after the Focus Group responses were taken into consideration.

Table 4.8
Technology Inhibitors as Reported by All Participants

Inhibitor	Digital Natives (N=6)		Digital Immigrants (N=6)		Combined (N=12)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Access to technology	6	100.00	6	100.00	12	100.00
Technology issues	5	83.33	5	83.33	10	83.33
Time	4	66.67	6	100.00	10	83.33

Motivation.

Focus group interviewees also mentioned “selling” the use of technology to teachers by showing them the benefits of its use.

I think to encourage the use of technology by teachers, they have to be inspired... I took a tech course recently and saw the physical outcome of using a Glogster account... I probably wouldn't have done it unless I saw a final product. (Focus Group Interviewee A– Immigrant)

Situated Learning experiences.

Context.

Focus group participants conveyed the positive aspects of in-district professional development offerings. However, they also expressed some drawbacks to in-district professional development when asked their comments on in-district versus out-of-district workshops and courses, and offered suggestions on how to make it more beneficial for teachers.

It would be beneficial if you're grade level or subject area could trade off and actually have time to do [activities] and then to use them in our classes. (Focus Group Interviewee D – Native)

It's hard to speak up to a colleague and say you don't understand something. One in-district PD when we learned about g-mail; in the middle school we were told to choose our pace. If you really feel you need the direct step-by-step instruction, you will go with this instructor...and so everyone chose. I felt that worked out better. Those who needed the more direct instruction got it and those who just are more the play around type of people [had] someone walking around helping you out. I thought that worked. (Focus Group Interviewee A – Immigrant)

Colleagues can be more influential if it's someone that is the same content area...another math colleague might be more influential for me teaching me how to use a SMARTBoard, showing me the different applications that might be useful for a math teacher but maybe not useful for an English teacher. So that would be the most influential. (Focus Group Interviewee C – Native)

Culture: Colleagues and mentors.

Focus group interviewees also reported that they talked once a week or more with colleagues regarding technology use, and one Digital Native and one Digital Immigrant found their mentors helpful. Again, these conversations took place in a variety of arenas and in both formal and informal settings.

I just seem to go to whoever's the go-to person for whatever the one little thing you want to learn. And I find that sometimes they come to me as well because that's the one thing I'm good at. (Focus Group Interviewee A - Immigrant)

My mentor teacher does a lot of SMARTBoard training so he has also been very influential and I just sometimes observed and saw different things that he does... A year ago when I heard a lot of people talking about switching to [Google], my mentor talked to me about getting certain students to do work on it so I started to introduce Google Docs. (Focus Group Interviewee C - Native)

One Digital Native and one Digital Immigrant in the focus group also concurred with the opinion of the single Digital Native and the single Digital Immigrant who did not report their mentor as being influential on their technology use.

My mentor was not technologically savvy at all and I'm not that great either, so I would help her with what I could but both of us would go across the hall to another colleague that was more...the go-to person. (Focus Group Interviewee B – Immigrant)

My mentor wasn't that proficient and I found since mentoring other people that they have new tricks and new things that they've used, that it's sort of an experiment every year, but it's just the go-to person that you know is good with whatever you're looking for. (Focus Group Interviewee D – Native)

As referenced previously, two Digital Natives and two Digital Immigrants reported administrators as having some influence on technology use, and two Digital Natives reported

administrators as having great influence on technology use on the survey. One Digital Immigrant spoke about this in the focus group, and a Digital Native in the group also agreed with this statement:

I think we're lucky at our school because our principal is really great with technology and she's always more than willing to either do a lesson with your kids or teach you or come to your room or whatever. She wants us all to be there with her and it's kind of her passion so we are lucky to have that. (Focus Group Interviewee B – Immigrant)

Self-teaching in context.

The focus group expressed surprise at the interview results regarding self-teaching of technology by Digital Natives and Digital Immigrants. They also questioned what interviewees meant by self-teaching and whether it was true self-teaching or playing and practicing after being taught a concept.

I'm surprised that Digital Immigrants are...equal with Digital Natives. I would think a Digital Native can self-teach because they already have experience whereas Digital Immigrants I would think would have a lot more trouble self-teaching. (Focus Group Interviewee C – Native)

I think it could be a combination...I know when I was taught [Google Docs] I just thought I just need to go home and teach myself and just play with this myself. That's how I'm more comfortable whereas Digital Immigrant...like I said, I'm surprised at...I would just be curious to know what they consider self-teaching. (Focus Group Interviewee C – Native)

I would think of self-teaching as more like you said, being instructed in Google Docs and then going home and kind of expanding on it...being given the minimal, kind of how to basically use it and then go and try to add all of the other kind of fillers. (Focus Group Interviewee B – Immigrant)

Data Analysis

Following the focus group session, the digital recording was transcribed. This transcription was then shared with the focus group participants to ensure accuracy of the information prior to further analysis. All transcribed data from the focus group was uploaded into the same MAXQDA 10 software program to connect responses to the previously identified themes already in place, as well as to identify new categories.

Summary

This study sought to answer the primary questions: *In what ways do the district's Digital Native new teachers vary in how they use technology in their classroom teaching when compared to the district's Digital Immigrant new teachers?* It also sought to answer a supporting question: *How have these new teachers learned to use technology in their classroom teaching and has Situated Learning been a component to this learning?* The study utilized a qualitative case study approach that included data collection in the forms of artifacts, informational surveys, individual interviews, and a focus group interview. A total of 12 out of 16 eligible teachers

participated in the study, consisting of six Digital Native new teachers and six Digital Immigrant new teachers.

The research data provided insight into participants' background with technology, their current level of technology use, how they utilize technology for teaching, inhibitors to technology use and influences on integrating technology in the classroom. Artifacts were analyzed for demographic data, technology access, attendance at in- and out-of-district professional development opportunities, and technology references in observation/evaluation reports. Informal surveys provided data regarding the amount of use and types of technology used in the classroom for delivery of instruction, student use, assessment of student learning, as well as influences on technology use. Eight individual interviews (four Digital Immigrants and four Digital Natives) were conducted to clarify survey results, inquire as to participants' background with technology, and investigate further the use of technology by teachers and how they have learned to integrate it into their classroom teaching practice.

After analysis of the artifact, survey, and interview data, the initial findings were compiled by the researcher. One final focus group interview with two additional Digital Natives and two additional Digital Immigrants was then conducted to review and reflect upon preliminary data compiled from artifacts and individual interviews. The focus group provided insightful feedback regarding the initial findings. Each focus group interviewee voiced their reactions, commented on the information, and added additional opinions on both the initial findings and their own personal experiences. This group validated the initial findings and also provided possible explanations for some of the outlying data. The focus group was a vital part of

the data analysis process, and the additional information gathered from these four participants was also added to the original data.

Five categories emerged from the analysis of all referenced data: previous technology experience, technology integration, technology use inhibitors, motivation, and Situated Learning experiences. For the purpose of further discussion in the next chapter, these five categories will be further organized into three findings which may have implications for both the district and the larger educational community: (a) there are more similarities than differences between Digital Natives and Digital Immigrants in regards to background experience and classroom technology use, (b) accessibility and time are factors that influence classroom technology use by both Digital Natives and Digital Immigrants, and (c) Situated Learning is a vital part of technology learning and use by all new teachers regardless of whether they can be characterized as Digital Natives or Digital Immigrants. (See Table A.1 in Appendix G for examples of coding process and the process of reduction from statements to codes to categories.)

The findings presented provide a better understanding of the technology use among and differences between Digital Native new teachers and Digital Immigrant new teachers, as well as how they learned to use technology for teaching practice and influences on current use. The next chapter discusses these findings and makes recommendations for future research of technology use and learning among teachers as well as suggestions for both professional development practices and for teacher preparation programs.

Chapter 5

Discussion, Implications, and Conclusion

Introduction

This study attempted to answer the following primary research question: *In what ways do the district's Digital Native new teachers vary in how they use technology in their classroom teaching when compared to the district's Digital Immigrant new teachers?* A supporting question was also examined: *How have these new teachers learned to use technology in their classroom teaching and has Situated Learning been a component to this learning?*

After analyzing the data from this study, three key findings include: (a) there are more similarities than differences between Digital Natives and Digital Immigrants in regards to background experience and classroom technology use, (b) accessibility and time are factors that influence classroom technology use by both Digital Natives and Digital Immigrants, and (c) Situated Learning is a vital part of technology use by all new teachers regardless of whether they can be characterized as Digital Natives or Digital Immigrants.

This chapter first discusses the results of the research study according to the key findings that emerged from the data. It then addresses implications for practice in the K-12 environment and offers suggestions for further research.

