THE IMPLEMENTATION OF SMARTPHONES AND TABLET TECHNOLOGIES INTO THE CLASSROOM BY SELECTED NEW YORK STATE PUBLIC SCHOOL LEADERS

A Doctoral Research Project
Presented to
Associate Professor Ann Myers, Ed. D.
Doctoral Research Committee Chair
School of Education
The Sage Colleges

In Partial Fulfillment of the
Requirements for the
Degree of Doctor of Education
In Educational Leadership

Richard R. DeMallie

April 4, 2013

THE IMPLEMENTATION OF SMARTPHONES AND TABLET TECHNOLOGIES INTO THE CLASSROOM BY SELECTED NEW YORK STATE PUBLIC SCHOOL LEADERS

We represent to Sage Graduate School that this thesis/dissertation and abstract are the original work of the author and do not infringe on the copyright or other rights of others.

Richard R. DeMallie — Date of Signature

Dr. Ann Myers
Associate Professor
Dissertation Chair — Date of Signature

Abstract

The popularity and use of handheld technologies cannot be denied in today's society. "300,000 first generation iPads were sold before midnight on their first day of sales and an additional 500,000 first generation iPads was sold by the end of that week" (Waters, 2010). The demand forced the iPad's sales to be delayed in Europe (Banister, 2010). Three hundred applications or *apps*, the computer term used for a problem which lends itself to processing or solution by a computer, for these devices are being added every day (Banister, 2010). "Apple sold five million iPhone 5's, the first three days it was placed on the market" (Combined Wire Service, 2012).

Internet service is now affordable to every socioeconomic group. "In fact today 41% of teens in households earning less than $30,000 per year use their cell phones to go online" (Hill, 2011, p. 23).

The use of handheld technology has changed the way our students' minds operate and problem solve (UsersExpieriencesWorks, 2011). Even with handheld technology use spanning across all generations of society and changing how we collect, gather, and disseminate information, their use in our educational system is minimal. "70% of schools in the United States did not allow cell phone use during the school day" (Morgan, 2010-2011, p. 141).

This qualitative multiple site case study examined four New York State public schools and how school leaders guided their districts through the process of implementing handheld devices into instruction. The phenomenon of change these districts and school leaders experienced were compared to the change theories of Kotter and Cohen (2002) and Bridges (2009). Eleven public school leaders were interviewed for this study, and the data were utilized to answer five research questions.

The research questions reviewed the skills of leadership associated with the integration process, the barriers to integration, the strategies used to overcome these barriers, and the factors that led the leaders to initiate the implementation.

Skills, such as the ability to form and articulate a vision and the interpersonal skills of communication and collaboration, were determined to be essential leadership skills for the implementation process.

Barriers of fear and infrastructure were areas that had to be addressed prior to expanding the implementation past the pilot programs. The strategy of embedded professional development had to be applied to assist staff to overcome their fears.

All of the districts were able to see the benefit of the handheld devices in the area of student engagement and increasing opportunities for their students to be college and career ready after graduation.

After comparing the integration processes of the four districts, the qualitative data supported the conclusion that a public school leader who chooses to implement handheld devices into their instructional setting should consider the change steps of Kotter and Cohen as a template for the implementation process.

Keywords: Technology, Integration, Smartphone, Handhelds, Change

Acknowledgements

Earning a doctorate was always in the back of my mind. However, I knew it would become a reality when my former superintendent, Dan Connor, spoke to me about moving to the principal's position at Gloversville High School. He slid a piece of paper over to me which had three goals inscribed on it, one of which was for me to pursue a doctorate in educational leadership. First and foremost, I am grateful to him for starting me on this journey.

I also wish to acknowledge Drs. Ann Myers and Daniel Alemu, Sage College professors who supported my family decision to delay admission to the program for a year. I then became a member of Cohort IV. I thank these two consummate professional educators for believing in me and supporting me.

I sincerely wish to recognize the understanding and support of the extended Gloversville community, including staff, students, administrators, and board members.

Specifically, I wish to thank my friend and mentor, Charles Giglio, who has taught me the importance of family, and who steadfastly encouraged me not to abandon my journey, even when I became discouraged and began to waver. His friendship, kind heart, and wealth of knowledge are characteristics I truly respect and love about him. Mr. Giglio is an individual who is a role model for every educator and human being.

I would also like to recognize and thank assistant principal Mr. Mark Batty for never refusing to take on extra duties for me. His understanding, professionalism, and friendship did not go unnoticed over these past 27 months.

Achieving the reality of receiving a doctorate would never have become a reality without the values and character instilled in me by my parents, Wayne and Vina DeMallIe. Their parenting has inspired me to become the person I am today.

I am blessed to have two men in my life I can call "Dad". My father, Raymond Dixon, spent countless hours sitting next to me, reviewing and editing this dissertation and considered it an honor and a privilege to be part of this process. When asked how I could repay him for his labor and time, this is what he said: "Never step out of the bounds of your marriage; love Karina more than you love yourself; never disrespect your mother; always respect Wayne for what he has done." I will always love you, Dad, and will abide by these guidelines.

My cohort members and I grew together and formed an indelible bond that will last forever. My journey to the end was a path less traveled and took a few more months to complete; without this bond, I would have never been able to finish. I especially want to thank Dr. Shawn Hunziker, who sent me text messages every weekend to be sure that I was on the right path. I also want to thank Stan Harper, and Drs. Deborah Fox and Richard Rose for attending and supporting me during my defense. I would also like to thank Drs. Elizabeth Wood-Pustolka and Sarah (Sally) Feinberg for allowing me to present with them in May of 2013 so I could complete my journey after the scheduled colloquium in November of 2012. Their willingness to finish as a team will never be forgotten.

As we witness the fruits of our labors coming to a successful end, I thank each and every one of you for being a source of support and strength, especially during those tough months. I hope that you were able to count on me as well.

I am blessed to have known our Tony Clement. He inspired us to stay together and help one another. I will never forget him.

To do great things it takes a team. I want to thank Dr. Robin Young for her willingness to be on this team and her meticulous editing eye. Her time spent on this dissertation assisted me in making this something my family and I will be proud of forever.

Without the support and friendship of our daughter's godmother, Allyson Warren, this dissertation could not have been achieved. Allyson, thank you for being a part of our family and for always taking care of our Karina when we needed you the most; without you, our lives would be incomplete.

I am eternally indebted to my best friend, confidant, and 'brother', Thomas Ciaccio. When I felt overwhelmed with all of my responsibilities, including this doctorate, Tom was always there to steady my compass and serve as a pillar of strength when I became discouraged or disheartened. I am truly thankful that he is a part of our family.

To my loving wife, Patricia DeMallie, and our little angel, Karina Grace, I thank you for supporting my dreams and walking with me through those days when I was filled with fear and frustration. I am thankful every day for the love, understanding, and compassion you both provided me during these past three years. As we begin the next phase of our lives, I will ensure that I redouble my efforts as a worthy husband and father.

Karina Grace, you are my life's work, and I pray someday that you will look on my efforts and be proud. Thank you for all of the little trinkets, treats, hugs, and kisses when you visited me in my office. I also hope that you will forgive me for those times when mommy told you that, "Daddy has to work."

Table of Contents

List of Tables

Chapter 1: Introduction

Problem Statement

Currently in this country, there is a societal and governmental agenda for students to be college and career ready. College readiness is defined as the knowledge and skills that high school graduates will need to be successful in college. These are the same as those they will need to be successful in jobs that pay enough to support a family, provide benefits, and offer a clear pathway for career advancement through further education and training (Slentz, 2012).

A measure of college and career readiness is a student's score on a standardized test. In New York State (NYS), college and career readiness is determined by students who score at least a 75 on the English Language Arts (ELA) Regents exam and an 80 on the Math Regents exam. These scores correlate with success in the first-year of college. NYS researched this and separated the data demographically. The percentage of students who entered high school in 2005 and graduated in June of 2009, who met the criteria of college and career readiness as determined by NYS was 40.8% (Slentz, 2012).

Simultaneously, there is a demand for students to develop 21st century skills. If students are prepared and have these skill sets, the United States (US) will produce youth capable of competing on both the national and the global levels for careers, jobs, and placement in institutions of higher learning.

Various technologies need to be incorporated into instruction to meet the current NYS standards and accountability measures. This is clearly stated in the Common Core State Standard (CCSS) I: Knowledge of Students and Student Learning. Element I.6 Performance Indicator (a) states: "Teachers use technological tools and a variety of communication strategies to engage each student," and Element II.6, performance indicator (b) states: "Teachers

incorporate a knowledge and understanding of technology in their lessons to enhance student learning" (New York State Education Department [NYSED], Office of Higher Education [OHE], Office of Teaching Initiatives [OTI], 2011).

According to Reeves' (2011) evaluation document, *Reeves' Leadership Performance Matrix*, which is part of the Annual Professional Performance Review (APPR), in the area of principal accountability, a specific area of his matrix is dedicated to technology.

> Leaders in education are technically savvy. They process changes and capture opportunities available through social networking tools and access and process information through a variety of online resources. They incorporate data-driven decision making with effective technology integration to analyze school results. Furthermore, leaders develop strategies for coaching staff as they integrate technology into teaching, learning, and assessment processes. (Reeves, 2011, p. 27)

The current societal demand for smartphones and tablets makes integration of these technologies a must in education. Apple sold five million iPhone 5s during the first three days it was on the market. White, analyst from Topeka Capital Markets, projected sales would be between 6 and 6.5 million. He reported that Apple did not meet this target because there was a limited supply and that 80 to 85 percent of US stores sold out in a short period of time (Combined Wire Services, 2012).

Yet, in most NYS public schools, the use of handheld technological devices is banned during instructional times (Hill, 2011). If technology and its associated capacity for information acquisition and connections are essential for students to be college and career ready and to possess 21st century skills, then why is it so difficult to integrate handheld devices into the public educational system?

Every NYS public school district is required to have a technology plan in order to compete for state funding. Districts applying for funding must submit their technology plans to the New York State Education Department (NYSED) before applications are even considered (NYSED, Office of Prekindergarten Through Grade 12 Education [P12], Office of Curriculum, Assessment, and Educational Technology [OCAET], Educational Design and Technology [EdTech], 2010).

This plan incorporates student use of the latest technologies. There is a general consensus among superintendents, principals, and educators that students need to utilize these new technological tools in order to streamline their learning and expand their educational opportunities. Further, these tools can potentially increase student engagement. However, integration of these tools is not a priority today.

Technology integration is a part of the CCSS recently adopted for NYS public schools (NYSED OHE OTI, 2011). These standards are associated with a rating system, and this rating system is part of every school's APPR. APPR ratings affect decisions concerning tenure, state funding, and faculty and principal retention and promotion.

Although smartphones and tablets have only been in use for a short time, (the iPhone was introduced to the market in 2007), their increasing popularity makes integration a necessity for NYS public schools to meet the newly adopted CCSS. However, there is a gap between the idea of integration and the actual integration of these technologies into classrooms. How can this gap be closed, and what are the skills needed by superintendents, building leaders, and union leaders to navigate a public school through the integration and change process of handheld technology?

Use of handheld devices is the wave of the future and has been a pressing issue of the last decade. In the peer-reviewed literature, articles were discovered that proved handheld devices

increase student engagement and academic success. The literature reviewed ranged from 2000 to 2012.

Purpose Statement

A qualitative study was performed using the frameworks of change developed by Bridges (2009) and Kotter and Cohen (2002). The study's purpose was to examine the phenomenon of change and the barriers public school leaders faced in incorporating the latest technologies of smartphones and tablets into the classroom. The study examined what types of information public school leaders used to sustain the change. Research focused on how the leaders in the NYS public school system integrated smartphone and/or tablet technologies into instruction. The qualitative study investigated the specific skills of leaders during the integration process, what barriers they faced, what strategies they used, what factors caused them to decide to implement the technologies, and the steps of the integration process itself.

Very little research existed about handheld technologies at the time of this study, but their use is a phenomenon that cannot be ignored. This study was designed to inform educational organizations about the process of integration and its barriers. Central office administrators, building administrators, and educators can all benefit from the knowledge gained of the change process for integration and how to sustain the integration. It also offers information on how to acquire the technologies, train staff, and evaluate outcomes, and then use the data acquired to sustain and spread the integration.

Handheld devices are cost effective. Handheld smartphones can be purchased for less than laptop or desktop computers. According to an interview with Hill (2011), Soloway claims that by 2015 all students in all grade levels will have a smartphone. "In fact today, 41% of teens

in households earning less than $30,000 per year use their cell phones to go online" (Hill, 2011, p. 23).

The smartphone and tablet movement is not only occurring in high schools, but it is impacting elementary schools as well. In a small city school in upstate New York (NY), kindergarteners utilize iPads during their station work. Observations of these students show a portion of them already have most of the skills necessary to manipulate the iPad and complete appointed tasks quickly. Students, who were deemed as having limited skills in manipulating the touch screen and comprehending the learning applications with the iPad, were able to sufficiently manipulate the touch screen by the end of class time.

In a recent video on YouTube titled, "A Magazine is an iPad that doesn't work", a one year old girl plays with an iPad, and then tries to manipulate the pages of a magazine (UserExperienceWorks, 2011). The video reveals that the iPad can engage all ages and can actually change the way a person's mind operates, even at a very young age.

The latest handheld technologies are beginning to enter the classroom and are becoming part of instruction. Technology has entered its way into the classroom since the first television broadcast in the 1920s. Computers moved into the picture when the first mainframe computer was introduced in the 1960s. In the1970s, the personal computer (PC) was introduced into society. Today, it is the boom of the Internet and the 21st century infusion of handheld computers, laptops, and computing on a *cloud*.

The US has always been a world leader in innovation and technology. The latest technologies of iPhones and tablets must be put into the hands of youth and integrated into students' learning in order for the US to remain a global leader. Students need to be prepared to compete for job opportunities at the global level.

Imagine a classroom where the devices students bring to school everyday are utilized. Teachers and students would not need to pick up their materials and move away from their learning environments. Further, teachers would not need to take time away from instruction to learn a new technology that would only replace current techniques (Tooms, Acomb, & McGlothlin, 2004). Schools need to shy away from the computer lab environment and concentrate on resources that are immediately available to them.

Imagine a place where direct instruction is not the norm, but just another instructional tool (teaching method). This new learning environment would create a new role for the teacher. The teacher would be more a facilitator than the primary source for information. Instruction could occur outside the traditional four-wall setting and 45 minute time frame. These types of learning environments would allow students to collaborate on projects anytime, anywhere, and on their own terms.

Research Questions

Research questions one through four were designed by the researcher to gather participants' perceptions of the change process associated with integration. Research question five was designed to determine the level of alignment between the perceptions of the respondents and the change steps of Bridges (2009), *Managing transitions*, and the work of Kotter and Cohen (2002), *The heart of change*.

1. What specific skills are associated with a school leader's ability to integrate handheld technologies into the curriculum of a New York State public school?
2. What barriers does a school leader face when implementing handheld technologies such as smartphones and tablets into the instructional programs of a New York State public school?

3. What strategies does a school leader use to plan and implement the change process which will move a district from one that does not yet use handheld technologies (i.e. smartphone, iPod, or tablet) to one that does?
4. What factors caused the school leader to decide to implement the use of handheld technology?
5. How do the change and transition steps of a school leader who has implemented handheld technologies into instructional programs compare to the change steps of Kotter and Cohen (2002) and the transition steps Bridges (2009)?

Definition of Terms

Annual Professional Performance Review (APPR):

In May 2010, the New York State Legislature—in an effort to secure federal Race to the Top funds—approved an amendment to Educational Law 3012-c regarding the APPR of teachers and principals. The new law states that beginning September 2011, all teachers and principals will receive a number from 0-100 to rate their performance. (New York Principals, 2012)

Building Leader: For the purposes of this study, a principal or a director of technology.

Central Administrator: For the purposes of this study, a superintendent of schools.

Union Leader: Elected president of the teachers' bargaining unit.

Constructivism: A theory of the way people create meaning in the world through a series of individual constructs. "It is a learning process which allows a student to experience an environment first-hand, thereby giving the student reliable, trust-worthy knowledge. The student is required to act upon the environment to both acquire and test new knowledge" (Constructivism, 2012, para. 1).

Handheld Device: "A small, hand-held computing device, typically having a display screen with touch input and/or a miniature keyboard and weighing less than 2 pounds (0.91 kg)" (Mobile device, 2012, para. 1).

Project Based Learning (PBL): "The use of in-depth and rigorous classroom projects to facilitate learning and assess student competence" (Project-based learning [PBL], 2012).

Smartphone: Combining telephone capability with personal digital assistance functioning, camera, "mass storage, MP3 player, Internet access, and networking in one compact system. In addition to email, these devices offer instant messaging" (Cheung & Hew, 2009, p. 154)

Tablet: "A mobile computer, larger than a mobile phone or personal digital assistant, integrated into a flat touch screen and primarily operated by touching the screen rather than using a physical keyboard" (Tablet computer, 2012, para. 1).