Limitations of the Study

This research project involved 16 K-12 district educators in their first five years of public school teaching. The limitations in this study were as follows:

1. **Sample size:** The sample size for this study was limited due to the size of the district and the number of teachers who qualified for the purposefully selected sample.
2. **Single district:** Data was collected from a single school district. This could limit full generalization of the findings to other districts.
3. **Bias:** The researcher was a district level administrator at the time of data collection, which could possibly have influenced participants' responses. However, it was known that the researcher had notified the district of her resignation, therefore reducing any fear of the use of acquired data for evaluative or other purposes in the future.
4. **Discussion among participants:** Participants may have talked with one another between scheduled interviews so may have anticipated the questions asked by the researcher. However, the questions did not have specific answers and were based upon individual experiences and survey data, limiting the risk of skewed data.

Research Procedures

This qualitative case study examined the ways Digital Native new teachers vary in how they use technology in their classroom teaching when compared to Digital Immigrant new teachers within one suburban, southeastern Massachusetts school district. It also investigated how both groups of new teachers learned to integrate technology in the classroom and whether situated learning has been a component to this learning.

Design approach.

A qualitative case study approach was used for this research study. This approach involved the collection of artifacts, surveys completed by participants, individual interviews, and

a focus group interview. Multiple sources of information allowed the researcher to triangulate the data to strengthen the findings of the study.

Population and site.

The study took place in one suburban, southeastern Massachusetts school district. Qualifying participants included this district's new teachers consisting of K-12 in-district teachers who were hired within the past five years and were still in their first five years of full-time public school teaching in a core content area (English, math, science, or social studies) in the United States. In total, 16 K-12 teachers in the district qualified to participate. Of these 16 teachers, 12 elected to participate; six were in the Digital Native category and six were in the Digital Immigrant category. The selected participants and setting all met the necessary requirements to conduct this study.

After an informational meeting in which the researcher explained the study and garnered consent from participants, each participant completed an informal survey. Four Digital Natives and four Digital Immigrants were then interviewed individually. Following these interviews and initial data analysis of artifacts, surveys, and interview information, a focus group interview was conducted with the remaining participants, including two Digital Natives and two Digital Immigrants. All data was then again analyzed to incorporate the results of the focus group interview.

Data analysis.

Upon receiving completed surveys from participants, interviews were scheduled and followed the same 13-question format, with clarifying questions added as necessary. All interview data were digitally recorded, transcribed, and entered into MAXQDA 10 software for

coding and identification of common themes. Five categories identified from the compilation of all data included: prior technology experience, technology integration, technology use inhibitors, motivation, and Situated Learning Theory experiences. These categories aligned with one or both research questions as well as the theoretical framework and/or literature as discussed in previous chapters. Data relating to these categories were then shared with a focus group to gauge reactions and garner additional responses. Upon transcription of the focus group's responses, the data was added to MAXQDA 10 to analyze with all other data previously collected and coded.

Discussion

The report of the research highlighted five categories that emerged from the data: prior technology experience, technology integration, technology use inhibitors, situated Learning experiences, and motivation. Following analysis, these categories were organized into three key findings: (a) there are more similarities than differences between Digital Natives and Digital Immigrants in regards to prior technology experience and classroom technology use, (b) accessibility and time are factors that influence classroom technology use by both Digital Natives and Digital Immigrants, and (c) Situated Learning is a vital part of technology learning and use by all new teachers regardless of whether they can be characterized as Digital Natives or Digital Immigrants. Findings (a) and (b) relate to the primary research question, while theme (c) relates to the supporting research question. These key findings will be illuminated throughout this discussion.

Key finding #1: The Digital Native/Digital Immigrant divide.

The first theme which emerged from the data was that there are more similarities than differences between Digital Natives and Digital Immigrants in regards to prior technology experience and classroom technology use.

Prior technology experience.

Prensky (2005) describes Digital Natives as “native speakers of technology, fluent in the digital language of computers, video games, and the Internet” (p. 8) and Digital Immigrants as those who were not born into the digital world, but who may have later “adopted many or most aspects of technology” (Prensky, 2001, pp. 1-2). The data from this study did show that Digital Natives had access to technology at a younger age than Digital Immigrants, with access to computers generally in elementary and middle school. This agrees with Jones (2002), who found that one-fifth of the college students in his study (Digital Natives) began using computers between the ages of five and eight, and before they were 18 years old (p. 2).

If Prensky’s (2005) definitions were the sole characteristics of Digital Natives and Digital Immigrants, this study would have reinforced the concept of two separate groups. However, the Digital Immigrant participants in this study actually had similar or more experience with technology than the Digital Native group, both personally and professionally, challenging these claims as well as the claim of Woods (2006), who suggested that Digital Immigrants have not been exposed to technology as much as their younger counterparts. Digital Immigrants were more familiar with technology than their Native counterparts and, as was the case in this study, had a similar number of years of technology experience in both a personal and a professional capacity before stepping foot into a classroom. This also contradicts Toledo (2007), who

claimed that Digital Immigrants are immersed in an unfamiliar culture of technology use, language, and behaviors (p. 88).

On the other hand, the findings of this study do reinforce the study conducted by Guo, Dobson, and Petrina (2008), who found no significant difference between Digital Natives and Digital Immigrants in regards to information and communication technologies (p. 251). And, although Prensky (2001) went on to say that technology can be more familiar to Digital Native teachers (p. 2), there was not a clear-cut divide among Digital Native and Digital Immigrant new teachers in this study, findings which contradict this claim.

Participants from both groups also had prior employment experience in which they worked with various forms of technology, with three of the six Digital Natives having worked with technology prior to becoming classroom teachers and four of the six Digital Immigrants having worked in a position which utilized technology prior to teaching. At least three of the Digital Immigrant interviewees commented that they used technology more in the business world than in teaching which had given them experience with different hardware, software, and programming. For example, Digital Immigrant Interviewee D wasn't necessarily looking for more kinds of technology when first coming into the classroom, the participant was surprised at long it took to get wireless, the limited mobility of desktop computing, and the small number of computers to which students have access, which would not have been the case in his business world experience. Therefore, prior experience through employment cannot be discounted and should be taken into consideration when discussing a possible Digital Native/Digital Immigrant divide.

The assertion that the younger generation of Digital Natives learns through experimentation, situated experiences, collaboration, mentoring and peer-to-peer, social connections (Dede, 2005; Experiential eLearning, n.d.) was reinforced by the Digital Native participants in this study. However, the desire for these types of experiences was voiced by both Digital Natives and Digital Immigrants alike, once again dispelling the notion of a divide between the two groups in this area.

The discussion regarding a Digital Native/Digital Immigrant divide ties into the finding by Lei (2009) that suggested Digital Native preservice teachers did not have experience using specific technology tools such as interactive whiteboards, content-related technology, and assistive technology (p. 91). Prior to their teaching careers, new teachers in both groups had limited exposure or access to the technologies they currently use on an everyday basis in the classroom. And, of those teachers who participated in traditional teacher preparation programs, the exposure varied as well, from the single technology course taught via textbook to the program where instructors consistently integrated technology into their classes. In any case, it did not appear that programs offered time, access, or opportunities for preservice teachers to actually learn how to integrate technology in their classrooms. Even though the participants in this study were fairly familiar with technology, they had not been instructed about how to use the types of hardware found in classrooms today, nor on how to actually integrate specific technologies into their everyday instruction.

In looking at the data, there is little evidence to support the notion of a Digital Native/Digital Immigrant divide based on one's background exposure to technology. The data suggests that such a divide has either decreased or perhaps did not exist at all.

Technology integration.

The amount of technology use was similar between both the Digital Native and Digital Immigrant groups for assessment of student learning, with participants in both groups varying widely on their responses from zero times per year to once per week. For delivery of instruction, the amount of use was also similar. Both groups used computers themselves to deliver instruction up to multiple times per day, although Digital Natives reported use as “always” or “almost always” where Digital Immigrants reported their use as “always”. This finding indicates that Digital Immigrants actually use technology slightly more for delivery than the Digital Native group. Considering the amount of previous experience many Digital Immigrants had prior to teaching, this finding could be related to their background technology experience.

Also similar between the two groups was the use of specific technologies for classroom use. All teachers with SMARTBoards referenced this piece of hardware on both their surveys and in their interviews. Computers, individual teacher websites, the internet, and Google were discussed by a variety of both Digital Natives and Digital Immigrants participants in the study, and overhead projectors were mentioned by one Digital Native and one Digital Immigrant. SMARTBoards were used by both groups, and the use of SMARTBoard technology did not seem to relate to the Digital Native/Digital Immigrant label, but to the availability of having a mounted SMARTBoard in the classroom. Each teacher who had permanent, easy access to an interactive whiteboard, regardless of group, reported using it consistently for delivery of instruction, again showing little difference between Digital Natives and Digital Immigrants.

Additionally, the factors described in participants’ most successful technology integration lessons did not vary by group and were also evenly matched. Technology integration activities

for both groups included website usage, current events via computer and SMARTBoard, and multi-media lessons. Like SMARTBoard usage, these highlighted technologies did not seem to vary by group, but by access to the technology itself. This is not the only piece of data that points to this suggestion, so the issue of technology access will be discussed further in a later finding.