Significance of the Study

The potential of these learning environments merit consideration by administrators and teachers, who are willing to take the risk to change pedagogy, align with CCSS, and utilize handheld devices. The new demands on the educational system in the area of college and career readiness cannot be ignored. The educational system is operating with scarce resources and school leaders need to research how to assist students to achieve in this new educational environment.

Research is absent to address the needs of leaders who are ready to begin implementing handheld instruction in the new environment of high demands and dwindling resources. This research serves those who are willing to take the risk of using handheld devices to enhance curriculum and instruction in public schools.

How can educators ignore the possibility of integrating these devices into instruction when 300,000 first generation iPads were bought before midnight on their first day of sales, and an additional 500,000 first generation iPads were sold by the end of that week (Waters, 2010)? The demand was so great it forced the iPads to be delayed for sale in Europe. Further, approximately 300 applications, or *apps*, for these devices are being added every day (Banister, 2010). An application "is computer software designed to help the user to perform singular or multiple related tasks" (Franklin, 2011, p. 51). The potential for learning with these devices along with the increased interactivity through the latest apps make the integration of these devices into educational systems an absolute necessity.

Despite the astounding popularity and widespread use of the new technologies, full integration of them as an educational tool eludes the NYS public school system. Data collected from a survey by Morgan (2010-2011) indicated that 70% of schools in the US did not allow cell phone use during the school day. Even with such comprehensive bans on cell phone use, 65% of cell phone owning students at schools that ban those same phones still bring them every day, and 58% still use them (Hill, 2011).

Certain public schools have a zero tolerance policy against cell phone use. The reason for a zero tolerance policy is the inherent fear that schools will not be in compliance with certain state or federal mandates. New state initiatives in the area of teacher evaluations and school accountability make a zero tolerance policy against cell phone use an unenforceable rule. A ban would be a moot point once cell phones are adopted as a teaching tool.

There are some schools today that have already incorporated the new technology and that are in compliance with the new state mandates. The Federal Child Internet Protection Act (CIPA) mandates all schools accepting e-rate funding to provide filtering of content harmful to

minors, and NYS's Dignity for All Students Act addresses bullying issues. Hill (2011) expressed hope that districts will establish responsible use policies and that schools will transition from banning the use of handhelds to programs teaching *digital citizenship*.

This is a historic time for education. Educators are being forced to move away from the obsolete teaching methods established during the Industrial Revolution and to move towards the new teaching methods of PBL and constructivism. This climate of change and the demands for accountability are reflected in the new teacher evaluation system, where student growth and achievement are attached to teachers' and principals' scores according to the APPR (RSA: 21st century enlightenment, 2010).

If current practices in the classroom do not change and the new methods of learning are not incorporated into daily lessons, then the public schools may be considered *last resorts* by society at large. Collins and Halverson (2010) observe that current technologies and online high schools offer accredited programs allowing students to learn on their own terms and on their own time.

Change can bring with it fear and anxiety, but it can also generate great excitement and produce significant benefits for educators who are willing to take on the challenges and risks associated with the new technologies.

Sir Robinson, an English author, speaker, and international advisor on education points out the current educational system is antiquated because of the new technology:

> Children are constantly being barraged with information. This is happening through the use of television ads, video billboards, video games and smartphone technology. Then, they are asked to come into classrooms and sit in rows, be assessed in groups according

to their age and sometimes intellect and basically told to sit, be quiet and listen. (RSA: 21st century enlightenment, 2010)

This study examined how individuals are currently taking the steps for change and how they navigated through the risks. This study took into account the evolution of prior standards to the CCSS recently adopted by NYS. Further, it explored the integration methods of individuals in the field and compared them with the change methods described by theorists Kotter, Cohen and Bridges.

The results of this study have significance for school leaders at the district and building levels, as well as for educational committees that seek to implement handheld technologies into classroom instruction. The study provides data that reinforces the benefits of a step by step change model in the technology integration process. By utilizing a change model as a template, the benefits include the ability to collect input from all stakeholders, the development of a pilot program, assessment of the infrastructure, and the creation of a rollout plan. The change model provides further information to assist the leaders in long range planning for sustainability as the technological devices evolve.

Delimitations

Only four NYS public schools were selected for this study. The schools were chosen because they had already integrated handheld technologies into two full grade levels. Three school district leaders from each of the public schools were selected to participate in the study. They were chosen to be interviewed because of their position within the educational system and their positional power to incorporate instructional changes.

Limitations

The research design required the inclusion of union leadership. In two of the four districts, this presented a limitation. Union Leader A was in this position for one month at the time of the study, and Union Leader D refused to participate.

There were two additional limitations to the study. The study called for full integration into two or more grade levels. Finding districts that met the criteria of the study proved to be difficult. First, in School District D, the pilot program was in one class with one teacher. At the time of the study, the school district leaders planned on integrating iPads into 20% of the student population. Second, School District B began their integration with smartphones. At the time of the study, the district switched from smartphones to netbooks. Netbooks are a form of laptop computer. They are small and portable, similar to a tablet.

Chapter 2: Literature Review

The days of the computer lab as a luxury are over. Today, the trend is handheld devices. The new standards and expectations held for integration make their implementation into the classroom an absolute necessity. Their overwhelming popularity among students make integration of handhelds a must, not a want, for public school leaders to ensure students are college and career ready. This chapter includes sections on (a) technology standards, (b) the integration process, (c) barriers to integration, (d) benefits to integration, (e) change models, and (f) leadership and the integration process.

Technology Standards

Handheld technology integration is beginning to occur in schools throughout the nation. Changes in federal and state legislation and regulations are supporting this transition. No Child Left Behind (NCLB) legislation, in Title II Part D: Enhancing Education Through Technology (EETT) Sec. 2402, specifically states:

- To promote initiatives that provide school teachers, principals, and administrators with the capacity to integrate technology effectively into curricula and instruction that are aligned with challenging State academic content and student academic achievement standards, through such means as high-quality professional development programs.
- PRIMARY GOAL- The primary goal of this part is to improve student academic achievement through the use of technology in elementary schools and secondary schools. (Enhancing Education Through Technology [EETT] Act of 2001, 2008)

Federal funding is attached to these national goals. In recent years, this funding supplied districts with funds for the acquisition of current technologies.

The International Society for Technology in Education (ISTE) is the respected source for standards in technology. ISTE was formed in 1998 and "is the premier membership association for educators and education leaders engaged in improving learning and teaching by advancing the effective use of technology in PK–12 and teacher education" (International Society for Technology in Education [ISTE], 2012, para. 1). ISTE developed six specific technology standards for each of the educational groups: students, teachers, and administrators. ISTE also established the National Educational Technology Standards and Performance Indicators for Administrators (NETS-A). The NETS-A standard which applied to this study is Standard I: "Leadership and Vision – Educational leaders inspire a shared vision for comprehensive integration of technology and foster an environment and culture conducive to the realization of that vision" (ISTE, 2002, para. 1).

The ISTE standards for teachers advocate for technology integration into their curriculum and instruction. Teachers need to possess a working knowledge of the technology and integrate the technology into their daily record keeping. Teachers need to "demonstrate a sound understanding of technology operations and concepts" (ISTE, 2000, para. 1).

The Race to the Top (RTTT) federal initiative of 2009 was a federal competition for states to receive a share of $4.35 billion in funding. The initiative "offers bold incentives to states willing to spur systemic reform to improve teaching and learning in America's schools" (The White House, n.d., para. 1). In order for states to compete for the funding, one of the requirements of the application was to adopt "standards and assessments that prepare students to succeed in college and the workplace and to compete in the global economy" (United States Department of Education [US DOE], 2012, Program description). NYS complies with the RTTT federal initiatives by aligning itself with the national set of CCSS. Alignment has brought about

an epic change in teacher and principal evaluations. It is imperative that teachers and administrators explore new avenues to increase student engagement. Technology offers great possibilities in this environment.

The CCSS emphasize diverse instruction, as opposed to direct instruction, and draw educators toward collaboration and constructivist pedagogy. Handheld technologies incorporated into instruction support these standards and accountability measures. In NYS's Teaching CCSS, Standard I: Knowledge of Students and Student Learning, Element I.6, Performance Indicator (a) states: "Teachers use technological tools and a variety of communication strategies to engage each student" (NYSED OHE OTI, 2011, p. 2). Element II.6, performance indicator (b) states: "Teachers incorporate a knowledge and understanding of technology in their lessons to enhance student learning" (NYSED OHE OTI, 2011, p. 5).

Under these performance indicators, teachers and administrators are held accountable for implementing standards. NYS has adopted evaluation rubrics to guide this accountability process. One of the models selected was developed by Danielson (2011), who is an expert in the field of teacher evaluations and ratings systems. Her recently revised *Framework for teaching* contains specific illustrations of how teachers can obtain a highly effective rating (Danielson, 2011). Danielson's work is characterized by a shift from a direct instruction model to a student-centered model.

Reeves (2011), an expert in the field of evaluation frameworks for administrators, in his evaluation document, *Reeves' leadership performance matrix*, a specific area of the matrix is dedicated to technology.

> Leaders in education are technically savvy. They process changes and capture opportunities available through social networking tools and access and process

> information through a variety of online resources. They incorporate data-driven decision making with effective technology integration to analyze school results. Furthermore, leaders develop strategies for coaching staff as they integrate technology into teaching, learning, and assessment processes. (Reeves, 2011, p. 27)

The current standards, accountability, and evaluations are evidence of the change that has occurred in technology since the introduction of NCLB to the RTTT legislation. Even with the new standards and accountability measures, technology integration is still absent in the majority of public schools.

Technology integration is often viewed dichotomously; it either exists or it does not. However, recent studies indicate it is not just whether the devices are present or not, it is whether the integration into the pedagogy has made a difference in students' comportment, attendance, and achievement.

The Integration Process

Dawson and Rakes (2003) considered the influence of principals' training in regards to the integration of technology into schools. These authors regard the type of technology acquired in integration as a secondary issue. The primary issue was the need for facilitators to implement the integration, and they viewed the principal as one of the main facilitators (Dawson & Rakes, 2003).

The assessment of needs for technology integration should not only begin with the material needs of the building, but should also entail the professional development needs of the staff, beginning with the principal. A principal's skills need to be assessed for the type of technology integrated and his/her deficiencies concerning the technology need to be addressed prior to the incorporation of any technological innovation (Dawson & Rakes, 2003).

The literature reviewed consistently supports the connection that professional development concerning technology integration cannot be just a one or two day opportunity for staff, but must be embedded over time (Dawson & Rakes, 2003).

Dawson and Rakes (2003) believe that in preparing facilitators for change, it is imperative to provide the facilitators with follow up assistance and coaching. Teachers and facilitators must be afforded the necessary equipment and supplies, must be helped in the problem solving associated with the innovation's implementation, and must be emotionally supported so commitment is maintained (Dawson & Rakes, 2003).

They define the importance of the principal's role in the integration process. Principal leadership and embedded coaches must be incorporated into any successful integration method (Dawson & Rakes, 2003).

> Administrators must understand both the capabilities and limitations of technology. Only then can they plan for, budget for, purchase carefully, install properly, maintain dutifully, schedule adequately, distribute appropriately, and replace systematically the electronic technology best suited for their needs. A principal who does not understand how to use technology will make poor decisions, spend a lot of money on unnecessary things, or not provide technology supplies at all. (Dawson & Rakes, 2003, p. 33)

Hokanson and Hooper (2004) examined integration and determined technology integration best occurs in five phases: familiarization, utilization, integration, reorientation, and evolution. The five phases reflect the path of progression from the introduction of the device to students (familiarization) to the transformation of instruction from traditional techniques to embedded instructional techniques utilizing a handheld device (evolution).

Students familiarize themselves with the technology offered, and then utilize the device to enhance something they would ordinarily do, such as note taking with a pencil and paper. For instance, rather than take out a notebook, students take out an iPad, iPod, or smartphone. The teacher then presents specific activities requiring the utilization of a technological device. According to Hokanson and Hooper (2004), if these phases are followed, then redirections of instructional techniques occur. This redirections allow students to create activities of learning on their own, increasing learning comprehension and student engagement (Hokanson & Hooper, 2004).

Tooms et al. (2004) focused on school leadership in the integration process. They suggested that the principal was the main catalyst for technology integration. Their work closely followed the thoughts of Dawson and Rakes (2003), in that in order for integration to occur, the principal needed to know how he/she personally fit into the new technology continuum being established. The principals needed to model the vision they had for the technology integration. Technology integration according to Hokanson and Hooper (2004) is not linear, but multidimensional. However, this begins with the principal of the school and how he/she understands the technology fits into his/her leadership role. The principal must decide whether the integration replaces an already established skill set or enhances a current skill set. Once the principals in the Tooms et al. (2004) study determined how the technology fit into their role as an administrator, the integration then ran parallel with their personal points of view. This strengthened their ability to spread the integration and inject their ideas into their schools.

The principal's involvement is imperative to integration success. Once principals see how their personal views of technology align with the technology continuum and implementation, then they can determine a vision for integration (Tooms et al., 2004).

Tooms et al. (2004) describe integration as a *buffet*. It is not a single dinner item, but rather an array of opportunities like the options at an all you can eat buffet. However, the buffet choices cannot be overwhelming. If teachers are overwhelmed, they are susceptible to falling back into their comfort zones. The object is to provide a few choices to encourage risk taking. Once an item is chosen, teachers learn how to use it for their curriculum needs. It is then the principal's responsibility to build an accountability system into the integration, so full implementation occurs (Tooms et al., 2004).

Staples, Pugach, and Himes (2005) conducted a study in three urban schools with high percentages of minorities and high percentages of socio-economically disadvantaged students. Their qualitative study examined technology integration in collaboration with a local university. The university gave each school $32,000 to hire a part-time technology specialist, and also provided each school with a technology coordinator to assist the three hired employees. The three schools could choose who they wanted to hire for the technology specialist position to set the parameters for integration. Each school used a different method for integrating the technology. One school hired a technology specialist, and the other two schools chose to hire teachers from their own staff as the technology specialists and gave them extra pay for the new position. The technology integrated was a computer lab, and the study ran for one year. Three scaffolds of integration were constructed as a result of the study:

- Alignment with the school's curriculum and mission: The principal needs to be sure the technology integration is reflected in the curriculum goals of the school. The example shown in the first school was the principal embedded integration into a project based learning curriculum;

- Teacher Leadership: It is important for teachers to take lead roles and model the expectations for the integration. The teachers need to become peer mentors and coaches for the staff. The teachers need to be resources for technology integration and curriculum alignment, not just custodians of the equipment. The principal cannot be the only expert; and
- Public and Private Roles for Technology: The integration of technology has to be celebrated publicly. (Staples, Pugach, & Himes, 2005, pp. 301-305)

Hew and Brush (2007) suggest other ways to integrate technology into the classroom. They suggest educators utilize handhelds in three ways:

- As a replacement - students can send notes to each other via a text or an email. (could replace PowerPoint presentations)
- As an amplifier - Students can take a quiz online (ex. polleverywhere.com)
- As a transformer - Students would be provided opportunities to reorganize their cognitive processes and problem solving activities. (Hew & Brush, 2007, p. 227)

In order to take full advantage of the new technology and supply educators with more time, Hew and Brush (2007) want leaders step away from the inflexibility of a 45 minute time period and move to more extended periods of time through block scheduling.

Hew and Brush (2007) identified maintenance costs, financing, and scarcity of resources as problems. Students could be used to assist in the upkeep of the technological devices. School leaders can lessen expenditures by being frugal when purchasing equipment and upgrades. Another way of being cost effective and using what resources are available is employing thin client technology, where several students share the same server, rather than every desk having its own computer (Hew & Brush, 2007).

Further, technology integration must be accompanied by ways to evaluate the current methods of student assessment in a school system. Student assessments need to align with the technology integration to meet the current state standards. For example, if the technology supports a PBL environment, then it also has to contain these three instructional steps described by Hew and Brush (2007): planning – teacher assisted brain storming, fieldwork, and celebration of learning. Utilizing this methodology, teachers allow students to guide the direction of the project, meet state standards, and gain significantly in their high stakes assessments such as the NYS Regents exams. An educator's pedagogical beliefs are the final frontier for technology integration. They concluded: "A teacher's belief system is much stronger than their actual knowledge of technology" (Hew & Brush, 2007, p. 238).

Villano (2007) discussed the involvement of the K12 handheld organization (a company in Long Beach, California (CA) that specializes in building multimedia applications specifically for handhelds) with schools in CA. K12 created a series of mini-movies to aid students in learning algebra. They also incorporated e-books and podcasts to assist students in other subjects. Villano (2007) concluded: "Students utilizing the techniques of the K12 organization and given input by an integration specialist, when working privately were more willing to take risks" (p. 22).

Another example of the integration process is one created by the Bill and Melinda Gates Foundation through the K20 Center for Education and Community Renewal (Williams, Atkinson, & Cate, 2008). The K20 organization worked with 97 schools, and their charge was to phase in technology integration through embedded professional development opportunities. The first phase of the integration began with 75 administrators. Each administrator was given a laptop and was trained by K20 personnel. The trainers utilized the IDEALS framework and the

ten practices of high-achieving schools outlined by O'Hair, McLaughlin and Reitzug (2000). The IDEALS framework stands for inquiry, discourse, equity, authentic, leadership, and service (Williams et al., 2008). The ten sequential practices are: shared vision, authenticity, shared leadership, personalized environments, teacher collaboration, inquiry and discourse, supportive leaders, community connections, equity concerns, and external expertise (O'Hair et al., 2000).

The first phase of the integration lasted one year. At the end of the year, "the leaders reported that the networking, support, and resources were more valuable than the laptop they had received" (Williams et al., 2008, p. 296). After the first phase, school leaders were asked to compete for a grant designed to provide the school with $40,000 - $50,000 in technological equipment and $4,000 for staff release time. In the grant writing process, schools were told to inform the grant holders how they would continue their practices under the K20 reform model. "The K20 reform model focused on sustaining leadership development by assisting administrators in building the capacity for their school community to implement the systemic change framework" (Williams et al., 2008, p. 296).

During the grant writing process, leaders were asked to ensure all the stakeholders in the school community, such as, teachers, students, parents, and administrators, be involved in the decision making process in terms of the technology integration. Also, the grant application had to include two additional research practices for integration based on a needs assessment made by a survey of teachers. The action plan devised from the above stipulations in the grant writing process was to provide evidence of a vision, shared goals, the development of a guide team, and getting district support (Williams et al., 2008). When the grant was approved, integration took place in several steps. A working network of leaders was developed, and there were discussions

with all members of the school community to devise an action plan. The premise of the initiative was the assumption that it takes three to five years to get integration started.

The K20 staff and the schools worked hand in hand in creating professional learning communities for the integrating and phasing in of the technology from the top down. Once teachers were comfortable using the integrated technology, then it was allowed to enter the classroom. Eventually everyone involved became familiar with the technology.

The K20 systematic reform was based on building leadership capacity, reflection, support, shared practices, and networking. Another key to success was that teachers knew they would be learning with and from students. Professional development "modeled the use of technology for authentic teaching and learning, rather than focusing solely on the technology" (Williams, et al., 2008, p. 297).

The Williams et al. (2008) study described schools that partnered with the K20 Center for Education and Community Renewal displayed "a 74% greater increase in the Academic Performance Index than the Oklahoma state's average increase" (p. 300). The Academic Performance Index is the Oklahoma's state measure for Adequate Yearly Progress (AYP) required by the NCLB. The Academic Performance Index utilizes school attendance data, student achievement data, graduation rate and drop out rate to provide a school with an API rating. "Before becoming involved in the K20 Center's systemic reform program, many of the schools were characterized by traditional school structures and top-down leadership that harbored isolation and stagnant teaching practices negatively impacting learning and school change" (Williams, et al., 2008, p. 298). Overall success was based on job-embedded professional development, the phase-in process, shared leadership, shared learning, sharing of

the best practices, and the opportunity to be a part of a professional learning community (Williams et al., 2008).

Wu and Zhang's (2010) study compared two groups, a group of fourth and fifth graders who were given the technology and a group of fourth and fifth graders who did not have the technology. Wu and Zhang found the integration of handhelds purely dichotomous. The mere possession of handhelds in a classroom had a positive effect on student achievement. They believed success was due to the product not the process (Wu & Zhang, 2010).

The purpose of Wu and Zhang's (2010) study was to examine whether or not handheld computers could be credited with students' increased achievement in spelling and increased testing skills for mathematics. They used 47 fourth graders and split them into two groups. Twenty-two students utilized a handheld device, and 25 did not. Results showed that students utilizing the devices were more successful in a teacher-designed test measuring students' English vocabulary and spelling (Wu & Zhang, 2010). They also took 97 fifth grade math students and split them into two groups. Thirty-nine of the students had handhelds, and 58 of them did not. The students were tested in math skills, specifically in dividing fractions. Again, the 39 students with the handheld devices performed better (Wu & Zhang, 2010).

Wu and Zhang's (2010) study took place over one school year. At the end of the year, the students were tested by a pencil and paper method. The study discovered that the students who were given the handheld devices used them: to explore knowledge through continual communications, as an individual workspace, to interact with peers more effectively, and for one on one learning activities. They also discovered that teachers who had the device in their classrooms used them: to shift from the drill and practice method to more student directed

learning and for formative assessments. The end result revealed over 93% of teachers surveyed believed handheld devices had a positive impact on student learning (Wu & Zhang, 2010).

The study that impacted the researcher the most was that of Hall (2010), who presented four constructs: level of use (LoU), stages of concern (SoC), innovation configuration (IC), and change facilitator style (CFS). Hall stated, "perhaps the most significant school-level factor affecting teacher implementation success is the leadership role the principal plays" (Hall, 2010, p. 245). The main thrust of his study was that integration is not a dichotomous act. Integrating technology does not mean that one day you don't have it and the next day you do. The integration of technology is a process that needs to be thoroughly thought out from beginning to end. Hall (2010) claims once technology is purchased, individuals do not automatically become experts in its use. Specifically, he stated, "there is a gradual process of trial and error as each implementer learns how to use the new tool, process, or function" (Hall, 2010, p. 233).

Hall (2010) employed the metaphor of an "implementation bridge" (p. 234). This bridge is constructed over the gap between current practices in the classroom and new practices. Traversing the bridge runs from policy and curriculum development to student outcomes in relation to student achievement and comportment. According to Hall, how the bridge is constructed and how far one gets across the bridge is determined by the actions of an instructional leader. First find the building's LoU. Once this is established, the leader surveys the staff's SoC. The SoC provide the leader a construct to understand the personal side of change from beginning to end. After the SoC are processed, the next step is IC, which is a map to build steps across the implementation bridge. Once the IC map is fully developed, it is used as a tool for assessing the degree of implementation. The map is periodically checked throughout the integration. Eventually, it turns into a diagnostic tool for future planning. The plan needs to

incorporate and support intervention techniques necessary to complete the implementation bridge. Finally, the CFS is approached. This moves the teacher away from lead instructor to facilitator. The perspective here is on process not product. The success of integration is determined by how far one gets across the implementation bridge. Crossing over the bridge would be a completion of the principal's vision for implementation (Hall, 2010).

Addressing the question of cell phones in classrooms, Franklin (2011) suggests integration will occur by initiating the "Three Es:" enable our learners, engage learners, and empower learners (Franklin, 2011, p. 264). Another important *E* she considers is teachers' egos. In order for a successful integration, teachers must leave their egos at the classroom door. She elaborated on this *E* by setting forth the following five points:

- Individual experiences – the curriculum or activities need to be constructed for all learners, for the accelerated and for those students who need extra time, for those who work individually and for those who collaborate;
- Free to make mistakes – mistakes are inevitable and parameters need to be in place to prevent students from being judged or harassed when mistakes do occur;
- Continuous access – students need to always be able to access the information disseminated in the classroom. The point being to insure students can re-enter the learning environment outside the classroom;
- Communicate and collaborate through texting, twitter and facebook; and
- Create and share documents – video, podcasts, record lectures or experiments for review later. (Franklin, 2011, p. 265)

Franklin (2011) offers us a progressive way to think about methods needed for successful technology integration in education today.

Peck, Mullen, Lashley, and Eldridge (2011) claim that certain elements need to be in place prior to any integration. They suggest a long-term plan must be in place for funding to sustain support staff and/or consultants. Needs assessments have to be established, and preparation must be made for the needs of staff and faculty from the basic operation of the devices integrated to the integration of the devices into the curriculum. A formal long-term support group needs to be established along with an informal support network. The informal network must be a small trouble shooting team trusted by the schools own Internal Technology Department. Peck et al. (2011) state:

> Administrators would do well to help strengthen collaborative relationships by creating school based technology teams, facilitating electronic distributions of work in the areas of software updates, maintaining interactive technology forums on school websites and publicly recognizing tech savvy staff members as important school leaders. (p. 43)

They tell us that showcasing tech-savvy staff members and their instructional techniques is an important aspect for a successful integration.

According to Peck et al. (2011), personal media device Internet filtering guidelines need to be adopted by the educational organization. These guidelines cannot be so general as to allow students the access to information deemed as distractions, such as facebook and twitter. However, the guidelines cannot be so strict that they obstruct an opportunity for students to learn from sites such as YouTube or Google images (Peck et al., 2011).

Barriers to Integration

Staudt (2001) labels certain teachers as *digital immigrants*. These digital immigrants teach through old technologies and cannot unlearn their old ways. They are unwilling to let go. They try to teach the *digital natives,* today's students, how to utilize old technologies. In

essence, they move the digital natives backwards and ill prepare them for the new digital generation. These digital immigrants serve as impediments to technological integration. Hokanson and Hooper (2004) examined the barriers involved in integration and described them in a first order and a second order context. The first order barriers involve hardware, access, and technical support. The second order involves pedagogy and personal preferences.

Toombs et al (2004) studied the integration of technology within an administrative hierarchy and determined time was a barrier. According to their study, administrators deemed it was a waste of time to learn a technology designed to replace something already effective and useful. The example given was the use of a daily planner. Administrators, while at a meeting, were asked to take down the date and time of the next meeting. Several took out their pens and a daily planner. A comment was made about how the district had spent monies toward the latest technologies and the question was asked: Why are the new devices purchased not being used? The main reason given was time. They saw the new devices as no quicker, no easier, and no better overall then a daily planner (Tooms et al., 2004).

A study by Staples et al. (2005) found evidence that barriers to integration included teacher preparedness, lack of systemic planning, and lack of support for Internet or intranet networks. Mechanical issues with computers were factors blocking integration as well. In their study, the students in one school could not utilize computers for three months. The devices could not be utilized because of a general lack of support for their use, a lack of Internet connectivity, and software issues. Staples et al. (2005) recognize time as a barrier also. They wrote:

> The reality is that although technology always needs to serve the curriculum first, it also requires administrators and teachers to invest real time and effort, real fiscal and human

resources in acquiring and learning to use technology itself and keeping up with technology precisely so that it can serve the curriculum. (Staples et al., 2005, p. 306)

A true disconnect was found from vision to integration. One principal wanted a type of shared decision-making process for integration. The other two handed the leadership role off to an individual they designated as the technology specialist. In all three schools, the lack of leadership and vision affected sustainability of the technology integration (Staples et al., 2005).

The premise of the Hew & Brush (2007) study indicated that school leaders not only acquire the technology, but that they also take an active role in the integration process. This reinforced the earlier findings of Tooms et al. (2004) and Staples et al. (2005). Staples et al. (2005) found that the principal needs to actively participate in the acquisition of hardware and software. The principal, while acquiring the hardware and software, has to be aware of the possibility of yet another barrier: absence of planning time for utilization of the technology.

Hew and Brush (2007) described instances where teachers viewed technology as a way to keep students quiet and busy, not as a way to transform their skills into cognitive thinking or problem solving. One of the main barriers was resistance due to the attitudes and beliefs of educators who could not see technology fitting into their respective subject areas. Hew and Brush also discovered there were educators who did not have the basic knowledge or the confidence in the proposed technology to effectively integrate it into their lessons and curriculum. They found a number of teachers did not even have the proper skill sets to incorporate any technology, let alone handheld technology (Hew &Brush, 2007).

Combining the scarce resource of time, with an educator who does not have the skill set to integrate technology, a third natural barrier to integration arises: confidence. An educator must have a certain level of confidence to effectively integrate technology into their pedagogy.

Some educators expressed that their subject matter was not conducive to technology integration, thus adding difficulty to integration (Hew & Brush, 2007).

Leaders who plan to integrate technology must take into consideration the need to change such attitudes and beliefs as part of an overall strategy for successful integration. To change such attitudes and beliefs, Hew and Brush (2007) suggest adding pertinent professional development opportunities along with these innovations:

- Utilizing study groups or mentoring opportunities, rather than the traditional workshops or conferences;
- Making sure to focus on content;
- Providing educators with the opportunity to work with the technology in a hands on environment;
- Ensuring the technology is related to the teachers needs;
- The technology should support the educators' pedagogy; and
- The professional development should provide a natural bridge to a classroom activity that will expand the current content of teachers' curriculum.

Hew and Brush (2007) found that in some cases, time was a barrier. Time to both prepare lessons and incorporate technology into their lesson plans proved to be a barrier for teachers. Also time to find the correct technology to fit their curriculum needs was a barrier.

According to Hew and Brush, assessments can be another roadblock. If a test is a high stakes one impacting teacher evaluations or ratings, educators might forgo planning and preparation of a technology integrated lesson. The content for the NYS tenth grade global studies curriculum covers a two-year time span. The teacher, because of the immense amount of content and the scarce resource of classroom time, fearing the risk of learning or bringing in a

new technology, could stay with traditional instruction. Thus, the high stakes testing in NYS can be considered a barrier to technological integration (Hew & Brush, 2007).

Cowan (2008) concluded, "In focusing heavily on testing and schools making Annual Yearly Progress (AYP), current reform efforts diminish the curriculum scope and teachers opportunities to conduct innovative practices" (Cowen, 2008, p. 56). Further, a limiting factor for the integration of technology is the pacing guides of what has to be covered in the curriculum for schools deemed as Schools In Need of Improvement (SINI) (Cowen, 2008).

According to Cowen, standardized testing does not assess critical thinking, problem solving, communication, teamwork, self-direction, or innovative critical thinking. These skills are current themes for assessing college and career readiness. These skills can all be enhanced by a PBL environment where handheld technologies have been integrated (Cowen, 2008).

Schachter (2010) also views assessments as a barrier to integration. Schachter claimed one leader stated, "Our state achievement test measures lower-level skills, not thought processes. We're still trying to find ways to assess what we know we morally should. We know students need to be competitive in a global environment" (2010, p. 43).

The customization of learning through the use of integrated technology can, in and of itself, be a barrier. Customized learning can leave out the basic foundations of education and not expose learners to different cultures, narrowing horizons rather than broadening them (Collins & Halverson, 2010).

The challenge of integrating technology is not limited to the US. Tosun and Baris (2011) conducted a study of integration in Turkey, and some common barriers were found. In their study, the authors discuss Information and Communication Technology (ICT). One barrier discovered in Turkey concerning ICT integration was fear. The teachers were fearful ICT would

replace teaching staff. Another barrier discovered was that teachers were required to re-learn instructional techniques using technology. In essence, teachers had to relearn their craft (Tosun & Baris, 2011).

Technology integration often occurs concomitantly with PBL or student-centered learning. PBL is an instructional method incorporating *real life* projects designed to enhance the skills students need to be college and career ready. This instruction is based on a student-centered approach, which creates an environment where the teacher is not the lead instructor, but a facilitator of learning (Tosun & Baris, 2011).

Thomas and Orthober (2011) conducted a study with an English teacher and a Latin teacher who decided to utilize texting in their curriculum. Barriers to the integration became evident quickly, especially in the case of equity. A number of students refused to give up their allotted monthly text messages for class time. There were some students who could not access lessons involving texting or who did not even possess a phone. Technological problems, cyber bullying issues, and cheating were other problems that occurred. The Latin teacher stated "ex abusu non arguitur ad usum, the abuse of a thing is no argument against its use" (Thomas & Orthober, 2011, p. 69). They concluded:

> All of these behaviors, cheating, cyber bullying and sexting, have this in common: they are new forms of old behaviors. Cyber bullying is still bullying. It is the abuse of power and some have called sexting the new form of flirting – an explicit love letter, albeit foolish at best and criminal at worst. Cheating is an act that predates mobile phones as well. (Thomas & Orthober, 2011, p. 69)

They found the greatest barrier to the success of their new instructional technique was the lack of access to the technology by students. Employing their method with students who did not

have phones or with students who refused to utilize their allotted minutes for the teachers proved to be impossible. When students utilized their own devices in class, an issue developed over the cost of a data plan. The students who were unwilling to give up their allotted texts for their classroom instruction confirmed this (Thomas & Orthober, 2011).

The public school system is designed to take the educational process out of the hands of parents and to provide an equal opportunity for all children to be educated. Today, the disparity between rich districts and poor districts is wide. If technology is not integrated properly, it would even increase this disparity. Only schools that could afford the new technology would have it. This places school selection back into the hands of parents, causing further inequity. Since the economically disadvantaged would lack access to technology, certain public schools would be turned into institutions of last resort. If the equity issues were not resolved, the opportunity to learn from using handheld technology would not be the same for all students. Therefore, equity is a large barrier to integration (Collins & Halverson, 2010).

The number of applications integrated into handheld technologies grows daily. A downside to this growth is there are currently no developmental standards for applications. Therefore, another barrier appears: choice. From the thousands of existing applications, a decision has to be made about which ones will meet the needs of the students (Skiba, 2011).

This problem of choice was confirmed in a study by Murray and Olcese (2011), who found that as of June 2010, there were 30,000 applications under the heading of education. Further, they stated, "Our study suggests, there is a paucity of applications that truly extend capability. Much of what these applications allow can be done with other devices and lead us to conclude the current trajectory will not revolutionize teaching or learning" (Murray & Olcese, 2011, p. 48).

Internal support structures that negatively affect technology implementation are another barrier. Two examples are a poor infrastructure that is not maintained or updated, which would negatively affect teachers' and students' abilities to log onto educationally pertinent sites, and Internet filters that would not block students from engaging in off task behaviors. If these two conditions exist in a district attempting to integrate technology into its curriculum, an environment would be created that places the teacher in the conflicting role of both an educator and a policeman for technology integration (Peck et al., 2011).