Digital Natives and Digital Immigrants also viewed a successful technology integrator similarly. It was evenly split between the two groups regarding the identified characteristics of such a teacher, with each group referencing daily use, flexibility and spontaneity, and the ability use technology as a tool to deliver content, with the content being the focus and not the technology. These findings demonstrate that there is little difference between the two groups as to what they feel constitutes effective technology integration in the classroom.

Motivation.

Several participants referred to the positive attitude of an individual teacher as a factor in technology use. Interestingly, some participants voiced comments in regards to technology use among younger versus older teachers. These comments seemed to be aimed more at teachers in the general Digital Immigrant category, including veteran teachers, by the Digital Immigrants themselves. They mentioned that all teachers must be open to new technologies and new routines rather than using old methods. One Immigrant referenced younger teachers using it more because they're not afraid of it and perhaps use it in their personal life. However, as shown, many Digital Immigrants seem to have prior experience with technology as well. In addition, attitude may also tie in with the comfort level of the user. The Digital Native who felt she might break her SMARTBoard at the beginning gradually got used to it over time and now

uses it consistently with her lessons, showing that not only are some Digital Immigrants hesitant to use technology, but some of their Digital Native peers are as well.

Summary.

The data suggests that, ten years after Prensky's first assertions, the Digital Native/Digital Immigrant divide has either decreased or perhaps did not exist at all. In either case, the Digital Native/Digital Immigrant divide should not be used to assume that a younger generation of teachers is more prepared or more adept at using technology in the classroom. Both groups also used similar technologies and viewed successful technology integration in the same manner, so it should not be assumed that the younger generation predominantly uses technology for teaching more or "better" than other teachers. Rather, the researcher agrees with Williamson & Redish (2009), who assert that all K-12 educators must utilize technology in the classroom regardless of their background in order for students to emerge with technology skills.

Key finding #2: Factors influencing technology use.

Two major inhibitors for both Digital Natives and Digital Immigrants were limited technology access and lack of time.

Technology inhibitor: Access.

As mentioned in chapter four, the limited access inhibitor involved limited, *immediate* technology access by teachers. Even though each building had at least one portable SMARTBoard and several SMART Response systems that could have been easily transported among rooms, participants without SMARTBoards or SMART Response systems in their classrooms did not mention any access to these portable technologies in their building. In fact,

no teacher in either group referenced using the portable devices but focused solely on permanently mounted classroom SMARTBoards and SMART Response systems housed in classrooms. Although each school has a cart of netbook computers, only one teacher referenced using the cart, but that could have been due to the limited time available for use due to a single cart available for the entire building. Each teacher in the study did refer to the technology they had available in their classrooms, whether it be a computer(s), a SMARTBoard, a SMART Response system, multi-media projector, scanner, or overhead projector. They each utilized what was directly available and working properly but, with little exception, did not go out of their way to find available technology, use another SMARTBoard classroom, or anything that may have taken them from their usual teaching pattern. Again, there was little difference between the two groups in this aspect, so teachers in general seem to be looking for direct, individual classroom access and not necessarily access in another part of their building.

This access to technology, or lack of, may affect one's sense of being successful as an integrator as well, regardless of group label. Even though they expressed interest in using more technology, one Digital Native and one Digital Immigrant both said "yes" when asked if they were successful technology integrators. However, these two teachers had also reported lower technology use in the classroom than the majority of their peers. When asked the question in their individual interview, Digital Native Interviewee C responded:

I think that I have work to do, but I think that I do a nice job in maintaining information on line about my classroom or about what's going on in the class so that kids can keep up if they are out of school. I think that I do a nice job in making sure that, if I feel like I'm

losing them, integrating just a little bit of the stuff that they love to get them back involved in the classroom.

Digital Immigrant Interviewee D stated, “I guess I would say I am [a successful technology integrator] because I have been able to do a lot of things.” When presenting this data to the focus group interviewees, they had a strong suspicion as to why these two participants would think of themselves as successful even with less technology use, and discussed this among themselves.

First, one possible reason came up from Focus Group Interviewee D (Native):

I teach fifth grade and I do language arts and science and I find myself using it more, especially my SMARTBoard, for science lessons and video clips and PowerPoints. So I find that the technology is a tool for the content; I can see how content areas might be more apt to use it in different ways.

However, since one of the responders who indicated successful technology use taught English while the other taught science, this may not be the reason behind it. Another conversation among the group brought up another possible explanation:

Focus Group Interviewee A (Native): Isn't there one of each who doesn't have a SMARTBoard? A bunch don't have SMARTBoards...

Researcher: Right, those two do not have SMARTBoards.

Focus Group Interviewee A (Immigrant): So of course they're proud of what they have done, but they don't have SMARTBoard so there's less frequent use.

Focus Group Interviewee C (Native): Oh, that makes sense...that's a good point. I think that's exactly it. I give myself a pat on the back when I incorporate anything technology related just because of not having resources.

Focus Group Interviewee B (Immigrant): I feel the same way...We don't do it every day because we don't have a SMARTBoard.

Therefore, access or lack of access to technology seems to also have an impact on what one views as "successful" technology integration.

Another thematic component is that all teachers in both Digital Native and Digital Immigrant groups felt they could do more with technology and expressed interest in being given more technology to use. Again, if teachers have the technology available right in their own classroom, it seems as though it will get used more often than not. It does not seem that they view technology as being accessible if they have to go out of their way to get it, such as accessing the portable SMARTBoard or SMART Response systems from elsewhere in the building.

Lastly, in regards to access, all but one Digital Native and one Digital Immigrant cited technology not working as the major reason behind their least successful lesson involving technology. Whether it was the web content filters being turned on unexpectedly, broken hardware, or even burnt-out bulbs, this lack of access inhibited teaching and learning with technology. As one Digital Native participant noted, "I had a lot of frustrations this year with the technology...so I think that made me more apt to just say forget it and not keep persisting as much as I should." One Digital Native participant summed up the thoughts of the focus group

when stating, “The biggest thing is access.” This has definite implications for technology spending and staffing in order to implement new technologies and to keep technology in working order as it ages.

Technology inhibitor: Time.

Under the theme of technology inhibitors, the majority of participants mentioned needing more time to plan for the use and integration of technology, as well as time to learn and practice with the technology provided to them by the school district. Seeing time as a major inhibitor to technology use, the focus group was actually surprised that two Digital Natives did *not* mention this lack of time since they all felt the same pressure of wanting to do more but not having time to do it. However, when following up with the two Natives who did not refer to time as an inhibitor, one of the two Natives stated, “I wouldn’t say that time inhibits me from using technology. Technology has actually saved me time in regards to assessing students.” Perhaps all teachers need to be shown how technology can be a time-saver in the long run.

Summary.

Woods (2006) suggested that Digital Immigrants may have a more difficult time with the constant changes that often come with technology. This could be the case, considering that more Digital Immigrants cited time as an inhibitor to technology use. These participants felt that they needed more time to learn the actual technology as well as practice it before implementing it with students. However, the majority of Digital Natives felt this way as well, again making the divide appear to be non-existent, or at least smaller than suggested in the literature (Prensky, 2001). In addition, both Digital Natives and Digital Immigrants cited access as being the most prevalent factor for both groups when deciding to use or not use technology. Although this was

a modest study, this finding again demonstrates that there are more similarities than differences among these teachers.

Key finding #3: Situated Learning.

According to the literature, four major premises guide a situated learning experience:

- learning is grounded in authentic situations,
- knowledge is acquired situationally,
- learning is a result of social relationships, and
- learning exists in complex environments made up of situations, people and activities (Stein, 1998).

Therefore, three facets of Situated Learning include context, culture, and activity. According to the theory, people learn best by being immersed in the environment and culture in which they will utilize their knowledge (Hansman, 2001; Lave, 1996; Stein, 1998), and can best learn these skills by working with peers (Ertmer, 1999; Persky, 1990). All participants, both Digital Natives and Digital Immigrants, referenced all of these aspects of Situated Learning in their technology learning and extent of classroom technology use.

Context.

The data from this study should serve as a reminder of Lei's 2009 study which showed that, even when one utilizes technology for social purposes, they often lack experience or expertise in using some technologies in the classroom setting (p. 91). Even participants who used social networking accounts or took part in a teacher preparation program were not exposed to the specific technologies found in their schools. And those teachers who had previous

experience with technology in the business world did not necessarily have exposure to specific hardware such as interactive whiteboards and student response systems.

Of the nine categories of influence referenced on the informational survey (teacher preparation program, in-district professional development, out-of-district professional development, colleagues, administrators, adult family members, family members under 18, friends, and self), the least influential were friends and family, although both of those were rated higher by Digital Immigrants than Digital Natives. This is understandable considering several Immigrants' reported reliance on their children to assist them in learning new technologies and keeping up with the constant changes that arise in technology over time. However, at least one Digital Native did refer to her students teaching her as well, hinting at a reliance, even by Digital Natives, on younger individuals to assist in increasing technology knowledge.

Of the nine categories listed above, in-district professional development and colleagues were rated as having the most influence on technology use by new teachers overall when combining "some" and "great" categories. This data aligns with the context, culture, and activity components of Situated Learning Theory. All of the teachers, Digital Native and Digital Immigrant alike, commented on the positive impact of in-district professional development offered to teachers, especially within the past year. Since over 75 SMART Boards had been installed throughout the district since 2008, the district had offered numerous previous workshops and two graduate level courses in previous years, and nine summer sessions on SMARTBoard and SMART Response in 2010 alone. There were also mandatory school-year training sessions on teacher websites and Google, both of which were implemented during the

2010-11 school year. Participants' comments addressed both the availability of training and the in-district facilitators, noting that there is a level of comfort with colleagues as facilitators.

Culture: Colleagues and mentors.

Colleagues not only provided technology knowledge, but the lesson and idea sharing that is crucial for new teachers. Participants reported that conversations took place during structured times such as common planning and department meetings, but many of these discussions took place “on the fly” as one participant commented. Both groups tended to seek out a “go-to” person for the particular technology they were working with at the time and did not necessarily approach the same person for all technology needs. One Digital Native commented, “We have [a colleague] across the hall and he is the guru with anything Google...while my mentor uses blogs.” This study reinforced Smylie’s (1989) finding that actual classroom experience is the most effective source of learning by teachers, followed by consultation with other teachers (p. 549), again relating to the context, culture and activity aspects of technology learning and use.

Technology conversations also cross discipline lines. For example, a science teacher referenced talking to an English teacher regarding iPad use, and an English teacher referred to getting assistance from a math teacher across the hall. One Digital Native brought up another way for teachers to share: “I always think that it would be a good thing to share [lessons] in some format, having teachers being able to access a part on our website or something like that.” The collaboration among colleagues clearly came through as a highlight on the subject of technology learning and classroom use. And, as referenced in the previous section, both Digital Native and Digital Immigrant participants demonstrated the importance of, and interest in, collaborative activities.

When discussing the influence of colleagues, the researcher specifically asked participants about the influence of their mentors. The majority of teachers reported a strong relationship with their mentors regarding technology use in the classroom. Conversations generally involved the more recent technology advances by the district (X2, SMARTBoards, SMART Response, websites, and Google), but also had an emphasis on lesson planning and idea sharing. Sharing was a theme and, again, the exchange of ideas with mentors and colleagues alike seemed to be the most positive aspect of the relationships as described. For the four participants (two Digital Natives and two Digital Immigrants) who found their mentor not helpful in the area of technology, it was because the mentors were not tech-savvy themselves.

The findings of this study strengthen the assertion by Ertmer (1999) that conversations and projects with colleagues assist teachers in developing curriculum and utilizing technology effectively. Although not a focus for this study, this ties into the notion of Communities of Practice, where people who share a common practice work together to improve that practice through interaction with one another (Rogoff, n.d.; Wenger, et al, 2002; Wenger, 2006). In addition, the observation, modeling, and mentoring aspects of cognitive apprenticeship as noted by Collins, et al. (1987) and Dennen (2004) were mentioned by many of the participants in the study. The majority of participants referenced their mentors as models who assisted them in the area of technology, and several participants showed interest in observing the work of other teachers in order to improve their own practice.

Toledo (2007) notes that some Digital Immigrants become experts in the eyes of their colleagues and that teachers, including Digital Immigrants, can share their experiences with technology to help peers create technology-rich environments as well (p. 89). This was

specifically noted by one Digital Immigrant participant, who stated that she would go to certain teachers about specific technologies, but that other teachers would come to her for other components. This finding again suggests the absence of a divide among Digital Native and Digital Immigrant new teachers.

Activity.

The activity component of Situated Learning relates to the out-of-district courses taken by participants, with the Digital Immigrants group taking these courses more often. When these teachers referenced their coursework, it was clear that the participants selected the specific courses according to interest. Therefore, it would make sense that these teachers found these courses to be applicable and were motivated to utilize this learning in their classrooms since they wanted to learn it in the first place. They self-selected courses based upon individual needs and participated in activities that were directly applicable to their teaching practice, thus making these courses more meaningful to each individual teacher.

In regards to teacher preparation programs, it was interesting that three of the six Digital Immigrants did not participate in a preparation program, but this same group took more out-of-district courses. This again could be because the activities offered by self-selected technology courses relate directly to their needs in the classroom, and provide more time for application of learning, thus addressing the “activity” component of Situated Learning Theory.

As mentioned, through relationships with peers, the importance of the culture aspect of Situated Learning was made clear. However, self-teaching actually came into play and the level of influence was rated as “great” by the most new teachers in both groups, addressing the activity component of Situated Learning. Most of the participants, regardless of category, reported they

self-teach technology skills through playing, experimenting, and perhaps simply practicing something someone has learned. All of the reported self-teaching related to what the teacher needed to learn at the time for a specific purpose. Utilizing technology for a specific activity allowed opportunities for all of these participants to self-teach.

The data showed that both groups of new teachers need time to experiment and self-teach some aspects of technology. This study reinforced Toledo's (2007) assertion that many Digital Immigrants experiment with and utilize technology (p. 89). Not only did the use of self-teaching by both groups show willingness to learn technology, but also gave the indication that, if given the time to practice and given the technology to use, all participants in both groups would utilize the technologies more.

When self-reporting their technology proficiency level, only one more person in the Digital Native group than the Digital Immigrant group reported an increase in their perceived skill level. Participants may have had different definitions of technology proficiency since the focus group questioned whether anyone, with all of the technology needed for teaching in the district, could not have improved their proficiency level. As reported in the previous chapter, one Digital Immigrant actually reported a decrease in technology proficiency, citing the lack of time and technology use in education as the reason, which goes back to the technology inhibitors and not a Digital Native/Digital Immigrant divide.

Summary.

As stated in Chapter 2, Situated Learning Theory is built on the premise that the applicable context, culture, and activities in which one is immersed during the learning process allows for transfer of this learning to real-world situations (Ho, n.d.; Lave, 1991; Putnam &

Borko, 2000). This theory has implications for both preservice and inservice teacher learning (Putnam & Borko, 2000, p. 5), and directly relates to the topic of technology integration in the classroom (Swan, et al., 2002). In addition, Situated Learning Theory has been used in conjunction with teacher learning (Putnam & Borko, 2000) as well as technology integration learning because of the importance of authentic context and practice (Swan, 2002). This study reinforced this relationship and adds to the existing literature that supports the magnitude of Situated Learning.

Implications

After analyzing the data from this study, three key findings include: (a) there are more similarities than differences between Digital Natives and Digital Immigrants in regards to background experience and classroom technology use, (b) accessibility and time are factors that influence classroom technology use by both Digital Natives and Digital Immigrants, and (c) Situated Learning is a vital part of technology learning and use by all new teachers regardless of whether they can be characterized as Digital Natives or Digital Immigrants. This section provides recommendations and suggestions for current practice based upon the research findings.

Digital Native/Digital Immigrant divide: Recommendations and suggestions.

The evidence from this study does not support the notion of a Digital Native/Digital Immigrant divide. However, some participants voiced comments in regards to technology use among younger versus older teachers and seemed to assume that younger teachers are more open to technology. By utilizing the terms of Digital Natives and Digital Immigrants, we may help create a vision of a divide that may not exist with many of our new teachers. Therefore, it is

recommended that the district not categorize these two groups by their Digital Native/Digital Immigrant status in order to prevent a division among faculty.

For professional development, as one focus group participant suggested, it is recommended that teachers be given the option to self-select their level of technology use, or be given some type of assessment or rubric to assess their level, and then attend training based upon that level. This will allow for all teachers, regardless of age or proficiency, to access applicable and pertinent technology training that will directly benefit them and the students they teach. The study conducted by Bebell, et al. (2004a) demonstrates that, although teachers may use technology in their practice, the ways in which teachers utilize technology varies and specific usage does not necessarily depend on the age of the user. This should also be considered when organizing professional development.

Participants mentioned a variety of ways to motivate both Digital Native and Digital Immigrant teachers to utilize classroom technology more. One motivational factor that was mentioned by several teachers was to show them how it would make their jobs easier instead of more difficult. “The first way to do that is to demonstrate to teachers how it can help them do their jobs better. If it makes their lives easier, if it helps them do their jobs better, if they see people they respect using the technology...” (Digital Immigrant Interviewee C). As mentioned by participants, it is recommended that teachers be shown how technology can help make their jobs easier, help address students’ individual needs, and help them to work with parents more easily. This can be done in conjunction with professional development offerings and mentor matching.

Technology inhibitors: Recommendations and suggestions.