Lack of sufficient support staff for the technology impedes successful integration. ISTE has set standards in the area of staff to technology ratios. A school district is considered *high efficiency* if the staff support ratio is one staff member to every 75 pieces of technology. A ratio of 75:1 to 150:1 is considered satisfactory, and a ratio of 250:1 is considered *low efficiency* (Peck et al., 2011).

Students' handling and operation of handheld devices can also present a barrier to integration. A North Carolina (NC) school integrated seven hundred iPods into their middle school in a seven-month period (Crompton, Goodhand, & Wells, 2011). Lost, stolen and broken iPods presented the first of a series of barriers. Additional barriers for the integration process included off task behavior, inappropriate Internet searches and cyber bullying (Crompton et al., 2011; Morgan, 2010-2011). Even charging the devices for the students presented a challenge for the North Carolina middle school (Crompton et al., 2011).

Finally, the current ban of handheld technology in public schools today is a barrier. "Over 70% of schools currently ban handheld technologies in their hallways" (Hill, 2011, p. 22).

Benefits of Integration

A number of benefits exist for the integration of handheld technologies. Expanding the learning environment is one of them. In a study by Staudt (2001), students in a health class logged their food intake and exercise time on their handheld devices. This allowed the students to see the amount of food or calories they took in (intake) and the amount of time spent exercising each day (expenditure) (Staudt, 2001).

The foremost benefit is student engagement. "The interest in mobile learning in traditional classroom settings is motivated by a search for more effective educational instructional approaches, especially in areas where current methods are viewed as lacking" (Robson, 2003, p. 2). Also, handheld technology integration will provide students with new learning opportunities, the possibility of maximizing teaching and administrative effectiveness, and the potential to build proficiency in 21st century skills. Handhelds make it easier to monitor student performance as well.

During the 2003-2004 school year, Swan, van't Hooft, Karatcoski and Unger (2005) researched the effect of handheld devices in K-8 schools in Ohio. They asked the questions:

- How do students use mobile computing devices?
- Does the use of mobile computing devices affect students' motivation to learn and engagement in learning?
- Does students' use of mobile devices support the learning process? (Swan et al., 2005, p. 101)

The researchers discovered students' engagement increased depending on the assignments. Increased engagement was noted specifically in writing assignments. The researchers noted the students were more willing to write utilizing handheld devices (as opposed to using pens and

paper) because they were not confident in their handwriting and spelling skills. In some instances, assignments called for technology the handhelds were not equipped for, such as the downloading of large amounts of data. In such instances, slow downloading caused frustration (Swan et al., 2005). Technical difficulties occurred, such as programs freezing, problems with recharging, and losing work.

Swan et al. (2005) found that students appeared to be motivated to use the device because of its real life application. They were comfortable with the device, enjoyed having the 24-7 access and availability of the technology, and enjoyed doing their assignments on their own time and own terms. They organized and shared assignments by *beaming,* which allowed the students to send notes to any other handheld device by lining up their infrared lights.

The length of time was a concern for Swan et al. (2005). Due to the short duration of their study, they thought a novelty affect may have occurred and believed the participants may have reported only what the researchers wanted to hear. It was determined more time would have better validated their results. The researchers concluded, "Technology itself won't make the difference; it's what students do with it that does" (Swan et al., 2005, p. 110).

Song (2007) employed a different phrase to describe another use for handhelds. His term was: "passive context awareness" (p. 42). Here, the user decides what object will provide a given context. For example, students taking on the role of a lion in a savannah, the handheld gives the students the ability to: "see, hear, and smell the world of the savannah" (Song, 2007, p. 42). Students can then determine what steps the lion needs to take to survive it's environment (Song, 2007).

Cowen (2008) states, in light of NCLB requirements and curriculum constraints, technology integration can align with basic skills sets. "Thinking about the best uses of

technology offers an opportunity to explore new ideas for lesson planning and to offer potential alternatives to limited definitions of curriculum" (Cowen, 2008, p. 56). Using a PowerPoint presentation or search engine is using technology as a tool. Interactions between teachers and students are the use of technology as a tutor for practice and as a tutee for cooperative learning (Cowen, 2008).

Integration of handhelds will transform the way students learn, not just replace old techniques of learning. For example, replacement occurs when a student downloads a book from eBooks rather than having it provided for them in class. Transformation, however, would "reorganize students' cognitive processes and problem solving activities" (Cheung & Hew, 2009, p. 165). Students could use the device to organize data and test a hypothesis. The tool increases a student's ability to engage in higher-level learning.

Cheung and Hew's (2009) transformation turns students into higher-level thinkers. This benefit of transformation would aid in an effective teacher evaluation as it aligns with Danielson's (2011) rubric, which has been adopted by a number of NYS public schools.

Schachter (2010) contended that the goal of technology integration is to assist students in critical thinking. Schachter interviewed Krueger, the Chief Executive Officer (CEO) of The Consortium of School Networking (CoSN), concerning how the assessment of 21st century skills can be integrated into current federal mandates like NCLB. Krueger stressed the need to measure 21st century skills when implementing technology, especially in the area of standardized testing. His message was to not be afraid of NCLB testing requirements, but to develop additional instruments to measure 21st century skills, global learning, and other important points of learning determined by the school district (Schachter, 2010). This would

foster critical thinking and research rather than following the outdated method of having students just regurgitate data (Loertscher, 2010).

Collins and Halverson (2010) claim the current educational model was formulated and designed during the Industrial Revolution and no longer applies in today's technological age. Further, this model only provides us with a one size fits all system that is uniform. Therefore a benefit of technological integration is that handhelds and computers can pace learning to an individual learner's speed. Computers or handhelds can customize learning by responding to a particular student's interests and difficulties.

Handhelds and computers supersede the teacher as the only source of knowledge (Collins & Halverson, 2010). Students can create online communities and have more information available to them in seconds. Students gain the opportunity to be their own source of knowledge and can create immediate references for disputing prevailing views, increasing their cognitive abilities.

According to Murray and Olcese (2011), handhelds can increase "individual consumption" of data as well as foster collaboration (p. 44). These two elements are directly related to 21st century skills and constructivist theory.

Portability and affordability are another advantage of handhelds (Morgan, 2010-2011). If institutions stop using computer labs, the cost of wire instillation and maintenance will end, and lab space can be opened up and used for other instruction. Once handheld technology integration is completed in a school system, the computer lab becomes obsolete (Tooms et al., 2004). Banister (2010), discussed the iPod and the iPad. "These devices are inexpensive, compared to classroom laptop carts or computer labs, their portability and durability provide students with potential learning tools that traverse the classroom, bus stop and home" (Banister, 2010, p. 122).

Further, when teachers discover they are not required to move away from their classrooms to utilize the technology, they are more apt to use handhelds for instruction (Tooms et al., 2004).

Integration of handhelds can make crises easier to handle for school leaders. A totally wireless technology gives individuals access to their student management systems, which include photos, phone numbers, parental work places, and addresses (Tooms et al., 2004)

Hundreds of applications are being created daily. Banister (2010) stated, "Since this manuscript was written 60,000 apps have been created" (p. 129). This asset of handhelds can customize learning for an individual student or to a teacher's curriculum. The *personalization* of the device can also be utilized for students who have language or speaking difficulties (Song, 2007). Another useful application example is the clock application, which can be used to interact with other students globally, such as e-pals, to share work and ideas.

The iPod's and the iPad's ability to download photos, music, and movies provides students and teachers with the ability to create podcasts, audio books, and video clips. The download feature breaks down traditional classroom instruction and fosters creativity in students. Downloading even general information will allow students to utilize the tool as a managing device (Banister, 2010). Students can keep their calendars and notes on a handheld device. This option creates a new potential for students. It frees them from the burden of backpacks and carrying around reams of paper (Song, 2007).

Today, most NYS public schools have banned the use of cell phones. It is common knowledge that the current shift in the educational evaluation system will increase an administrator's workload by 50%. If the workload is increased, and the technology is more accessible to every social class, the effort necessary to truly ban cell phone use in schools is futile. Statistics show even with the large ban policy, students are still texting in school. Right

now, 85% of students have the ability to send a text message and, in fact, are sending an average of 50 text messages a day (Thomas & Orthober, 2011).

In the same study by Thomas and Orthober (2011) of an English teacher and a Latin teacher who decided to incorporate texting into their curriculum, they discovered texting brought some real benefits. The teachers could interact with the students at all times. They were able to send students reminders about assignments, give real time updates, and even take advantage of their *dead* time, such as time spent waiting for a bus. Texting gave the students an opportunity to reflect and discuss daily topics with one another and the teacher. Students, who were reluctant to participate in class, were able to do so through the texting option. The teachers assessed students through polleverwhere.com, an online product that allows a teacher to quiz students over the Internet. Students answer the questions by texting onto the site, eliminating the need for paper and providing the teacher with instant results for making assessments. The end result: Texting increased class community and student rapport (Thomas & Orthober, 2011).

As handheld devices begin to enter classrooms, the benefits increase. One clear benefit of utilizing student owned handhelds is they already know how to use the device. This negates a large hurdle to integration. Further, the need for technology services is downgraded if there is wireless access. Students become responsible for maintaining their own devices. Certain experts in the field consider the handheld a tool used for daily living (Skiba, 2011).

Skiba (2011) coined the term *hyperconnectivity*. Hyperconnectivity allows users to utilize social networking sites and converse about their course work. The ability to be *hyperconnected* creates a social learning environment centered on the classroom and encourages students to use their devices for sharing notes and questions, rather than just using them for off task behavior (Skiba, 2011).

One aspect of handheld devices that definitely expands the learning environment is the global positioning system (GPS) application. Students have used the GPS application to create stories based on the locations of people, places, and things. This type of handheld activity is described by Song (2007) as "active context awareness" (p. 42).

"Mobile texting usage is up 450% over the last two years… We now have parents purchasing cell phones for their six year olds" (Franklin, 2011, p. 262). Communications and hardware companies Verizon and Ericsson suggest that by 2015 all cell phones will be smart phones and that eighty percent of the world's population will have instant access to the internet (Franklin, 2011). These statistics reveal integration of handhelds has to, at some point, be brought into the classroom, or classrooms themselves will be rendered obsolete.

Change Models

Bridges' (2009) model has three transitional phases:

1. Ending, Losing, Letting Go: Letting go of the old ways and the old identity people had prior to the integration of the proposed change;
2. The Neutral Zone: Going through the in-between time when the old is gone but the new isn't fully operational; and
3. The New Beginning: Coming out of transition and making a new beginning. (p. 4-5)

Kotter and Cohen (2002) described a sequential eight-step change process:

1. Increase urgency,
2. Build a guiding team,
3. Get the right vision,
4. Communicate for buy –in,
5. Empower action,

6. Create short term wins,
7. Don't let up, and
8. Make change stick. (p. 7)

Crompton et al. (2011) conducted a study in NC at the Grey Culbreth Middle School, which provided their sixth, seventh and eighth grade students with iPod touches. The devices were implemented into the curriculum over a seven-month period, resulting in the iPod touches being placed in the hands of 700 students. The iPod touches were implemented by the teachers and administrators with support from the North Carolina Virtual Public Schools (NCVPS), Culbreth parents, and the school's technology budget. Integration followed these steps:

1. Provide small groups of teachers one month to "play" with the devise.
2. Supply all teachers in the school with an iPod touch to utilize.
3. Provide an iPod touch to a small group of sixth, seventh and eighth graders.
4. Establish charging stations and a lab just for iPods, as well as, provide teachers with funds to purchase applications.
5. Send a letter requesting that parents allow their child to bring in an iPod touch from home, if they owned one, and purchased iPods for every student in the school who did not have one. (Crompton et al., 2011)

A contract was signed by the students to guarantee appropriate use and application of the devices. The iPods were engraved with the school name and given an identification number. Cameras were disabled, and a filter controlled only by the teacher was imbedded into each iPod touch. As a result the school increased students on task behavior, exceeded their growth goal, and accomplished Annual Yearly Progress (AYP) under the NCLB guidelines (Crompton et al.,

2011). The integration of the iPods enhanced student learning, but did not replace the desk top computer.

Leadership and the Integration Process

A pertinent study performed by Dawson and Rakes (2003) investigated how training principals in technology affected technology integration. They asked the question: How does the professional development of the principal in the area of technology directly relate to the success of technology integration (p. 32)? They considered the principal's demographics (age, sex, and years of experience) and how each related to the schools score on the School Technology and Readiness Assessment (STaR). They employed an analysis of variance (ANOVA) and listed four findings.

- A significant statistical difference existed between principals 41-55 and those under 41;
- No significant statistical difference for years of administrative experience;
- No statistical significance for the different genders (male or female); and
- No statistical difference when groups interacted two at a time for years of experience, age, and gender.

Their worked showed STaR scores increased as a result of principal training (Dawson & Rakes, 2003).

The data proved that principals who received training on integrating technology into the curriculum led schools with higher levels of integration than principals who received training in the basic use of technology tools or applications (Dawson & Rakes, 2003). Further, principals who received training in how to customize the technology integration to the needs of their schools also displayed a higher level of integration than principals who were only trained in

Internet fundamentals. "The findings indicate that training that teaches the principal the methods required for integrating technology into the curriculum is preferable to training that concentrates only on teaching her or him the basic technology tools" (Dawson & Rakes, 2003, p. 44). Further, they concluded both the superintendent and principal have respective roles in technology integration. "Superintendents should encourage principals to take risks and to share technological innovations that improve learning outcomes with their peers" (Dawson & Rakes, 2003, p. 46).

Anderson and Dexter (2005) conducted a study to answer two questions: (a) "Are leadership decisions or leadership characteristics associated with school wide and classroom based technology integration outcomes?" and (b) "What is the role of a technology leader in regards to the technology infrastructure and other school characteristics?" (p. 50). To answer these questions, the researchers took a purposeful sample of 898 schools. The researchers sent out a survey asking questions to participants formed from the six standards defined by the National Educational Technology Standards for Administrators. These are: (I) leadership and vision; (II) learning and teaching; (III) productivity and professional practice, (IV) support, management, and operations; (V) assessment and evaluation; and (VI) social, legal and ethical issues (ISTE, 2002).

During the study, Anderson and Dexter (2005) analyzed the data and were able to formulate eight different indicators for *technology leadership*:

- Technology Committee – Did the leader utilize a shared leadership format?
- Principal Days – Did the leader commit at least five professional development days for the staff or himself / herself?

- Principal E-mail – How much did the Principal use this for communication? (role modeling)
- Staff Development Policy – Is there a plan for teachers to be peer mentors and professional development?
- School Technology Budget – Does the principal have the direct authority over a technology budget and is there a line item in the districts budget for purchasing technology?
- District Support – Does the district support technology use?
- Grants – is the district making efforts to fund the technology from an outside resource so the entire financial burden is not placed on the district?
- Intellectual Property Policy – Student and Adult use policies? (Anderson & Dexter, 2005, p. 58)

To measure outcomes regarding these eight factors, the researchers used three factors: (1) what extent the teachers utilized the Internet; (2) how often were the teachers integrating the technology into classrooms or teaching activities; and (3) what was the actual technology use by the students? (How often did the students utilize the technology during the school year?) (Anderson & Dexter, 2005, p. 60).

The researchers found two significant variables impacting the three predictors. First was technology leadership and second was the student per computer ratio. Anderson and Dexter (2005) concluded, "Perhaps the most important finding from our analysis is that technology leadership has greater leverage on desired outcomes than does technology infrastructure and expenditures" (p. 73). They further concluded, "The study confirmed that technology leadership played a very central, pivotal role in technology related outcomes and findings revealed

considerable diversity in technology leadership and organizational support" (Anderson & Dexter, 2005, p. 73).

Schachter (2010) reported a large disconnect between chief technology officers (CTOs) and their ability to impact instruction. One of his recommendations was for superintendents to be aware of the disconnection when hiring CTOs. In technology integration, superintendents need to be the first to model the technologies to be integrated and use them appropriately if they want to achieve the goal of teaching 21st century skills, critical thinking, and problem solving.

To increase school wide use of technology, Schachter (2010) suggests boosting applications, tools, and infrastructure to handle the technology prior to its actual integration. Superintendents must also employ professional development as a major tool for successful technological integration. His final suggestion is that the superintendent's institution needs a balance of assessments, such as PBL, which would be enhanced by the technological integration (Schachter, 2010).

Summary

The literature review concentrated on six categories: technology standards, integration methods, barriers to integration, benefits to integration, change models, and leadership and the integration process. In each of these six categories, the actual technology integrated was not the singular factor for a successful transition away from traditional instructional methods. The agreement in the literature was that there was significance to the steps followed during an integration process, the district or building leaders' ability to guide the integration, the attitudes of the educators, the training that supersedes the acquired technology, and, of course, how the technology fits into an educational system as a whole.

Chapter 3: Methods

This research focused on how 11 NYS public school leaders integrated change from traditional instructional methods to instructional methods that utilized handheld devices. This chapter includes the following sections: (a) research design, (b) research questions, (c) population, (d) sampling strategy, (e) data collection strategy, (f) conceptual framework, (g) validity, (h) instrumentation, (i) bias, and (j) data collection and analysis.

Research Design

A qualitative multiple site case study was used to examine the process utilized by 11 public school leaders in four NYS public schools who integrated smartphone and tablet technologies into instruction. Qualitative research was chosen because the integration of handhelds into classrooms is a recent phenomenon and the populations of the districts that have integrated handhelds were so small. The qualitative research design allowed the researcher to obtain the richest description of the issues surrounding integration by those who led the process.

Qualitative research is described by Vogt and Johnson (2011):

> In its "strong form", a research paradigm that not only advocates the use of qualitative data (e.g., interviews, participant observation, open ended questions) but also advocates a worldview supporting relatively strong forms of relativism, theory-ladenness of facts, under determination of theory by evidence, Duhem-Quine thesis, and the problem of induction. (p. 315)

Creswell (2012) also explains qualitative research:

> In qualitative research, you collect data to learn from participants in the study and develop forms, called protocols, for recording data as the study proceeds. These forms pose general questions so that the participants can provide answers to the questions.

> Often questions on these forms will change and emerge during data collection. Examples of these forms include an interview protocol, which consists of four or five questions, or an observational protocol, in which the researcher records notes about the behavior of participants. Moreover, you gather text (word) or image (picture) data. Transcribed audio recordings form a database composed of words. With each form of data, you will gather as much information as possible to collect detailed accounts for a final research paper. (p. 17)

For the purpose of this qualitative research, a multiple site case study of the phenomenon of change was chosen. This multiple case study examined four NYS public schools. Research was based on Creswell's (2009) design method, "Case studies are a strategy of inquiry in which the researcher explores in depth a program, event, activity or process, of one or more individuals" (p. 13). A case study is defined twofold by Yin (2009) as:

> an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. Second, the case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result benefits from prior development of theoretical propositions to guide data collection and analysis. (p. 18)

Yin (2009) stated that "case studies are pertinent when your research addresses a descriptive question – 'What is happening or has happened? – or an explanatory question – 'How or why did something happen'" (p. 4). This case study employed data gained through qualitative research to describe the phenomenon of change faced by four NYS public schools during the

integration process of handheld technology. Specifically, this was a multiple case study. "If you studied two or more organizations in the same manner, you would have an embedded, multiple-case study" (Yin, 2009, p. 7).

The research conducted centered on investigating what change steps occurred in the four schools studied and how those change steps compared to the change theories of Kotter, Cohen, and Bridges. The researcher also sought to discover how the change was initiated by the public school leaders and what barriers they faced during the process.

Research Questions

The research questions used were designed from the frameworks of Kotter, Cohen, and Bridges. The foundation for creating the five research questions was their change and transition steps. The five questions were:

1. What specific skills are associated with a school leader's ability to integrate handheld technologies into the curriculum of a New York State public school?
2. What barriers does a school leader face when implementing handheld technologies such as smartphones and tablets into the instructional programs of a New York State public school?
3. What strategies does a school leader use to plan and implement the change process which will move a district from one that doesn't yet use handheld (i.e.: smartphone, iPod, or tablet) technologies to one that does?
4. What factors caused the school leader to decide to implement the use of handheld technology?

5. How do the change and transition steps of a school leader who has implemented handheld technologies into instructional programs, compare to the change steps of Kotter and Cohen and the transition steps of Bridges?

Population

There were two delimiting variables for participation in this research: NYS public schools outside of New York City (NYC) and NYS public schools with at least two grade levels fully integrated with handheld technology. Delimiting variables are "variables that specify the nature of a population or sample" (Vogt & Johnson, 2011, p. 101).

Four schools were identified that met the specifications for the research, and an invitation letter was sent to each superintendent (see Appendix A). Within the letter, the superintendents were informed of the parameters of the study. This entailed a request to interview the building leader most closely associated with the handheld integration and the teachers' union president. The superintendent was informed participation in the study was completely voluntary and was asked to reply to the researcher with their intent, whether they would participate in the study or not. If the superintendent did not reply to the invitation letter, follow up correspondences were made via email or the telephone.

Superintendents who agreed to participate in the study were then sent the consent form (see Appendix B). The consent form informed the superintendents of the purpose of the study, the procedures, and the risks. All superintendents were contacted first.

The study was determined by the IRB to be of minimal risk. All information pertaining to participants in the study was kept confidential. Confidentiality was insured by keeping both the participants and their districts anonymous. Participants were made aware of the confidentiality clause and informed their interviews would be recorded and transcribed by a

confidential transcriber (see Appendix C). Confidentiality was also assured by providing each participant with a pseudonym: "Administrator A in School District A." Demographic information was kept confidential by only referring to general aspects of each school community, such as student and staff population ranges. Only information from publicly available data on the NYSED website was considered usable in describing each district.

Participants were given the right to opt out at anytime without penalty, and if they chose to opt out, their collected data would be eradicated.

Sampling Strategy

A purposeful sample was used. A purposeful sample is "a sample of subjects selected deliberately by researchers, usually because they think certain characteristics are typical or representative of the population" (Vogt & Johnson, 2011, p. 310). Four NYS public schools that had already integrated handheld technology into two or more grade levels were chosen for this study. This strategy also assisted the researcher in pinpointing which administrative positions would best provide the most relevant change data.

Administrators were chosen because, by definition, leadership in schools is embedded in the administrative roles. Administrators are the driving force behind change and innovation. The ideas may not come from the administrators themselves, but they are the conduits for instructional change.

Union leaders were selected for their roles in assisting their members in following administrative regulations and acting as liaisons when barriers occur. Union leaders can influence the members of their unions to attend professional development opportunities and also, create opportunities for them to be empowered to aid the change process.

In the Decision Making section of Reeves (2011) Leadership Performance Matrix, it states:

> Leaders in education make decisions based on the vision and mission of their district using facts and data. They use a transparent process for making decisions and articulate who makes which decisions. The leader uses the process to empower others and distribute leadership when appropriate. (Reeves, 2011, p. 11)

According to Reeves, administrators will make decisions based on data. They will also empower and distribute leadership when appropriate. Union leaders need to be involved in the entire process of implementing handhelds into the school system. They are the gatekeepers who allow or prevent change from occurring through their influence on their members. For successful technology integration, it is important for union leaders to not only model leadership roles, but also to promote it for their members.

Staples et al. (2005) concluded the following regarding teacher leadership. It is important for teachers to take lead roles and model the expectations for the integration. The teachers need to become peer mentors and coaches for the staff. The teachers need to be resources for technology integration and curriculum alignment, not just custodians of the equipment. The principal cannot be the only expert.

Data Collection Strategy

The selection of participating schools was initiated by contacting via email the foremost technological service associations in the region, the most popular handheld producer, Apple, and one of the largest data plan vendors, Verizon (see Appendices D, E, F, & G).

The Northeastern Regional Information Center (NERIC) "operates in a geographic service area that covers 12 counties, the NERIC partners with seven Boards of Cooperative

Educational Services (BOCES) to provide advanced technology services to more than 140 school districts" (Northeastern Regional Information Center [NERIC], 2008, para. 1).

The other professional association contacted was the New York State Association for Computers and Technology in Education (NYSCATE), which:

> is a non-profit, professional organization representing more than 7,000 technology using educators and administrators in New York State. NYSCATE is an affiliate of the International Society for Technology in Education (ISTE), and cooperates with such partners as the New York State Education Department, state and national educational organizations, private sector corporations, and publishers to further the use of technology in our schools. (New York State Association for Computers and Technologies in Education [NYSCATE], n.d., para. 2)

The selection of the participants occurred in two phases. The first phase of the process involved sending emails of inquiry to NERIC (see Appendix D), NYSCATE (see Appendix E), Verizon (see Appendix G), and Apple (see Appendix F). None of the responses resulted in finding a participating school that met the criteria to be included in the study.

The second phase of the process to identify the purposeful sample relied on the professional network of the researcher, including assistant superintendents of area BOCES, sitting superintendents, and colleagues. This probe resulted in the identification of the four schools selected for this research. Of the four schools, eleven school leaders emerged, six males and five females.

Upon finding the districts, the researcher sent each superintendent an invitation letter (see Appendix A). Superintendent A responded to the letter, and the other superintendents were all contacted through follow up emails or phone calls. Once the initial contact was established, each

superintendent was sent a consent form (see Appendix B) and the interview questions and protocol (see Appendix H).

After receiving each returned consent form, an interview time and date were set in accordance with the superintendent's schedule. Participants had the option of face-to-face interviews, Skype interviews, phone interviews, or if the participant had an iPhone 4 or an iPad 2, they could utilize the Facetime feature. Participants chose the time and place for their interviews. Each interview followed an approved protocol (see Appendix H), and the participants were asked to answer 12 questions.

After the superintendent was interviewed, the researcher asked for permission to contact recommended individuals who best fit the specifications for participation in the study. Once these individuals were identified by the superintendent, the cover letter was sent to them (see Appendix I).

After the initial cover letter was provided to potential participants, the researcher waited seven days for a reply. If a reply was not forthcoming, the researcher made contact with each potential participant again via email or telephone. Participants who agreed to the study were sent the consent form. If they signed the consent form, they were sent the interview protocol and questions. The protocol and interview questions gave the researcher a document, which included the date, time, and place of the interview (see Appendix H).

All of the interviews were recorded and conducted over the phone. At the end of the superintendents' interviews, they were asked to furnish the researcher with the contact information for and the names of the districts' teachers' union president and the administrator they felt had the greatest impact on the integration process.

Prior to being interviewed, participants were asked to verify the receipt of the interview questions and protocol and were asked if any clarification was needed. All participants were informed that their participation was completely voluntary and that their interviews would be recorded. The participants were also notified of the minimal risk involved in the study.

At the end of the procedural statements and clarifications period, the participants were told they had the right to opt out of the study at any time without penalty, and if they opted out, the data collected from their interview would be immediately destroyed. All participants were informed procedures were in place to keep their identity, along with their district's, anonymous. They were also informed that at the end of the study all interview data would be destroyed.

Participants were guaranteed the interview would not exceed 90 minutes; however, none of the interviews exceeded 60 minutes.

The interviews ended with a thank you statement, and participants were made aware of the member checking process. Member checking is defined by Vogt and Johnson (2011) as:

> The practice of researchers submitting their data or findings to their informants (members) in order to make sure they correctly represented what their informants told them. This is perhaps most often done with data such as interview summaries; it is less often done with interpretations built on those data. This procedure is most popular in qualitative research. (p. 228)

Participants were apprised that they would receive a transcript of the interview composed by a confidential transcriber hired by the researcher (see Appendix C). The transcripts were sent to participants through an email attachment. Upon receiving the transcripts, participants were asked to reply to the researcher in seven days and answer two questions:

1. Were your feelings about the subject matter accurately captured?

2. Were your statements accurately captured?

They were also asked if they had any questions concerning the transcript or if any corrections were necessary. Participants were thanked and then informed they would have one week to review the transcript. Participants were also informed that if, at the end of the seventh day no response was received, the transcripts would be verified by the researcher against the audio recording.

Nine out of the 11 participants verified their transcripts. Two of the participants did not reply in the seven day time period, and as a result, the researcher validated the transcripts and notified the participants of this action by email. None of the verified transcripts were altered. No participant opted out of the study.

Conceptual Framework

Research and interview questions were guided by the work of Bridges (see Appendix J) and Kotter and Cohen (see Appendix K) to enable analyses for results. Administrators and union leaders were interviewed based on how they implemented systemic change in comparison to the transition steps of Bridges (2009) and the change steps of Kotter and Cohen (2002). Bridges' (2009) model has three transitional phases:

1. Ending, Losing, Letting Go: Letting go of the old ways and the old identity people had prior to the integration of the proposed change;
2. The Neutral Zone: Going through the in-between time when the old is gone but the new isn't fully operational; and
3. The New Beginning: Coming out of transition and making a new beginning. (pp. 4-5)

Kotter and Cohen (2002) described a sequential eight-step change process:

1. Increase urgency,
2. Build a guiding team,
3. Get the right vision,
4. Communicate for buy –in,
5. Empower action,
6. Create short term wins,
7. Don't let up, and
8. Make change stick. (p. 7)

Validity

Research and interview questions were designed to ensure validity (see Appendix H). They were developed by the researcher based on the work of Bridges (2009) and the work of Kotter and Cohen (2002) (see Appendices J & K). All research and interview questions were aligned with one of Bridges' three phases or one of Kotter and Cohen's eight steps.

A panel of experts reviewed the validity of the questions. The panel consisted of three members, who were purposefully sampled by the researcher because of their expertise in the field of technology integration and change. The research and interview questions were sent to the panel for review. One expert panel member was interviewed utilizing Facetime, a second panel member was interviewed face-to-face, and a third panel member was corresponded with through a series of emails.

All of the expert panel members informed the researcher the questions were valid, were structured well, and would glean the information necessary for this study as it related to Kotter, Cohen, and Bridges. The expert panel altered none of the research and interview questions.

The other procedure conducted to ensure validity was member checking. After the interview process, transcripts were sent to the participants. They were given seven days to review the transcripts. The researcher sent an email reminder to each participant two days prior to the seventh day. Participants were asked to answer two questions:

1. Were your statements accurately captured?
2. Were your feelings about the subject matter accurately captured?

In the event this member checking process did not occur, the researcher reviewed the transcripts against the recorded interview and validated the data received. An email was sent to the participant to insure they knew their transcript was member checked by the researcher.

At the end of the member checking process, participants were again informed about the confidentiality of the study and the researcher's role regarding confidentiality. Participants were reminded they could still opt out of the study if they chose to do so without penalty.

Instrumentation

Twelve interview questions were formulated from current literature on administrators' opinions and philosophies in the area of transition and integration of handheld technologies and were held in align with the conceptual frameworks of Bridges (2009) and Kotter and Cohen (2002) (see Appendix H).

The interview questions were *semi-structured*. Semi-structured questions are defined by McMillan (2012) "as questions that do not have a predetermined structured choice. Rather, the question is open – ended, yet specific in intent, allowing individual responses" (p. 168). Participants were allotted 90 minutes to answer all of the questions.

All transcripts and audio files were stored in a code protected hard drive. Hard copies were kept in a locked file cabinet. At the completion of the study the hard drive was deleted and the hard copies were shredded.

Bias

In a qualitative study, the potential for bias is increased by the way data were collected. The researcher is the primary individual who collects the data, and "the human instrument has short comings and biases that might have an impact on the study" (Merriam, 2002 p. 5). A researcher's own bias may skew the results. Bias was minimized by providing the interviewees with data through transcripts, member checking, standardizing the data collection procedures, and adhering to a strict interview process protocol by asking the same exact questions of each participant.

Transcripts of the interviews were provided to participants for feedback on accuracy and completeness. Participants were given the opportunity to comment on the interpretation of the data and the results. All participants were then asked the same two questions for validity.

1. Were your statements accurately captured?
2. Were your feelings about the subject matter accurately captured?

Participants were given the choice to contact the researcher directly via Skype, telephone or Facetime. Participants could also reply via email. Verbatim transcripts were provided to ensure the words taken down exactly matched what the participants said. Every effort was made to adhere to an approved standardized protocol for the interview process. Every interview was conducted in the same manner. These actions minimized the potential for bias.

Data Collection and Analysis

Data collected were gleaned from 11 open-ended interviews with public school leaders purposely selected because they initiated and experienced the phenomenon of change. According to Yin (2009),

> This flexible format permits open ended interviews, if properly done, to reveal how case study participants construct reality and think about situations, not just to provide the answers to a research's specific questions and own implicit construction of reality. (p. 12)

Public school leaders for this research were selected using Yin's (2009) guidelines:

> The insights gain even further value if the participants are key persons in the organization, communities, or small groups being studied, not just the average member of such groups. For schools, the principal or department head would carry this status. (p. 12)

Interviews were turned into transcripts by the confidential transcriber (see Appendix C). The researcher then reviewed the transcripts, and the answers to the interview questions were organized according to the research and interview question grids (see Appendices J & K). After the organization of the data into the grid, the answers to each interview question relating to the subsequent research questions were again reviewed by the researcher. The emergent themes were coded, and findings were gleaned from the disaggregated data. According to Creswell (2009):

> Coding is the process of organizing the material into chunks or segments of text before bringing meaning to information (Rossman & Rallis, 1998, p. 171). It involves taking text data or pictures gathered during data collection, segmenting sentences (or

paragraphs) or images into categories, and labeling those categories with a term based in the actual language of the participants (called an in vivo term). (p. 186)

Data from the interviews were stored into hard drives and back up hard drives. All access to the hard drives required a user identification code and a password. At the conclusion of the research, all data were deleted.

The data analyzed from the interview process included: years the participant held their position, number of devices in the district, type of devices in the district, years of the integration, and grade levels affected by the integration.

Public data obtained from the 2011-2012 NYS report cards for each of the four schools were also included (NYSED P12, Information and Reporting Services [IRS], 2012). The data from this website provided basic information such as: student enrollment, staff, population, free and reduced lunch percentages, average class size, graduation rate, and per pupil expenditures.