All but one Digital Native and one Digital Immigrant cited technology not working as the major reason behind their least successful lesson involving technology. As one Digital Native participant noted, “I had a lot of frustrations this year with the technology...so I think that made me more apt to just say forget it and not keep persisting as much as I should.” Therefore, one recommendation to the district would be to provide teachers with more access to technology. This would impact budget decisions, but if the district expects their students to effectively use technology in the world, then it must provide the technology necessary for teachers to prepare them to do so. The district should develop a technology purchasing and rotation schedule, but should also allocate funds to support technology staffing to service the technology throughout the district in order to keep it in working order for teacher and student use.

Access or lack of access to technology seems to also have an impact on what one views as “successful” technology integration. In less affluent districts where technology is sparse, teachers may believe they are successful because they are doing all they can to integrate technology with what they have available to them, but in another district this may not even scratch the surface of what is considered technology integration. This dilemma has implications for equity among classrooms in a single district, as well as equity proponents across the country. Therefore, it is recommended that the technology be distributed evenly among the buildings and content areas, and that the district identify more teacher models to demonstrate and model effective integration practices.

These findings also have implications for teachers who may have to travel to their classes rather than “owning” their own room. It is recommended that district and building administrators alike begin organizing and promoting other possible ways to access technology

rather than simply in a teacher's own classroom. A couple of ideas could include borrowing pieces of equipment from a colleague or a central location, or trading classrooms with another teacher for a day. Also, as noted above, more staffing is necessary to effectively implement new technologies and to service these technologies as they age. If the budget limits this possibility, perhaps grant funds could be utilized for purchasing or staffing, or students could be trained to provide technical support where funding is limited.

Based upon the technology inhibitor of time, another recommendation is provide more time for training in order for teachers to learn how to incorporate technology into their teaching. This would involve re-structuring professional development so there is ample time to practice applying the technology after learning about it. The district could also provide structured time within common planning, department meetings, grade level meetings, and even staff meetings to specifically focus on technology integration practices.

Situated Learning: Recommendations and suggestions.

One recommendation involving Situated Learning would again entail revamping the district's professional development practices. It is recommended that training sessions allow for time for teachers to practice what they've learned, connecting to the importance of training teachers for classroom technology use in an authentic setting (Swan, et al., 2002). These sessions should also allow for teachers to follow up with peers in order to discuss implementation techniques and ideas. In addition, the district should schedule time for observation of peers using technology for teaching and make these observations an expectation for all staff. Although the district provides time for mentors and new teachers to observe one another, this should be expanded to include more experienced teachers as well and emphasize a

focus on technology integration. The collaboration among colleagues clearly came through as a highlight on the subject of technology learning and classroom use, and responses from both Digital Native and Digital Immigrant participants demonstrated the importance of, and interest in, collaborative activities. Because of the interest and impact of shared activities, it is recommended that the district also provide more structured opportunities for teachers to share best practice and technology integration ideas as noted in the previous section.

Although optional summer workshops and courses were helpful, the expectation of use by offering mandatory training sessions seems to have had more of an impact on technology use, thus showing that in-district professional development is a vital component of classroom technology use. Therefore, it is recommended that the district continue this practice. In addition, giving teachers a choice in the level and topics of their training, as mentioned by Focus Group Interviewee A (Immigrant), is a critical piece of this in-district professional development. However, it should be kept in mind that, although participants referenced having colleagues as professional development facilitators as a positive aspect of in-district professional development, two focus group participants (one Digital Native and one Digital Immigrant) did point out two possible drawbacks. One is that the facilitator may assume teachers have certain skills, and the other is that teachers may have more difficulty asking questions or admitting shortcomings in their technology knowledge and skills to a peer. Because of these possible issues, it is important that the district identify in-house facilitators with the teacher leadership skills necessary to implement effective training for their peers. Simply because a teacher uses technology in their classroom does not necessarily mean that the teacher is the best candidate for teaching his/her colleagues. It is recommended that the district develop the skills of their technology-using

teachers in order to help them become effective professional development facilitators by providing more teacher-leader training opportunities.

Another recommendation is that the district take technology integration skills into account when matching mentors and new teachers. The four participants who reported their mentor as not being helpful stated that their mentor was not knowledgeable in the area of technology. If the district expects teachers to utilize technology effectively, then the newest faculty members should have mentors who can be role models in this area. This theme of selecting mentors carries over into the arena of teacher preparation and carefully matching preservice teachers with cooperating or supervising teachers who use technology. If preservice teachers are conducting their practicum work in the district, they should be matched with a cooperating teacher who will set an example with their technology use in order to nurture use by the newest teachers entering the profession and possibly the district itself.

Since the impact of the building administrator was also referenced by three participants, it is further recommended that training be provided for principals to learn how to use technology effectively as well as learn how they can encourage best practices for using technology in the classroom (Ash, 2011). The technology proficiency of a new administrator should also be taken into account by the superintendent when hiring administrative staff.

Further Research

Digital Native/Digital Immigrant divide.

The only noticeable difference in technology use between the two groups was relative to actual student use in the classroom. Although there was not a difference between use of

technology for delivery of instruction or assessment of student learning, Digital Natives did report more student use of technology than their Digital Immigrant colleagues. Perhaps, as one Digital Immigrant suggested, this may be due to their comfort level with technology and skills at troubleshooting. However, in looking at the prior experience with technology and all of the other similarities reported among the two groups, this may not be the case at all. It was not within the scope of this study to research exactly how new teachers are having students utilize technology. Therefore, student use in the classroom by Digital Native and Digital Immigrant teachers should be a specific focus for future research. This does not seem to be related to the teacher's previous exposure to technology, so perhaps there is a relationship with the comfort level of having students access technology in the classroom or prior exposure to this specific type of activity in the classroom.

Technology inhibitors.

This study revealed that two major inhibitors to technology use were lack of access and time. One suggestion for future research would be to investigate which, if any, teacher preparation programs actually provide preservice teachers access to the specific technologies (interactive whiteboards, student response systems, etc.) they might find in classrooms. These programs could also be explored as to the time they spend, if any, on teaching specific technologies as well as on integration practices and the impact this has on teachers when they arrive in their own classrooms.

Another suggestion would be identify districts that provide ample access to technology as well as time to learn how to integrate it. The research could then examine the impact this has, if any, on teacher use of technology, student use of technology, and/or student achievement.

Situated Learning.

One suggestion for future research is to examine school districts that offer Situated Learning activities to identify best practice and most effective strategies. This information could also be used to find any correlation that may exist between specific Situated Learning experiences and teacher or student technology use. Another suggestion would be to examine teacher preparation programs to identify experiences that incorporate Situated Learning as part of their program and the impact that these experiences have on the participants and their success in the classroom.

Summary

Some new teachers today are Digital Natives and some are Digital Immigrants, making it possible to, as Prensky (2001) has suggested, have a divide among our newest teachers coming into the profession since they fall into both categories. However, others believe that the conversation surrounding Digital Natives and Digital Immigrants tends to exaggerate the gaps between adults (Jenkins, 2007). This study sought to understand if there is such a divide in technology use in the classroom. Whether or not one exists, we must address the professional growth of each teacher as technology continues to expand and evolve. In many school systems, the technology planning cycle tends to be longer than cycles of innovation, making many technology plans obsolete before they are even implemented. And, as technology constantly changes, so does its use as an integrated piece of teaching and learning (Swan, et al., 2002).

The data from this study revealed little difference between Digital Native and Digital Immigrant new teachers' use of technology for delivery of instruction and assessment of student

learning, and a slight difference in student use in their classrooms. It also showed that, although Digital Natives have had experience with technology at a younger age, Digital Immigrants have had similar exposure to technology in terms of time, and perhaps more in terms of previous experience in the workplace. The data did not suggest a divide between the two groups, and highlighted more similarities than differences.

When discussing the use of technology in their teaching practice, teachers in both groups indicated that, if provided with direct access to different technologies, they would utilize these technologies in their classrooms. Participants also indicated that, given more time to learn, plan, and practice, they would utilize technology more often, and perhaps more effectively, in their classrooms. In addition, frustration was often felt when technology didn't work properly or as expected. Access and time were two major factors in technology integration practices among new teachers.

The findings from this study provided support for the importance of Situated Learning experiences for new teachers, regardless of their Digital Native/Digital Immigrant status. Participants indicated that colleagues were most influential on their learning and technology use, which signified the importance of the culture aspect of Situated Learning. In-district professional development was referenced by all participants as having a positive impact on their classroom technology use. Self-teaching was also highlighted, emphasizing that teachers often play and practice with technology as needed for direct application in the classroom.

Digital Natives have now entered the classroom as teachers, but so have their colleagues who were born prior to this generation and are considered Digital Immigrants. There was no direct benefit to them for consenting to this research project; however, the information learned

from this study may help the district as a result of professional development planning based on the findings. Future new teachers may also benefit as suggestions were made for preservice teacher preparation programs.