Summary

A qualitative multiple case study of four public school districts in NYS was performed. The goal was to determine the change process of how public school leaders integrated handheld technologies into classroom instruction. An interview process was used to collect data. Interviews of selected superintendents, building leaders, and teacher union presidents were conducted. The data collected were coded and organized into themes. The data were kept secured in an electronically code protected environment. All interviews were recorded and transcribed. Potential bias was combated by member checking and adhering to a strict interview process protocol by asking the same exact questions to each participant.

Chapter 4: Findings

A qualitative multiple case study using the frameworks of change developed by Bridges (2009) and Kotter and Cohen (2002) was performed. The study's purpose was to examine the phenomenon of change and the barriers public school leaders faced in incorporating the latest technologies of smartphones and tablets into the classroom. The study examined what type of information public school leaders used to sustain the change. Research focused on how the leaders in NYS public school systems integrated smartphone and/or tablet technologies into instruction. This study investigated the specific skills of leaders during the integration process, what barriers they faced, what strategies they used, what factors caused them to decide to implement the technologies, and the steps of the integration process itself.

Research questions 1 through 4 were designed by the researcher to gather participants' perceptions of the change process associated with integration. Research question 5 was designed to determine the level of alignment between the perceptions of the respondents and the change steps of Bridges (2009), and the work of Kotter and Cohen (2002) (see Appendices J & K). The five questions were:

1. What specific skills are associated with a school leader's ability to integrate handheld technologies into the curriculum of a New York State public school?
2. What barriers does a school leader face when implementing handheld technologies such as smartphones and tablets into the instructional programs of a New York State public school?
3. What strategies does a school leader use to plan and implement the change process which will move a district from one that doesn't yet use handheld (i.e.: smartphone, iPod, or tablet) technologies to one that does?

4. What factors caused the school leader to decide to implement the use of handheld technology?
5. How do the change and transition steps of a school leader who has implemented handheld technologies into instructional programs, compare to the change steps of Kotter and Cohen and the transition steps of Bridges?

The findings of this research were based on information gleaned from 12 interview questions (see Appendix H) and public data retrieved from the NYSED website (NYSED P12 IRS, 2012). The data gathered through the interview process were transcribed, member checked, and coded. A start list of codes was created from the conceptual framework and the research questions, as suggested by Miles and Huberman (1994). The data were organized into the research question matrix (see Appendices J & K) to assist with description and meaning across the sites of the study. Ultimately, the codes were revised as the interview transcripts were read and reread by the researcher, allowing themes to become clearer.

The study was designed for a population defined as leaders within a district that had integrated handheld technology in at least two grade levels. The leaders interviewed were the superintendents, the building principals or building leaders designated by the superintendents, and the union leaders of the four districts that met the criteria. The aim of this study was to interview 12 participants or three school leaders from each of the four districts. Eleven interviews were conducted. One leader declined.

This study was approved as a confidential study. Information pertaining to the leaders and the years they held their positions is reflected in Table 1. Pseudonyms were used to protect the identity of the school districts and the public school leaders who voluntarily participated. The pseudonyms were:

- District A, Superintendent A, Building Leader A, Union Leader A
- District B, Superintendent B, Building Leader B, Union Leader B
- District C, Superintendent C, Building Leader C, Union Leader C
- District D, Superintendent D, Building Leader D, Union Leader D

Table 1

Years in Position as of August 2012

School Leader	District A	District B	District C	District D
Superintendent	6	7	7	4
Building Leader	6	10	13	3
Union Leader	<1	1	2	*

Note. *Refused to participate.

All of the school districts selected for this study were NYS public central school districts. A central school district is defined as:

> a school district formed by combining any number of common, union free and central school districts. First established in 1914, the central school district is the most common form of district organization in the state. Like union free districts, central school districts may operate a high school. Their school boards may consist of five, seven, or nine members. The number of board members may be increased or decreased as set forth in law. (New York State School Boards Association [NYSSBA] & New York State Bar Association [NYSBA], 2010, p. 7)

The school report cards were downloaded from the NYSED website and demographic data were collected (NYSED P12 IRS, 2012). Table 2 is a side by side comparison of each district using the demographic data gathered from its 2010 -2011 NYS school report card.

Table 2

Demographic Data of Participating Districts

	District A	District B	District C	District D
Student enrollment	951-1250	951-1250	550-750	751-950
Free and reduced lunch %	21%	26%	25%	29%
Average class size	18	18	18	17
Graduation rate	85%	79%	92%	92%
Number of teachers	101-125	101-125	51-75	76-100
Per pupil expenditure	$15,000-$16,000	$17,000-$18,000	$17,000-$18,000	$18,000-$19,000

The 2012-2013 school year marked the sixth year of the handheld integration process for District A (Superintendent A, personal communication, July 3, 2012). School District A utilizes the iPad and, as of the 2012-2013 school year, has 450 devices in the hands of its students. The one to one iPad integration now encompasses the entire fifth, sixth, and seventh grades. Also, according to Building Leader A (personal communication, July 5, 2012), School District A has four iPads in every first grade class room, three to four iPads in every co-taught special education classroom, and a one to one ratio of iPads every in every one of their self contained special education classrooms.

School District A piloted the integration program for two years before expanding it into the entire fifth grade population (Superintendent A, personal communication, July 3, 2012). The first year of integration was the implementation of netbooks into a fifth grade class. These devices were abandoned for the iPad the following year. According to Superintendent A (personal communication, July 3, 2012):

> The first year we tried netbooks. It was a disaster. And it was a disaster because they weren't reliable pieces of technology. And that's why the next year in that fifth grade we went with the iPads which are a very reliable piece of technology.

Building Leader A (personal communication, July 5, 2012) stated:

> we had started with netbooks and so every student in (the) class got a netbook, had internet access but the devices were just not reliable . . . And so we decided to go with iPads and not only have they been more reliable, but the access for so many different apps has really helped us to show the utility of the device.

The second year the iPads were distributed to one fifth grade classroom, and in the following year, the entire fifth grade population was provided with iPads. Building Leader A (personal communication, July 5, 2012) described the roll out: "The first year we did netbooks in one class, second year we did iPads in one class, third year we rolled out the iPads to all fifth grade and sixth grade students." In the 2011-2012 school year, the sixth graders in School District A could take home the iPad devices. The fifth grade students did not take the iPad devices home (Building Leader A, personal communication, July 5, 2012).

School District B began its technology initiative three years ago in their middle school utilizing mobile learning devices in grades five and seven. Two years later, the district moved to a laptop environment with netbooks. In the start of the 2012-2013 school year, the district supplied 700 netbooks to all of its 700 students in grades five through twelve.

Superintendent B was asked why the district moved from smartphones to netbooks. Superintendent B replied: "Functionality . . . the smartphone key pad was not conducive to educational uses" (Superintendent B, personal communication, July 17, 2012). Union Leader B (personal communication, September 14, 2012) concurred with Superintendent B:

> It gave more possibilities, especially at the high school level. And preparing for college . . . they do a lot of project and a lot of internet based research and it was just . . . I think it was much more flexible and I think that was the reason.

School District B's current integration supplies close to two-thirds of its entire student population with a technological device.

School District C entered its fifth year of the handheld integration process in September 2012. The district utilized the Apple products: the iPad and the iPod. In the 2012-2013 school year, School District C had 161 iPads in the hands of its fifth through eighth grade students, 43 iPods in the hands of its fourth grade students, and 10 iPods in every Pre-K through third grade classroom. The district supplied 49 iPads to its staff members. School district C provided 214 Apple handheld devices to its students in the 2012- 2013 school year.

School District D entered its second year of the integration process in 2012. The district integrated a total of 163 devices. The devices were Android tablets and iPads. These devices were distributed in the high school and in the elementary school. The district had classroom sets for kindergarten, grade one, and grade six. They also distributed the devices to the special education teachers and put them in their library. In the 2011-2012 school year, the district provided a full class set of android tablets for integration into the classroom of the teacher selected to lead the process.

Table 3

Integration Data as of August 2012

	District A	District B	District C	District D
Student enrollment	951-1250	951-1250	550-750	751-950
Number of devices	450	700	214	163
Types of devices	iPads*	Netbooks**	iPods & iPads	Android Tablets & iPads
Years integrated	6	3	5	2
Grades integrated	5th-7th	5th-12th	Pre-K-3rd: 10 iPods per class 4th: iPods 5th-8th: iPads	K, 1st, 6th High school: Sporadically placed Special areas & Special education: Full class sets

Note. *Year 1, netbooks. Years 2-6 iPads. **Year 1, smartphones. Years 2-3, netbooks.

Research Question 1

What specific skills are associated with a school leader's ability to integrate handheld technologies into the curriculum of a New York State Public School?

With information gained through the data collection process of interviewing the population sample, the researcher identified a number of skills necessary for successful technology integration. Further, a number of management skills were revealed.

Management is an essential character of leadership. When a management skill was revealed by a leader, the particular area managed was placed in parenthesis next to the general heading: Management. The responses of the leaders of school districts A, B, C, and D are sequenced according to the district's assigned letter. Answers of the leaders displaying a particular skill follow the order of the interview questions (see Appendices J & K).

Skills: School District A.

Vision. Vision is the ability to create a direction for the integration process (Kotter & Cohen, 2002). "The vision was to create an environment that was technology rich which . . . our goal was to ensure that our kids embodied those 21st century skills that we were looking for" (Superintendent A, personal communication, July 3, 2012).

Building Leader A (personal communication, July 5, 2012) commented on changing student computer access from once a week for 45 minutes:

> that just did not seem like the right way to be preparing kids, even at this young age, for the work place . . . the goal was that every student in the building and actually in the whole district would . . . have one to one computer access.

Union Leader A's vision for the integration into the classroom was slightly different:

> My vision of the integration of handheld technologies in the classroom was going to be more of a supplemental resource for the teachers and the students to enhance the curriculum that they were currently using. (personal communication, July 25, 2012)

The leaders of School District A set goals and had a vision in relation to their initiative.

Management (data utilization and staff). Data were linked to choosing the correct individual to pilot the program.

> We looked at who signed out our mobile laptop carts the most. Who was signing up for extra time in the computer lab? Who was consulting with our library media specialist . . . for websites and other digital resources? And we came up with this one teacher, a fifth grade teacher . . . who is just outstanding . . . when you talk about digital natives and digital immigrants [this teacher] is a digital native and . . . believed very strongly in the initiative. (Building Leader A, personal communication, July 5, 2012)

Superintendent A (personal communication, July 3, 2012) also recognized the abilities of this teacher to initiate the integration process: "We felt that we had a real strong teacher leader who was very passionate about technology and we knew that [this teacher] was the perfect individual to begin this initiative with."

Building Leader A (personal communication, July 5, 2012) described the skill of managing staff first through the Director of Technology. "Then our Director of Technology was very . . . very proactive I guess in getting as much training for teachers."

Once the integration was spreading, the superintendent was able to employ the efforts of teacher leaders to assist in the training efforts.

> And I will say a big part of that is we leaned heavily on our teacher leaders. It's not our principals providing the PD. It's not my technology coordinator providing the PD. It's teacher leaders who have already been using these iPads in their classrooms.
>
> (Superintendent A, personal communication, July 3, 2012)

Management (accountability). The demand for accountability provides a baseline for the integration to be successful and sustained. Building leader A (personal communication, July 5, 2012) told of how they were able to ensure accountability by relaying their expectations of the pilot program to the teacher leader:

> We sat down with [the teacher and said] . . . when we first start there are going to be issues with this but we want to see if we can handle some issues before we roll it out to the rest of the school.

Superintendent A (personal communication, July 3, 2012) described their expectations of the principals and how they would ensure the integration was occurring in the classroom:

> My principals have to be very, very active in not only those formal observations, but those walkthroughs because it's important for us to know that if some teachers are not integrating the technology as effectively as others, that we provide them with the supports they need to get better at it. . . . What I would want the principal to tell me is when I was in there that day and they were utilizing a math lesson . . . they were utilizing the iPads.

Management (finances). Superintendent A was able to use BOCES and Apple to finance the integration:

> So we just bought those directly from BOCES through Apple and paid the $499. . . . and I should say Apple's been very involved with us. So when discussions began about you know, we don't need 120 now, we need 240, and then the next year we might need 360. We met with them, the Apple financial person, the BOCES person, myself, and my tech [person], and we reached an agreement on a lease. . . . We also get PD from certified Apple people. And we also have large purchasing power for apps that are also embedded within that lease. . . . We've actually taken the I's and . . . there's a company that actually will buy them from us for a couple hundred dollars and we reinvest that money into our . . . school district to purchase additional iPads. (personal communication, July 3, 2012)

Building Leader A described the use of funds from an outside community foundation:

> But on top of that, through the [local] Education Foundation, which is a private entity that gives grants to teachers and through the Special Ed department…we have four iPads in every first grade classroom. We have three to four iPads in every co-taught Special Education classroom. And our self- contained Special Education classrooms have iPads for every student in the class. (personal communication, July 5, 2012)

Interpersonal skills (collaboration and communication). Interpersonal skills are a requirement of leadership; a leader must be able to collaborate and communicate in order to effectively guide the change process as evidenced by Kotter and Cohen (2002), specifically, step 2, "Building a Guide Team: Helping pull together the right group of people with the right characteristics and sufficient power to drive the change effort" (p. vi), and step 4, "Communicate for Buy In: Sending clear, credible, and heartfelt messages about the direction of change" (p. vi).

Superintendent A's ability to communicate and collaborate with Building Leader A and staff was evident in the leaders' efforts to move the integration forward through the district. "So it's . . . really there's been a great deal of collaboration between the teachers, the principals, and our technology coordinator (Superintendent A, personal communication, July 3, 2012).

> . . . I think we have teachers who are willing to accept risk taking . . . because they recognize that that's a good thing and we can learn as much from a failure as we can from a success. So I think because we've created that environment of trust and collaboration that people are willing to try new things. (Superintendent A, personal communication, July 3, 2012)

Data utilization (interpretation). The collection, interpretation, and utilization of data allow leaders to move forward with integration and examine outcomes to sustain the integration. Superintendent A examined data relevant to the success of the integration in terms of student achievement, outcomes, and comportment.

> It was very important for me to look at data . . . But so far looking at the ELA and Math scores, we feel our kids are actually showing improvement. And again getting back to you know, we believe that some of those other things that you don't think about like

attendance, student behavior, there we've seen significant improvements that we've noted. (Superintendent A, personal communication, July 3, 2012)

Building Leader A also recognized the interpretation of data as an important tool to measure the integration's success in less objective ways than just test scores.

So you know, we are looking at things like attendance. I will tell you the attendance in that fifth grade teacher's class, the individual students, their attendance improved when they are in (this teacher's) class. And the individual attendance of all the fifth and sixth graders did improve this year. . . . You know it's much more subjective than I think a test score can show. (Building Leader A, personal communication, July 5, 2012)

Management (decision making and time). Decision making is a constant for leadership. Superintendent A took ownership for making the decision to start the integration of handhelds: "quite frankly as a leader, I gave my blessing for this thing to move forward. . . . We provided release time. We provided you know, time where they could go in and observe other classrooms" (personal communication, July 3, 2012).

Adaptability. The leader must be able to adapt to changes as they occur during the integration process. Building Leader A adapted to the change from netbooks to iPads:

We had started with netbooks and so every student in [the teacher's] class got a netbook. . . . we just had a lot of problems with them from a technical standpoint. . . . And so we decided to go with iPads and not only have they been more reliable, but the access for so many different apps has really helped us to show the utility of the device. (personal communication, July 5, 2012)

Summary of skills for School District A. The skills of the leaders of School District A are clearly displayed in Table 4.

Table 4

Skills of Leaders in School District A

Leadership Skill	Superintendent	Building Leader	Union Leader
Vision	X	X	X
Management (data utilization and staff)	X	X	
Management (accountability)	X	X	
Management (finances)	X	X	
Interpersonal skills (collaboration & communication)	X	X	
Data utilization (interpretation)	X	X	
Management (decision making & time)	X		
Adapatability		X	

Skills: School District B.

Vision. Superintendent B discussed preparing students for college and career readiness by utilizing a skill set the students already had but were not using in their current instruction:

> Well, the reality for me was that students were bringing a whole set of skills to the educational setting that truly educators were not tapping into. And that is they were coming here with the understanding of how the digital world is working . . . it just became immediately apparent that we are missing a huge part of the picture. . . . Well, I think one it does start at the top. I mean you've got to have that vision . . . that culture of always looking to continually improve . . . I've tried to create that whole culture of continuous improvement. (personal communication, July 17, 2012)

Building Leader B discussed vision in a very concise statement: "Well, I think the bigger vision was to allow students to have access to instant information" (personal communication, August 8, 2012).

Union Leader B articulated Superintendent B's ability to relay the vision to other public school leaders: " . . . I think our superintendent and the person who initially got us going with the little handheld devices in the middle school had a real vision. That this is the way things are going" (personal communication, September 14, 2012).