By expecting new teachers, Digital Natives and Digital Immigrants alike, to effectively utilize technology in the classroom without specifically learning how to do so in the applicable environment, the importance of the social and physical context of using technology tools is ignored (Brown, et al., 1989; Ertmer, 1999; Stein, 1998; Swan, et al., 2007). Both Digital Native and Digital Immigrant teachers today do recognize that the students today have a need to keep technology in their lives, even during the school day.

While new teachers are entering the profession in high numbers (National Commission on Teaching and America's Future, 2008), education is witnessing an increasing demand for technology use in the classroom (NETS Project, 2008). This study focused on the purported Digital Native/Digital Immigrant divide and also examined the impact of situated learning on technology use classroom by new teachers, both issues that address concerns of the education profession. The discussions with both groups of new teachers provided a closer look at technology use for classroom teaching, a possible divide among our teachers, how teachers learn to use technology, and how teachers are influenced in using or not using technology in the classroom. The data provided useful information that suggests opportunities for professional development in this suburban, southeastern Massachusetts school district, but also has possible implications for other districts as well. Therefore, the findings from this study are important to the broader world of education.

By not providing teachers with access to technology and time to learn and implement it, districts are providing a disservice to the teachers, but even more importantly to the students they serve. By acknowledging the importance of this study's findings, school districts will take the first step toward providing the service our students need and deserve.

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Appendix A



Signed Approval to Conduct Research Study – Superintendent of Schools

Northeastern University, College of Professional Studies, Ed.D. Program

Researcher Name: Ellen Peterson

Title of Project: Digital Natives and Digital Immigrants: Teaching with Technology

Signed Approval to Conduct Research Study

You are being asked to allow a research study to take place in the Norwell Public Schools District. This form will tell you about the study, but the researcher will also explain it to you. You may ask the researcher any questions that you may have.

Why is this research study being done?

Education is witnessing an increasing demand for technology use in the classroom. At the same time, new teachers are entering the profession in high numbers. Some of our newest teachers have been exposed to technology since birth and have been labeled as “Digital Natives” while other new teachers who have had access for a shorter period of time and have had to adjust to technology are being labeled as “Digital Immigrants”. It is crucial that we investigate both groups of beginning teachers and their technology usage in the classroom in order to provide all of our students with the skills necessary to compete in today’s society. Therefore, the purpose of this study is to explore how Digital Native new teachers and Digital Immigrant new teachers vary in the use of technology in their classroom teaching practice, as well as how they have learned to use technology in the classroom.

Where will this take place and who will participate?

This project will take place in individual classrooms and the Professional Development Center in Norwell Public Schools. The researcher will investigate artifacts such as professional development attendance, coursework, and observation and evaluation reports to identify technology preparation and use by the teachers. The participants will complete a survey that will take approximately 20 minutes and eight subjects will each participate in one interview that will take approximately 60 minutes, scheduled at their convenience. An additional four participants

will then participate in one focus group interview for an additional 60 minutes. The surveys and interviews will be used to gather information on technology use in the classroom, preparation, and personal experiences with technology.

Qualifying participants will include Norwell Public Schools' new teachers consisting of K-12 Norwell teachers who have been hired within the past five years and are still in their first five years of full-time public school teaching in a core content area (English, math, science, or social studies) in the United States. In total, 16 K-12 teachers in Norwell Public Schools qualify to participate: eight Digital Native new teachers (two Grade 5 teachers, one HS English teacher, three high school math teachers, one high school history teacher, one high school English teacher) and eight Digital Immigrant new teachers (one kindergarten teacher, one grade 2 teacher, one middle school science teacher, one middle school English teacher, two high school foreign language teachers, one high school English teacher, and one high school science teacher).

Will there be a risk to participants?

There is no foreseeable risk to teachers for participating in this project. Teacher participation in this study is completely voluntary. Once the study has begun, they will still have the option of withdrawing from the study at any time. If they decide to withdraw, they will not lose any rights, benefits, or services that they would otherwise receive as an employee. There is no payment nor any cost for consenting to this project.

Who will benefit by being in this research?

There is no direct benefit for consenting to this research project; however, the information learned from this study may help the district as a result of professional development planning based on the findings. Future new teachers may also benefit as suggestions will be made for preservice teacher preparation programs.

Who will see the information?

Only the researcher, Ellen Peterson, will have access to collected data and all data will remain confidential. However, not all participants will be anonymous to the researcher as the researcher must have the ability to match interview data to observational data. All quotes will be reported anonymously, and no data that can identify participants will be used. This data will be used to gain greater understanding of the technology use by Digital Native new teachers and Digital Immigrant new teachers. Findings will be used to plan future professional development opportunities for new teachers and suggestion will be made for teacher preparation programs. Interviews: All interviews will be audiotaped and a transcribed to analyze data. Once audiotapes are transcribed, audiotapes will be destroyed. Transcripts will be destroyed following completion of the research study. Consent forms will be retained in a locked cabinet at the researcher's home office for three years.

Who can I contact if I have questions or problems?

You may contact the researcher, Ellen Peterson by phoning 781-659-8800, ext. 20 or via email at ellen.peterson@norwellschools.org.

.....

I give consent for this research study to be conducted in the Norwell Public School District.

Signature of the person granting approval

Date

Printed name of person above

Signature of person who obtained approval

Date

Printed name of person above

Appendix B



Invitation to Participate in Research Study

Northeastern University, College of Professional Studies, Ed.D. Program

Researcher Name: Ellen Peterson

Title of Project: Digital Natives and Digital Immigrants: Teaching with Technology

Invitation to Participate in a Research Study

You are being invited to take part in a research study. This form will tell you general information about the study, but the researcher will also explain it to you at a meeting listed below. You may ask the researcher any questions that you may have at that time.

What is the purpose of this research study?

The purpose of this study is to explore how Digital Native new teachers and Digital Immigrant new teachers vary in the use of technology in their teaching practice, as well as how they have learned to use technology in the classroom.

What will I be asked to do?

If you decide to take part in the study, the researcher will ask you to complete a survey, participate in one focus group interview that will take approximately one hour, and, if selected, also participate in one individual interview that will take approximately one hour. At no time will this information be used for evaluative purposes.

Who can I contact if I have questions?

You may contact the researcher, Ellen Peterson by phoning 781-659-8800, ext. 20 or via email at ellen.peterson@norwellschools.org.

Informational Meeting Date: _____

Informational Meeting Time: _____

Informational Meeting Location: _____

Appendix C



Northeastern University
Human Subject Research Protection

960 Renaissance Park
Northeastern University
Boston, MA 02115-5000
Tel: 617.373.7570; Fax: 617.373.4595

Signed Informed Consent Document - Teacher

Northeastern University, College of Professional Studies, Ed.D. Program

Researcher Name: Ellen Peterson

Title of Project: Digital Natives and Digital Immigrants: Teaching with Technology

Informed Consent to Participate in a Research Study

You are being invited to take part in a research study. This form will tell you about the study, but the researcher will also explain it to you. You may ask the researcher any questions that you may have. When you are ready to make a decision, you may tell the researcher if you want to participate or not. You do not have to participate in the study. If you decide to participate, the researcher will ask you to sign this statement and will give you a copy to keep.

Why am I being asked to take part in the research study?

We are asking you to take part in this research project because you are a K-12 classroom teacher in a core content area hired by a U.S. school district within the past five years and hired by Norwell Public Schools in the past five years.

Why is this research study being done?

Education is witnessing an increasing demand for technology use in the classroom. At the same time, new teachers are entering the profession in high numbers. Some of our newest teachers have been exposed to technology since birth and have been labeled as “Digital Natives” while other new teachers who have had access for a shorter period of time and have had to adjust to technology are being labeled as “Digital Immigrants”. It is crucial that we investigate both groups of beginning teachers and their technology usage in the classroom in order to provide all K-12 students with the skills necessary to compete in today’s society. Therefore, the purpose of this study is to explore if Digital Native new teachers and Digital Immigrant new teachers vary in the use of technology in their classroom teaching practice, as well as how they have learned to use technology in the classroom.

What will I be asked to do?

If you decide to take part in the study, the researcher will ask you to complete a survey regarding your technology use. This survey will take approximately 20 minutes to complete. You may also be asked to participate in one individual interview that will take approximately 60 minutes, scheduled at your convenience, or may be asked to participate in a focus group interview lasting approximately 60 minutes. Both the survey and the interviews will be used to gather information on technology use in the classroom, preparation, and personal experiences.

Where will this take place and how much of my time will it take?

This project will take place in your classroom within Norwell Public Schools. The survey should take approximately 20 minutes and can be done at this meeting. The interview will take approximately 60 minutes and will be scheduled at your convenience. The focus group interview will take an additional 60 minutes. You may be asked to review transcribed information as well in order to ensure accuracy.

Will there be a risk of discomfort to me?

There is no foreseeable risk to you for participating in this project.

Will I benefit by being in this research?

There is no direct benefit to you for participating in this research project; however, the information learned from this study may help you or others as a result of professional development planning based on the findings. Other new teachers may also benefit as suggestions will be made for preservice teacher preparation programs.