Risk taking. The leader sets the tone and pace of integration by the ability to take risks. Risk taking is an absolute in any change process. Superintendent B and Building Leader B are described as risk takers. Building Leader B was a leader who will take on any new challenge. "I believe initially the middle school started . . . one of the reasons is that I'm ready to try just about anything" (Building Leader B, personal communication, August 8, 2012). Building Leader B portrayed Superintendent B as a risk taker:

> But our superintendent now . . . [is] definitely somewhat of a daredevil . . . and [our superintendent is] like, let's go for it. Let's do it. I think we should do it this way. [Our superintendent is] like the energizer battery . . . you know [our superintendent is] one of those people . . . [who] . . . hears about something or . . . has even the slightest idea . . . starts like, OK how can we make this work . . . [Our superintendent is] just, well how can we make it happen. And so [our superintendent] bugs people at BOCES and bugs people at the State Ed office. (personal communication, August 8, 2012)

Management (staff, time, and accountability). Superintendent B and Building Leader B expressed their ability to manage staff during the integration process. Superintendent B was able

to manage the unique skills of certain teachers and place them in supporting roles to strengthen the integration process.

> Yes. Like an instructional support . . . IST, instructional support teacher, . . . who had the expertise in technology to help assist staff and digitizing their current plans . . . So you know, we had high flyers on every team. So they would take the lead and then provide support and coordinate with the instructional support people. (Superintendent B, personal communication, July 17, 2012)

Building Leader B (personal communication, August 8, 2012) reinforced the managing of staff:

> . . . we had an instructional support teacher who is very savvy with technology. And [the support teacher] was in the building on a regular basis working with teachers and answering their questions and supporting them. And instructional support, not just technology . . . So [the support teacher's] focus was, you know, how do you use this in the classroom?

Each leader revealed their understanding of the importance of beginning the integration process in the middle school setting. The middle school setting already had team planning time built into the schedule, and the leaders were able to use this common planning to provide the staff with professional development and sharing opportunities. The superintendent expected the staff to use this time to share and schedule observations of the integration process.

> OK, listen, you want to be in [that teacher's] classroom because here's what we're going to do at this time. Or you know, on these days be there to help AIS (Academic Intervention Services) or whatever you needed to do. So again it was that commitment from the district that we're here to help you. (Superintendent B, personal communication, July 17, 2012)

Superintendent B provided the staff with a directive. " . . . it wasn't an option. The other thing we did is that you had to develop a unit within the first ten weeks of school. That would rely on the use of the handheld devices" (personal communication, July 17, 2012).

Building Leader B made it a priority to attend the team planning sessions. Building Leader B's presence served as an accountability measure. As a result of Building Leader B's attendance, the teacher leaders took an active role in the integration process.

> We have team planning time every day. . . . I didn't have to directly say a whole lot of anything. The rest of the team members would talk about what they were doing and the other person had nothing to offer. And they'd say, when we talk about it next week let's make sure that everyone has done something. (Building Leader B, personal communication, August 8, 2012)

Interpersonal skills (collaboration and communication). Superintendent B collaborated with Building Leader B: "So you know, we had high flyers on every team. So they would take the lead and then provide support and coordinate with the instructional support people" (Superintendent B, personal communication, July 17, 2012).

Superintendent B also collaborated with their BOCES. "We had two instructional support teachers at the middle school. . . . They were BOCES" (Superintendent B, personal communication, July 17, 2012).

Building Leader B attended the team planning meetings to ensure the vision of the superintendent was being followed and that there was sufficient support to continue the integration process. "We have team planning time every day. . . . I didn't have to directly say a whole lot of anything" (Building Leader B, personal communication, August 8, 2012).

Their interpersonal skills were evidenced by these efforts.

Knowledge of curriculum. The leaders' knowledge of curriculum allowed them to strategically place the technology. Strategic placement is used as an attempt to guarantee a successful integration.

> . . . They were doing some virtual learning and building virtual worlds and in the eighth grade they were looking at a STEM initiative dealing with renewable energy . . . because our middle school is grades five through eight. . . . It only makes sense to pilot this in grades five and seven and then the middle school would really be the pilot site . . . " (Superintendent B, personal communication, July 17, 2012)

Building Leader B recognized that by increasing their technology, the needs and desires for the middle school instructional environment would be enhanced.

> And we had used a lot of technology overall in the building, the middle school. . . . The teachers had tried to integrate it as much as possible . . . we had teachers who definitely would try to go to war over being able to get into the labs. I went from there to getting carts for every grade level . . . not just one lab, started working to two labs. So at that point then the next step was this opportunity for us to do this. (Building Leader B, personal communication, August 8, 2012)

Union Leader B understood how technology would advance instructional methodology to enhance students' abilities to become college and career ready.

> Because all of the seniors have to do a thesis project, and there's a lot of project orientation . . . and we are the two years humanities program with the global and the English classes, and they do a lot of project and a lot of internet based research. (Union Leader B, personal communication, September 14, 2012)

Management (finances). Superintendent B hired staff to support the integration process and used BOCES as a financial resource to alleviate the district's responsibility to pay for their entire salaries. "One is up front professional development for staff. And then the additional cost of bringing in support teachers. We had two instructional support teachers at the middle school; they were BOCES" (Superintendent B, personal communication, July 17, 2012).

Management (students). Building Leader B managed students by holding them accountable for the proper use of the handheld devices.

> . . . they weren't doing their school work, I'd say to them, bring your netbook in. You're not taking it home. . . . let's see in a couple of weeks, if you get your homework in . . . I'll let you take your netbook home. . . . I mean it shouldn't have been a punishment, but it was an incentive so to speak. And that really helped a lot of students to get their work in. (Building Leader B, personal communication, August 8, 2012)

Community awareness. Having the skill of community awareness gives leaders knowledge of the background and acceptance of the technology outside the school environment. This knowledge helps to garner support for integration within the community to assist in sustaining the initiative beyond the pilot program.

> Well, first of all we're a rural district . . . and we're not exactly the most affluent. . . . I've lived here all my life and I know we've gone from being [nearly the] poorest county in the state to being [only a little higher] . . . So I know that the access to internet technology is not as great as it would be in a more urban setting. So I thought the way to allow students to not only have access in the classroom but also to be able to be connected and able to use this technology at home to continue their work. There are several people on the board who are involved . . . in information technology and they

> realized that this is the wave of the future. And so they're willing to get in on the cutting edge and make this type of technology . . . available to the students . . . so our kids are prepared when they go out into the world . . . but with this kind of asset in our repertoire they'll be much more competitive when they enter college and the workforce, to have experienced this. (Union Leader B, personal communication, September 14, 2012)

Data utilization. Superintendent B used data to provide evidence the integration process enhanced their learning environment.

> When I look at student success . . . I'm looking at the participation rates, the absenteeism, the home…the rate of homework getting done . . . and we went back as long as we kept records that we knew of…for the first time in the history of the district. . . . the three days we handed out the netbooks when we had the rollout process, not one kid was absent." (Superintendent B, personal communication, July 17, 2012)

Superintendent B also examined data in the area of discipline: "discipline problems have really truly diminished. We're looking at our middle school down about 20% in discipline in instruction . . . in classroom discipline referrals" (personal communication, July 17, 2012).

Reflection. The skill of reflection entails recalling the past to build a better future. Superintendent B reflected upon the past and saw the need to integrate handheld technology. Upon this reflection, Superintendent B concluded fulfilling this need would make today's students college and career ready:

> I don't want [my child] to have the education that I had. And you shouldn't want your daughter…granddaughter…niece… nephew to have the education you had. Because it's not going to prepare them for the world that they're going to walk into. (personal communication, July 17, 2012)

Summary of skills for School District B. The skills of the leaders of School District B are clearly displayed in Table 5.

Table 5

Skills of Leaders in School District B

Leadership Skill	Superintendent	Building Leader	Union Leader
Vision	X	X	X
Risk taking	X	X	
Management (staff, time, & accountability)	X	X	
Interpersonal skills (collaboration & communication)	X	X	
Knowledge of curriculum	X	X	X
Management (finances)	X		
Management (students)		X	
Community Awareness			X
Data utilization	X		
Reflection	X		

Skills: School District C.

Vision.

What we wanted to do was to give our students whatever tools are necessary in order to learn best at this point . . . and will do the same in the future. And so, with the integration of handheld technology it was a new tool for our students to use to help them learn better. (Superintendent C, personal communication, July 31, 2012)

"That's pretty straight forward I guess, that every kid has one" (Building Leader C, personal communication, August 27, 2012). "I think we're looking for ways to differentiate instruction and reach a broader spectrum of students and it's our hope that exploring new technologies will enable that" (Union Leader C, personal communication, August 3, 2012).

The vision, as defined by all three leaders, was the district's ability to provide students with another tool for learning that would enable them to increase their comprehension of the curriculum. According to the leaders, increased comprehension would allow students to be more successful in terms of academic achievement.

Management (staff). Superintendent C recognized the broad spectrum of staff skills as they pertained to handheld technology. Superintendent C, working in conjunction with the Director of Technology and the Director of Innovation and Enrichment, organized professional development opportunities to support staff.

> We have teachers that are actually beginning the curriculum process, and we have one teacher that is actually writing an i-text this year. So I can see different levels. We've trained our faculty extraordinarily well. . . . I know that probably one of the biggest problems in education is the fact that teachers may have technology but they don't use them. (Superintendent C, personal communication, July 31, 2012)

Building Leader C managed staff by finding teachers to support the initial pilot program. "We had two teachers at that grade level that we thought were ready to take on that type of a challenge and kind of volunteered for it. And that's where it started. Just based on teachers' willingness" (Building Leader C, personal communication, August 27, 2012).

Management (students). Superintendent C managed the students' showcasing how the integration was accepted and how the integration was essentially affecting their learning. "You

know, we've had many presentations where the kids show us how they're using technology and some of the new methodologies they've figured out that will help support their learning" (Superintendent C, personal communication, July 31, 2012).

Interpersonal skills (collaboration and communication). Superintendent C collaborated with the Director of Technology and the Director of Innovation and Enrichment.

> I have some people who I work with in my instruction. . . . my Director of Technology and my Director of Innovation and Enrichment that are always on the cutting edge and are excited about what they do and pull us along with them. (Superintendent C, personal communication, July 31, 2012)

Building Leader C described their inquiry with teachers about the progress of integration.

> I was talking to the fourth grade teachers . . . about how they liked it . . . what we could do next year to improve on it . . . they were doing fine, they liked it . . . in terms of improving, they thought their pace was good . . . their final remark was, you can't take these away now. Our sixth grade teachers last year had them for the first year . . . I just kind of interviewed them at the end of the year. I said what can we do differently? . . . What if they were gone? And they said, we can't teach without them now. (Building Leader C, personal communication, August 27, 2012)

Risk Taking. Building Leader C spoke of why the district is a leader in the area of technology integration.

> I think because we just did it. We didn't sit around and talk about it. We made the decision four years ago that mobile carts [and] going to the labs just isn't going to do it. Because going to the labs just ended up being Internet research and word processing.

> And we got to thinking that that's just not going to cut it. And it's not a good use of resources. (Building Leader C, personal communication, August 27, 2012)

Community Awareness. Superintendent C and Union Leader C declared the handheld integration a success because of the support of the community. "I think it's because we have a community that's willing to support education that includes handheld technologies" (Superintendent C, personal communication, July 31, 2012). Union Leader C also claimed community support as part of the success:

> . . . well we're fortunate to have a foundation. . . . to have a community that established a foundation to raise money to accelerate the process of going digital. We're in a community that's pretty darn supportive of education. That wants us to be leaders. That wants our school to produce kids that will go to other good schools. (personal communication, August 3, 2012)

Data Utilization. Superintendent C collected qualitative data to deem the integration a success.

> I think it's more qualitative than it is quantitative. By walking into classrooms and watching kids use the technology as a tool to help them learn and to look at the ways that they've figured out how to use them is pretty amazing. (Superintendent C, personal communication, July 31, 2012)

Prior to the integration, Building Leader C used data to determine the success of handheld use outside of the school day. Building Leader C gathered data to see how many families in the district could access the Internet from home. "I think it's successful to this point because two years ago we surveyed our community, grades four through twelve, and we had

94% Internet access at home in those grades" (Building Leader C, personal communication, August 27, 2012).

Reflection. Building Leader C reflected on prior technology integrations and discussed why the district decided to integrate handheld technologies:

> the laptop cart initiatives in the past . . . were dismal failures in my perspective just because it was too difficult for teachers to implement, moving a big cart of 25 computers into their rooms . . . And we found that we're not really integrating technology if we have to bring technology to the kids or take them to the technology. (personal communication, August 27, 2012)

Summary of skills for School District C. The skills of the leaders of School District C are clearly displayed in Table 6.

Table 6

Skills of Leaders in School District C

Leadership Skill	Superintendent	Building Leader	Union Leader
Vision	X	X	X
Management (staff)	X		
Management (students)	X		
Interpersonal skills (collaboration & communication)	X	X	
Risk taking		X	
Community Awareness	X		X
Data utilization	X	X	
Reflection		X	

Skills: School District D.

The union leader of School District D declined to participate in the study.

Vision. "My vision is to get one in every student's hands" (Superintendent D, personal communication, August 31, 2012).

Building Leader D's vision was to entrench 21st century skills into the students of the district.

> I think with the philosophy that we want to teach kids to be responsible users, and we certainly want them to be 21st century learners, so that they can use these devices to access information. . . . but, most importantly, they should be able to create their own content, collaborate with each other making videos if they are using different apps, or whatever. (Building Leader D, personal communication, September 2, 2012)

Management (staff). Superintendent D expressed how they found and utilized a teacher leader for the integration process.

> [This teacher is] actually a teacher on special assignment for half a day and [this teacher's] a technology professional developer. So [this teacher] offers a lot of workshops on the handheld devices. . . . then [this teacher] designs professional development to get the same technology out into the teacher's hands. [This teacher's] been able to model for other teachers. (Superintendent D, personal communication, August 31, 2012)

Building Leader D concurred. "[The teacher is a] .5 social studies and .5 . . . technology staff developer . . . You know, [this teacher's] been to a lot of conferences. . . . [this teacher] was the real driving force behind it" (Building Leader D, personal communication, September 2, 2012).

Interpersonal skills (collaboration and communication) and data utilization. The leaders of School District D used data in order to communicate to staff the need to integrate handheld devices into the curriculum. " . . . we've again, tried pilot groups that have gathered data regarding impact on student learning. And really studied that and communicated that with staff. And then we have a technology committee that actually reviews that data" (Superintendent D, personal communication, August 31, 2012).

Superintendent D not only used data to determine the impact handhelds had on student learning, but also used data to determine staff needs.

> Again, we look at data. We look at instructional practice. You know, what do they need to know. How will we know if they know it or not and what are we going to do if they don't know it. (Superintendent D, personal communication, August 31, 2012)

Building Leader D's ideas on data collection and communication mirrored the superintendent. Building Leader D also made use of data to garner support for the integration of handheld devices in the district.

> I think this piece that made it successful or easier was that it was a pretty open process. It was a pretty transparent process. . . . There was a trial period. We collected data. We listed the feedback. We shared the data. . . . We tried to invite anyone who was interested in that discussion into the process. And so again it was using the shared decision making. (Building Leader D, personal communication, September 2, 2012)

Building Leader D collected data, collaborated, and communicated with other schools in the immediate area of School District D to provide further evidence to the staff for the need to integrate handheld technologies into the school:

There are [demographically similar] schools in this situation, I think, because we also had sent out a listserv question to [many] districts in the [region] . . . and the [local] BOCES and most of them were . . . in our situation. Where they had these policies that are basically banning the devices in school . . . and they're not being terribly well enforced. (Building Leader D, personal communication, September 2, 2012)

Building Leader D provided their staff data in the area of student comportment after the pilot period was over.

OK, so we tried to collect both quantitative and qualitative data. . . . would look at . . . types of infractions in discipline referrals . . . instances of cyber bullying, sexting and those types of things. And then with the qualitative . . . what do you notice in the lunch room. What do you notice in the halls? What do you notice with kids learning in the classrooms? (Building Leader D, personal communication, September 2, 2012)

Superintendent D collaborated with the technology committee to not only supply the district with immediate plans for the integration, but also discussed long term plans for the process.

So we did a lot of work with that technology committee in terms of doing a long range plan for how we were going to begin phasing in handheld technology. Are we going to invest any more money in laptop technology and where are desktops going? So really looking at it rather strategically in terms of you know they all have their pluses and their negatives. (Superintendent D, personal communication, August 31, 2012)

Management (accountability).

We've done what's called a technology grant process. . . . what that has involved is that teachers have had to apply for a SMART Board, because again we're limited in terms of

> funding. . . . There were some specific questions that they had to answer regarding how did they feel it was going to impact student achievement. . . . Or how do you see this impacting unit or lesson plans? So there were a lot of questions and lots of thought process and reflection on what that was going to look like and sound like. (Superintendent D, personal communication, August 31, 2012)

The "grant process" developed by Superintendent D relayed to the staff, if they wanted to have the technology, then there had to be a plan in place for its use in the curriculum.