Who will see the information about me?

Only the researcher, Ellen Peterson, will have access to collected data and all data will remain confidential. However, not all participants will be anonymous to the researcher as the researcher must have the ability to match interview data to observational data. All quotes will be reported anonymously, and no data that can identify participants will be used. This data will be used to gain greater understanding of the technology use by Digital Native new teachers and Digital Immigrant new teachers. Findings will be used to plan future professional development opportunities for new teachers and suggestion will be made for teacher preparation programs. Interviews: All interviews will be audiotaped and a transcribed to analyze data. Once audiotapes are transcribed, audiotapes will be destroyed. Transcripts will be destroyed following completion of the research study. Consent forms will be retained in a locked cabinet at the researcher's home office for three years.

Can I stop my participation in this study?

Your participation in this study is completely voluntary. Once the study has begun, you will still have the option of withdrawing from the study at any time. If you decide to withdraw, you will not lose any rights, benefits, or services that you would otherwise receive as an employee.

Who can I contact if I have questions or problems?

You may contact the researcher, Ellen Peterson by phoning 781-659-8800, ext. 20 or via email at ellen.peterson@norwellschools.org.

Who can I contact about my rights as a participant?

If you have any questions about your rights as a participant, you may contact:
Nan C. Regina, Director, Human Subject Research Protection, 960 Renaissance Park,
Northeastern University, Boston, MA 02115, telephone 617-373-7570, email: irb@neu.edu
Calls may be made anonymously if you wish.

Will I be paid for my participation?

There is no payment for participating in this project.

Will it cost me anything to participate?

There is no cost to you for participating in this research project.

.....

I agree to take part in this research.

Signature of the person agreeing to take part

Date

Printed name of person above

**Signature of person who explained the study to
the participant above and obtained consent**

Date

Printed name of person above

Appendix D

Hi Ellen,

Yes. You have permission to use any of the teacher survey resources that we have available (www.intasc.org). We only ask that you 1) cite our work and 2) send us a copy of your completed study.

Good Luck with your research,

Assistant Research Professor
Technology and Assessment Study Collaborative
Lynch School of Education
Boston College
www.intasc.org

On Jan 15, 2011, at 12:16 PM:

To whom it may concern:

I am a doctoral student at Northeastern University. I am conducting a research study on "digital native" teachers and their use of technology, how they use it, and whether they feel prepared for using technology in their professional lives.

I would like to focus my research around categories of use and kindly ask your permission to utilize your teacher survey, or parts of it, in my research study. Please respond to let me know if this is authorized.

Thank you.

Ellen Peterson
Ed.D. Doctoral Student

Appendix E

Participant's Name: _____ Date: _____ Time: _____

Number of Years Teaching full-time: _____ Number of Years Teaching in Norwell: _____

School: _____ Content Area: _____ Date of Birth: _____

1. When did you get your first computer? First email account? First social networking account?
2. What other experiences with technology did you have prior to teaching? During your teacher preparation program? Since beginning to teach?
3. What or who has been most influential on using/not using technology? Why? What role did/does mentor teacher have in tech use? Who else plays a role and how?
4. How often do you talk with colleagues about technology use? What are some of the discussion topics/reasons for discussion?
5. Review survey responses and ask clarifying questions.
6. Why do you utilize specific technologies for those purposes listed? Which were you prepared to use as a beginning teacher and how were you prepared? Which have you been prepared to use since and how were you prepared?
7. How and from whom do you learn new technologies?
8. In what ways are you currently using technology for classroom instruction?
9. What has been your most successful experience using technology for teaching? Why do you think so?
10. What has been your least successful experience using technology for teaching? Why do you think so?
11. What does a successful technology integrator look like? Do you consider yourself to be one? Why or why not?
12. How can we encourage use of technology by teachers?
13. What have I not asked that you feel I should have asked regarding technology use for teaching practice?

Appendix F

Today's Date: _____ Name: _____ Date of Birth: _____

Subject: _____ Grade Level(s): _____ School: _____

How many years have you been teaching in Norwell Public Schools? _____

How many years have you been teaching in United States public education overall? _____

I use technology for:	# times per day	# times per week	# times per month	# times per year	COMMENTS
Delivery of Instruction					
Student Use					
Assessment of Student Learning					
Other:					

I use the following technology in the classroom for DELIVERY OF INSTRUCTION:	Do not use	Rarely	Occasionally	Frequently	Almost Always	Always	COMMENTS
Computers							

SMART Board							
SMART Response							
Document Camera							
Scanner							
LCD Projector							
Digital Camera							
Other							

I use the following technology in the classroom for STUDENT USE:	Do not use	Rarely	Occasionally	Frequently	Almost Always	Always	COMMENTS
Computers							
SMART Board							
SMART Response							
Document Camera							
Scanner							

LCD Projector							
Digital Camera							
Other							

I use the following technology in the classroom for ASSESSMENT OF STUDENT LEARNING:	Do not use	Rarely	Occasionally	Frequently	Almost Always	Always	COMMENTS
Computers							
SMART Board							
SMART Response							
Document Camera							
Scanner							
LCD Projector							
Digital Camera							
Other							

How do I use each of the following?	Do not use	Delivery of Instruction	Student Use	Assessment	COMMENTS
Internet sites					
Wiki/Blog					
NPS Website					
Social Networking					
Video Sites					
Other					
Other					
Other					

The following has had an influence on my use of technology in the classroom:	No Influence	Some Influence	Great Influence	COMMENTS
Teacher preparation program				
Professional development (in-district)				

Professional development (outside district)				
Colleagues				
Administrators				
Adult family members				
Family members under 18				
Friends				
Self				
Other				

Which applied to your proficiency level with technology immediately prior to teaching:

_____ **Unfamiliar (no experience with technology)**

_____ **Beginner (able to perform basic operations and use basic applications, but still require help on regular basis)**

_____ **Proficient/average (able to perform operations and use applications without assistance)**

_____ **Advanced (able to competently use wide range of technologies and applications)**

Which applies to your proficiency level with technology currently as a teacher:

Unfamiliar (no experience with technology)

Beginner (able to perform basic operations and use basic applications, but still require help on regular basis)

Proficient/average (able to perform operations and use applications without assistance)

Advanced (able to competently use wide range of technologies and applications)

Appendix G

Table A.1
Reduction from statements to codes to categories (examples)

Significant Statements	Emergent Codes	Category	Reflective Memos
<p>“I was surprised that Immigrants still received computers in the same decade” (Native)</p> <p>“Maybe the Natives were too young to get [email] before 1990” (Immigrant)</p> <p>“I got my first email in college...that was the first time I’d ever seen it” (Immigrant)</p>	Background - Personal experience	Previous technology experience	<p>Surprised about the timeline of experience – Immigrants same amount of time</p> <p>Focus group - possible explanation for earlier email</p>
<p>“I worked in publishing, for an entertainment company, for an architect, so lots of applications” (Immigrant)</p> <p>“I was hired as a financial analyst...I taught myself how to program on a mainframe and did financial modeling...I was one of the first people who desktop published a commercial magazine” (Immigrant)</p> <p>“As a residence director, I did networks and emails and outlook” (Native)</p>	Background - Work	Previous technology experience	<p>Work experience for some Immigrants extensive – wide range</p> <p>Work experience for Natives more basic</p>
<p>“Technology in Education was really a textbook telling us how to use technology in education” (Native)</p> <p>“We had overheads; that was about all the technology they taught us to use” (Native)</p>	Background - Teacher preparation	Previous technology experience	Outdated - Tech Education via a textbook & overheads

“There wasn’t direct SMARTBoard instruction [or] direct teacher instruction on how to integrate technology”
(Native)

No SMARTBoards,
SMART Response, direct
application

“Part of my teaching program was a technology/
math/science course...it was a very useful course”
(Immigrant)

More recent TPPs – more
modeling; still not direct
instruction

“We became familiar with blogs/wikis/websites from my
teachers using them rather than explicitly instructing us
how to use them” (Native)

“I use the website for links and internet explorations”
(Native)

Technology use –
teacher/student

Technology
integration

Use of various websites by
DN and DI

“I will use the website to go to links that go to different
activities that follow the curriculum” (Immigrant)

“Everyone in our department goes to the library to work on
a research project” (Native)

Online research – both DN
and DI

“They do everything from typing up lab reports to more
web-based assignments where I’ll give them a topic and
have them do research online” (Immigrant)

“The interaction of the students with the SMARTBoard...it
really piques their curiosity. And they’re more interested
when the SMARTBoard is on” (Native)

Connection to students -
SMART Board use by both
DN and DI – excitement for
using it, both teacher and
student

“We can do anything on the SMARTBoard...[the
students] are pretty good with it too” (Immigrant)

“[Reading] quizzes are taken in [the computer lab] as well

Assessments (reading) –

as vocabulary quizzes and sometimes quizzes related to literature” (Immigrant)

both DN and DI

“We were going to the computer lab a lot and I was having them take the reading assessments” (Native)

“There’s always transparencies I use” (Native)

Overhead projector by DN!

“My most successful lessons were multi-media with the SMARTBoard” (Native)

Technology
Integration –
Unsuccessful/
successful

Technology
integration

Multi-media lesson – most
successful

“I found a great Edgar Allan Poe online note taking site...the story was narrated to them and they could pause the story and respond to the story through the notes” (Immigrant)

Use of different websites -
successful

[Students] link to a website called Math Open Reference...you can move with your finger or the mouse different points to show things like the rotation of angles... that has been a very, very successful tool that I’ve used. (Native)

“I also incorporated more current events into the curriculum...quick access, video clips, news articles, things like that have been very successful and engaging for students” (Native)

Current events – most
successful for both DN/DI

“With my Arabic class we were able to get all the events that were happening in Egypt as they were happening” (Immigrant)

“I think that somebody who is good at integrating

technology realizes it's not about the technology itself, it's about the content that you are delivering" (Native)

"A successful technology integrator is successful if the technology is integrated as seamlessly as possible...it's not just to show a video because you can show a video but how can you show a video with animation that actually does something that you couldn't do otherwise" (Immigrant)

"[Technology is] just constantly being used and it flows with your lessons" (Native)

"My role model uses [the SMARTBoard] every day from the minute she walk in the door until she leaves"

"One thing that might have been a little bit surprising was how long it took to get wireless...[and] right now we have issues with the number of computers that students have access to" (Immigrant)

"Obviously the resources need to be available...there are plenty of teachers that don't have SMART Boards and I really feel that I am a much better teacher with it this year than I was without it" (Native)

"I would use the document camera every day...there is nothing better than being able to just pop a student essay under the camera and show it to everybody and talk about it" (Native)

"I would definitely use a SMARTBoard...I would like to be able to use the SMART Response and that's the sort of thing that I could use every day" (Immigrant)

Successful integrator = focus on content, not tech – both DN/DI

Successful integrator = use every day – both DN/DI

Inhibitors - Access

Technology use inhibitors

Access to resources necessary

Would use if access: document camera, SMARTBoard, SMART Response

“No [I don’t consider myself a successful technology integrator], but if I had technology to integrate, I might be” (Immigrant)

Access – relationship between access and successful integration

“It takes a long time to type up formulas onto a PowerPoint or any graphs...it takes a lot longer than standard writing on the board” (Native)

Inhibitors – Time

Technology use inhibitors

Time for preparation of lessons

“I found some of the things we did with [SMART Response] in training like how to include and upload test questions on it seemed a little bit labor intensive so I didn’t go through creating that many quizzes” (Native)

“I really feel as though in this profession I am always at a loss for time and I have been amazed at that” (Immigrant)

Less time in education – planning, training, follow-up

“I’m surprised I guess that only ½ of the Digital Natives said that time was an issue” (Native)

Surprise – time is a factor according to focus group – check on outliers

“I thought this [website] was perfect, signed out the computer lab; when I get there, the website’s blocked, so I guess that’s kind of the trial and error” (Native)

Inhibitors – Tech Issues

Technology use inhibitors

Website filters hindered lessons – both DN/DI

“I remember my worst lesson was when I tried it on my computer, but then when I went to the computer lab, that whole website was blocked and it was like okay, now what do I do?” (Immigrant)

“I also had a lot of frustrations this year...I’d find perfect

Glitches with technology –

videos at home and little clips of things and then at school they just wouldn't play...or the SMART Response systems had a lot of little glitches in them" (Native)

both DN/DI

"I think that the less frequent use was glitches with technology and not having the access to it" (Immigrant)

"It's more of a headache then it's worth sometimes...as far as Google Docs goes, I'm not sure if that's a headache that I want to go into right now" (Native)

Attitude/motivation

Motivation

Headache – not sure it it's worth it

"I can see how you could manipulate the data quickly [with SMART Response], but it seemed like it was a lot of set-up time for relatively meager results" (Immigrant)

Need to see reason to use

"If I have access and time, of course I would love to. I'm willing to learn" (Immigrant)

Willingness

"A lot of time the in-district stuff is like a day course where you're taught it, you're given a half hour to an hour to play around with it and that's all on self-motivation" (Immigrant)

Self-motivation

I think it would be beneficial if like you're grade level or subject area could trade off and use some of the actually have time to do [the activities] and then use them in our classes (Native)

SLT – context

Situated Learning

Use in classes – direct context

Because of the professional development days before the school year started, they taught us how to setup our classroom website. That definitely helped me to hit the ground running (Native)

You might not receive the formal instruction that you would in an actual, more formal course, whereas if it's with a colleague it might be assumed that everyone knows how to do this (Native)

It's hard to speak up to a colleague and say you don't understand something. (Immigrant)

"Colleagues are motivating too, when you see them doing something kind of cool with technology or you hear about a lesson that they've used, it motivates me to kind of try it out or if it's specifically for a subject area" (Immigrant)

I just seem to go to whoever's the go-to person for whatever the one little thing you want to learn. And I find that sometimes they come to me as well because that's the one thing I'm good at. (Immigrant)

We have [one teacher] across the hall and he is the guru with anything Google (Native)

I talk with my colleagues I would say at least once a week about technology use. (Native)

We have a lot of varying levels of people with technology so we exchange ideas in terms of tips and things like that ... so we'll pop in and out...have you seen this, have you seen that, have you tried this, does it work. And then over lunch we'll talk about things...it comes up a lot. (Immigrant)

My colleagues would definitely be the most influential. [One colleague] really gave me the quick over on the SMARTBoard and I couldn't believe how much he could

SLT – culture

Situated Learning

Positives/negatives to in-district PD/facilitator

Colleagues – go-to people (including self) for certain things

Discussion occurs often – not just with mentors
Times/locations vary – in meetings, on the run, during lunch, etc.

show me in about 10 minutes...[Another colleague] definitely helped me because he showed me how much fun they could be with the kids and how easy it was to use the SMART Responses (Native)

We're lucky at our school because our principal is really great with technology and she's always more than willing to either do a lesson with your kids or teach you...She wants us all to be there with her and it's kind of her passion (Immigrant)

Administrator modeling-
important!

[My mentor] is not really into technology anyway, not a knock against him, but he hasn't been able to be, teach me into being in technology. (Immigrant)

SLT – mentor

Drawback – mentor not
knowing technology

My mentor wasn't that proficient with [technology]...I found since mentoring other people that they have new tricks and new things that they've used, that it's sort of an experiment every year (Native)

My mentor [and I] certainly collaborated in terms of things like Google Docs. We're both pretty savvy with the technology...we've exchanged a lot of that so that's been very helpful. (Immigrant)

Mentors – influential
Exchanging ideas, sharing

I mean when [my mentor] and I are doing lessons, we're constantly exchanging things...I would say if not a daily basis, a weekly basis we're exchanging some sort of way we use technology. (Native)

Daily, weekly, drop in

I play with things, and see how things fit together, and see if I can do certain things on making lessons, but it's mostly self-teaching (Native)

I self-taught a lot of the things that I use now in the classroom (Immigrant)

I took an out-of-district course on integrating literature using PowerPoint into the classroom and I found that very useful and I do use it. We created things through the class that we could use in our classroom (Immigrant)

I think it would be beneficial if your grade level or subject area could trade off and actually have time to do [the activities] and then to use them in our classes (Native)

It would be helpful to observe other teachers more often...I think would be helpful and for some people that might encourage them to use it more than just having the training. They can see how it's used in action (Native)

We've had the professional development on Google Docs. I've used that before but I did learn from the training we had some things I didn't know. (Immigrant)

The professional development I had this year and the summer training for SMART Boards and then the SMART Response...was very beneficial (Native)

Pushing the professional development and training courses is important...Making some training mandatory certainly would be helpful (Immigrant)

Maybe there are even more fundamental things that could

SLT – activity

Situated Learning

Self-teaching – both DN and DI

Self-taught when needed technology for a purpose

Useful when able to use in classroom

Idea – peer observation!

In-district PD; direct application

be optional training for some people. Something like Google Docs would be intimidating if you are not totally comfortable with internet basic skills. (Immigrant)

Workshops that I chose were great because I realized that “ok I can do this”, because they were pretty basic and it broke it down (Immigrant)

I think out-of-district you might choose which course or which PD you would want specific to your needs (Native)

“Another math colleague might be more influential for me teaching me how to use a SMARTBoard, showing me the different applications that might be useful for a math teacher, but maybe not useful for an English teacher” (Native)

When we learned about gmail, we were told to choose our pace...I felt that worked out better. Those who needed the more direct instruction got it and those who just are more the play around type of people [had] someone walking around helping you out (Immigrant)

Mandatory training!

Optional training

Provide choices for PD

Specific content activities and application

Leveled/paced PD