Adaptability. The district first used the galaxy tablet from Verizon as their handheld device, and then switched to the iPads:

> And I'm not a tech guru by any means, but we were unable to manage I believe the tech issues around the handheld tablets versus the iPads. But then we also knew that if we were going to go iPads, that we were going to have to change to something different. So we have a . . . project right now and part of that is we now have connected both buildings onto the same network. (Superintendent D, personal communication, August 31, 2012)

Management (decision making). In order to move the integration process forward, there had to be a decision made to allow students to bring in their handheld devices from home, as well as, utilize a school issued device. Prior to the integration the district had a ban on handheld devices. Building Leader D collected data and made a decision to move forward in allowing students to use their devices during the school day. "And then getting to a point where you just have to say, look there really are only about six or seven teachers that are still dug in against it and 75% supporting . . . so we're going to move ahead" (Building Leader D, personal communication, September 2, 2012).

Summary of skills for School District D. The skills of the leaders of School District D are clearly displayed in Table 7.

Table 7

Skills of Leaders in School District D

Leadership Skill	Superintendent	Building Leader
Vision	X	X
Management (staff)	X	X
Interpersonal skills (collaboration & communication)	X	X
Data utilization	X	X
Management (accountability)	X	
Adaptability	X	
Management (decision making)		X

Summary of Research Question 1. There were nine leadership skills presented through the disaggregating of the data to answer research question one. The skills, as revealed by the interview questions of the superintendents, are in Table 8. Those of the building leaders are in Table 9, and those of the union leaders are in Table 10.

Table 8

Skills identified by the Superintendents

	Superintendent			
Leadership Skill	A	B	C	D
Vision	X	X	X	X
Data utilization	X	X		X
Management	X	X	X	X
Interpersonal skills	X		X	X
Knowledge of instruction		X	X	
Risk taking		X		
Reflection		X		
Community awareness			X	
Adaptability				X

Table 9

Skills identified by the Building Leaders

	Building Leader			
Leadership Skill	A	B	C	D
Vision	X	X	X	X
Data utilization	X		X	X
Management	X	X	X	X
Interpersonal skills			X	X
Knowledge of instruction		X		
Risk taking		X	X	
Reflection			X	
Community awareness				
Adaptability	X			

Table 10

Skills identified by the Union Leaders

	Union Leader		
Leadership Skill	A	B	C
Vision	X	X	X
Data utilization			
Management			
Interpersonal skills			
Knowledge of instruction			
Risk taking			
Reflection			
Community awareness		X	X
Adaptability			

Research Question 2

What barriers does a school leader face when implementing handheld technologies such as smartphones and tablets into the instructional programs of a New York State public school?

Barriers are obstructions to integration. They appear in any change process. In order for a successful integration to occur, barriers to the integration must be faced and overcome.

Barriers: School District A.

Financial. Funds are needed to begin the integration process, to upgrade infrastructure, to purchase equipment, and to properly train staff. The ability for a district to supply funds for these elements is a barrier.

Superintendent A and Building Leader A considered funding a barrier to the integration process. Sustaining the integration of technology through each grade level and finding the resources to properly train staff were barriers that needed to be addressed.

> The only two barriers really were resources; both human and fiscal . . . we said if we're going to do this and it works, we've got a commitment. If it works in fifth grade, those fifth graders that have invested an entire year of iPads, it doesn't make any sense if they move to sixth grade and now they don't have them. But we made a commitment financially to ensure that as our kids move from grade to grade, they continue to be educated using iPads. Now, that also means a commitment to professional development and training. (Superintendent A, personal communication, July 3, 2012)

Building Leader A's statements coincided with those of Superintendent A. " . . . it was money to purchase the devices. It was money for professional development for teachers. It was time for professional development for the teachers. And I think those were the big things" (Building Leader A, personal communication, July 5, 2012).

Fear. "The emotions that undermine change include anger, false pride, pessimism, arrogance, cynicism, panic, exhaustion, insecurity, and anxiety" (Kotter & Cohen, 2002, p. 180). Fear is another barrier. Leaders need to be sensitive to the fears that undermine change. They need to find ways to reduce or eliminate the fears in order to move the integration forward.

Superintendent A spoke of the professional development opportunities provided by the district to address those fears. "I think after the training, . . . people felt pretty comfortable that they had . . . a good understanding of what's going to happen in September. So that fear was really, really minimized" (Superintendent A, personal communication, July 3, 2012).

Union Leader A expressed the fears of the staff over their own skill level and their fear of what the students would do with the technology.

> So you know, there's the fear of technology in some people. There's the fear of privacy for some people . . . in the upper grades . . . they're tied to the curriculum so strictly… they're going to be evaluated . . . so . . . you know, [they are] resistant to bring in a piece of technology to supplement. (Union Leader A, personal communication, July 25, 2012)

Infrastructure. The infrastructure of a district must align with the technology integrated. The lack of alignment can be a barrier. District A first began their initiative with netbooks. They were not a match.

> Well, first the whole hardware issue when we started with the netbooks; that was the biggest barrier . . . One of the things that obviously had to be done was we had . . . to go wireless. I think the big thing this year was getting the entire building you know; covered with wireless so that the iPads can go anywhere in the building and the kids can use them wherever they are. (Building Leader A, personal communication, July 5, 2012)

Data collection for success. The inability to collect data is a barrier.

> You know our superintendent really wanted us to look at test scores. And, while I know that everything is based on test scores these days, much to my chagrin, I'm not sure that you can measure the effectiveness of this initiative based on test scores. Because that's what it's all about is getting the kids to be problem solvers and independent thinkers and not just sitting waiting for the teacher to feed them information. I'm not exactly sure how you measure that. (Building Leader A, personal communication, July 5, 2012)

Curriculum integration. Curriculum integration is a barrier because of the perception of technology by certain teachers. They did not view the technology as valuable for instruction nor

did they see it as enhancing their curriculum. Union Leader A characterized curriculum integration as a barrier:

> The teacher being able to work it into their curriculum first of all. . . . So maybe just changing or adapting might have been . . . They just didn't want to do it, you know. They got their curriculum. They're happy with the way it goes. (Union Leader A, personal communication, July 25, 2012)

Summary of barriers for School District A. There were five distinct barriers that arose from School District A's data: financial, fear, infrastructure, data collection for success, and curriculum integration.

Barriers: School District B.

District policies. The banning of cell phone use and handheld devices during instructional times is a barrier to technology integration. School District B, prior to the integration, had a ban on handheld devices.

> It did not align . . . you bring the cell phone in, you shut it off, you put it in your locker, and you don't touch it again until the end of the day. So we had to modify all of that. And that was a challenge. (Superintendent B, personal communication, July 17, 2012)

According to Building Leader B:

> There really wasn't a board policy for handhelds initially. . . . So we had to make sure there was something written in there . . . but handhelds we just had to create those documents. And have . . . those approved by the board. Parents' permission forms, student permission forms. Let's see . . . information concerning the netbooks. The policy. Student policies related to taking care of the netbooks. I'm trying to think of what else because boy, it was a lot. (personal communication, August 8, 2012)

Fear. "The biggest barrier we faced . . . and it was totally unanticipated on my part . . . teachers freaked out that kids knew more than they did. Freaked out. Completely flipped out" (Superintendent B, personal communication, July 17, 2012). According to the superintendent, the teachers feared that the students understood more about utilizing the devices than they did.

Building Leader B concurred but also saw parental fear as a barrier:

> I'd say some of the teachers who were not as comfortable - getting them on board . . . And some of the parents who it was new to them. You know they weren't as comfortable . . . my kids going to bring this home and educating the parents a lot. And teaching students how to use them properly. Those were some . . . of the barriers. (personal communication, August 8, 2012)

Union Leader B recognized the wariness of the staff. "I mean let's face it, some people are more comfortable with technology than others. . . . but by and large it . . . was comfort level among staff" (Union Leader B, personal communication, September 14, 2012).

Data collection for success. Superintendent B explained that the current methods of standardized testing were a barrier to measuring success. "Absolutely. Absolutely. Absolutely. There is not a real true metric out there that will measure the impact of this integration because of the current evaluation system" (Superintendent B, personal communication, July 17, 2012).

Union Leader B understood the importance of data to the success of the integration. Union Leader B knew it was a district priority: "I don't think that we've figured it out yet on a whole . . . on a large scale, but I do think that they're working on trying to come up with some rubric for quantifying it" (personal communication, September 14, 2012).

Infrastructure. The filter and the wireless network proved to be barriers to the integration process.

> And at first, the devices were not as filtered as say . . . the school computers. So there was much more need to monitor that. And I think there were a few glitches in terms of connectivity. . . . The service is through Verizon . . . and Verizon is what covers the district area, it was surprising that there were still a few dead zones in our school district area. So that was an interesting issue. (Union Leader B, personal communication, September 14, 2012)

Summary of barriers for School District B. School District B acknowledged four barriers to their integration process: district policies, fear, data collection for success, and infrastructure.

Barriers: School District C.

Finances. The district was concerned about continued funding but was fortunate to have community support for the integration.

> I think the figuring out the way to have it funded was also a difficult task. And we have an education foundation and we have some community members that have helped support the purchase of technology here in the building. And that's been very helpful. (Superintendent C, personal communication, July 31, 2012)

The financing of the integration was budgeted in such a way; they were able to put the district one year ahead of schedule. "This year was actually our biggest purchase, but that only happened because I did a decent job of budgeting our technology money last year. We were able to have some extra. We're actually one year ahead of schedule" (Building Leader C, personal communication, August 27, 2012).

Fear. Superintendent C described the fear of the parents. "You know I think what most people get concerned about is that it's . . . somehow technology is replacing the teacher and they

understand . . . by watching their children it certainly doesn't replace the teacher" (Superintendent C, personal communication, July 31, 2012).

> I'll start with staff. The barrier was the fear of kids having another avenue to not pay attention. So there were the two or three teachers that didn't resist the devices themselves and learning to use them. They just resisted the management that would come along with them. In terms of parents . . . we haven't seen a ton of resistance. . . . There have been two or three that I can think of . . . a little fearful of technology and a little fearful of us creating the next generation of screen zombies. And we're working with the teachers in the sense that . . . taking the iPad away from a kid as a punishment has to be the absolute last resort. Because if a kid was writing in a textbook, you wouldn't take the textbook away from them . . . So that was that biggest barrier. How are we going to deal with all of this? (Building Leader C, personal communication, August 27, 2012)

There was a fear of how the students would utilize the devices. "Just for a single example, whether our students should have access to YouTube. About whether students should be able to use their cell phones as note taking devices or iPods in the classroom" (Union Leader C, personal communication, August 3, 2012).

Infrastructure. A barrier was maintaining an infrastructure to monitor the operation of the devices and to have the ability to add in the applications necessary for learning.

> From an infrastructure standpoint, managing the iPads . . . this would be the first year of me actually managing them from a central system so that I can push out apps and know what users are online, check internet traffic, and all of that other stuff. We haven't been able to do that in the past. So now we can do that. That was one barrier that we overcame. (Building Leader C, personal communication, August 27, 2012)

Another barrier was wireless capabilities: "The second barrier is having the wireless infrastructure. Being able to handle another 140 plus devices online at the same time, if it ever came to that. That was just better, beefing up our wireless network" (Building Leader C, personal communication, August 27, 2012).

Union Leader C reinforced the barrier of wireless Internet as related to infrastructure:

> . . . getting our network up to speed so that we had a wireless . . . first of all getting any servers to . . . understanding the capacity needs of servers. Getting the servers working. Integrating new technology with old computers and with old servers. Getting the wireless network up and running. (Union Leader C, personal communication, August 3, 2012)

"Understanding how to block students . . . to have student access limited in a variety of ways but teacher access less restrictively blocked. We're still having on-going debates over what should be available to students" (Union Leader C, personal communication, August 3, 2012).

Filtering the Internet use to minimize student off task behavior and to maximize teacher access to enhance their curriculum was a barrier.

Data collection for success. Trying to quantify the success of the integration through data, specifically student achievement was a barrier. "I think it's more qualitative than quantitative" (Superintendent C, personal communication, July 31, 2012).

> It's difficult to quantify it now because we're not in the position of creating a real experiment . . . Where a bigger district could roll them out to an elementary school, compare their test scores to another elementary school. We don't have that option. . . . it's just teacher feedback right now. So I can come up with something that will help me tag their progress on iPods to iPads to ELA, math. I would love to. But at this point in

time, I'm a big question mark on that. (Building Leader C, personal communication, August 27, 2012)

Summary of barriers for School District C. School District C specified four barriers to their integration process: finances, fear, infrastructure, and data collection for success.

Barriers: School District D.

District Policies. The district's policy of banning handheld devices during the school day was a barrier.

> You know we have pretty tight board policies but I use this story sometimes. We had a student in our cafeteria. She had a Kindle and she was reading a book during lunch and one of the cafeteria monitors confiscated it because she was breaking our electronic device policy. Well, you know, you just stopped a kid from reading when they had some free time during the day. So I think that for me was a very concrete example of we have some work to do with our policies. (Building Leader D, personal communication, September 2, 2012)

Fear. There were fears exhibited in terms of student use on school purchased devices and the devices they were bringing from home. The district had to address the fears of the board of education, parents, and staff. Superintendent D set forth some of the issues they addressed to combat the fears of the district:

> Well, their big issue that they have is about bullying and what rights do we have to control that, especially if they have access to the Internet with the handheld devices at any time. So as you begin to look you know . . . they're coming in with cell phones and they're able to access that. Who's to know that they're not sitting . . . in the cafeteria watching porn. You know, I think those are some of the concerns that came up from the

board's perspective in terms of how do you control that. . . . you know, and some of the scary things around that, certainly going back to policy, is how do you manage and keep an eye on what kids and/or staff are having . . . observing and looking at on a daily basis. (personal communication, August 31, 2012)

Building Leader D also discussed fear:

Yes, the biggest barrier was just with staff. You know I've got some staff members that don't own cell phones, don't own the iPads. You know, have no idea what G3 and G4 means. And so I think a lot of the frequency of emotions that if you open them up and you know . . . is going to explode, or etiquette is going to get worse, disrespect is going to be on the rise. You know like I think there also is another obstacle that we certainly saw at the board level was the board never wanted them . . . certain board members weren't tremendously text savvy. (Building Leader D, personal communication, September 2, 2012)

Infrastructure. Assessing the wireless needs for the district was a barrier. According to Superintendent D:

The big barrier was could we support it, you know, wireless wise. We weren't wireless….we didn't have a lot of wireless capability even last year. So those capabilities have been increased. So you know, those….that hardware piece I guess and that network piece, you know, server piece has been a real issue for us in terms of how do we handle that? (personal communication, August 31, 2012)

Finances. Superintendent D told of how the district was able to use funds from a recently passed capital project to strengthen their wireless capabilities. Without these funds, the integration could not have spread. "And of course planning for the capital project has allowed us

to really make sure we can handle . . . bandwidth and everything else" (Superintendent D, personal communication, August 31, 2012).

The district's vision is to get the device into the hands of every student. Superintendent D described finances have been a barrier to fulfilling the vision:

> So you have to understand that we're certainly not where we need to be. . . . I think back to SMART Board technology . . . we've done what is called a technology grant process . . . teachers have had to apply for a SMART Board, because we're limited in terms of funding . . . we did pretty much the same thing . . . with the iPad. (personal communication, August 31, 2012)

Summary of barriers for School District D. School District D faced four barriers to the integration process: fear, infrastructure, policy, and finances.

Summary of Research Question 2: Barriers. There were six barriers presented through the disaggregating of the data to answer research question two. The barriers, as revealed by the interview questions of the participants, are in Table 11.

Table 11

Barriers of the School Districts

	School District			
Barrier	A	B	C	D
Fear	X	X	X	X
Infrastructure	X	X	X	X
Current policies		X		X
Finances	X		X	X
Data collection for success	X	X	X	
Curriculum integration	X			

Research Question 3

What strategies does a school leader use to plan and implement the change process which will move a district from one that doesn't yet use handheld (i.e.: smartphone, iPod, or tablet) technologies to one that does?

Strategy is required for a successful integration. The how and why of the integration is determined by a successful strategy.

Strategies: School District A.

Data collection. Data collection provided evidence to the stakeholders of the success of the integration and gave them adequate reasons to continue to support the vision of the district for handhelds.

It was very important for me to look at data. Is it having an impact on our math scores? Is it having an impact on our ELA scores? Is it having an impact on attendance, student

comportment? And some of those things that are less tangible, like you know, students working together cooperatively in teams like they'll have to when they enter the workforce a year or so from now. . . . but so far the data we have looked at, we have seen improvements in learning; attendance has improved. There is less misbehavior on the part of students. . . . we have to be reflective too in talking with our teachers and our principals and our parents, because if we're not coming back to the board saying that these are the reasons we need to continue to provide the resources which become more expensive as we add on grade levels, the board's not going to be committed to that if we don't provide them with evidence that this . . . initiative truly is in the best interests of our kids. (Superintendent A, personal communication, July 3, 2012)

Building Leader A understood that, due to the short time frame of the integration, they would not be able to measure success through test scores. Data for the success of integration was gathered by surveying parents.

We did do a parent survey last year in the one class. We're going to do another one in the fall for this year's class . . . of all the fifth and sixth graders. So you know, that is I think important. The feedback we got from the parents previously was that, you know in general the kids were much more excited about school because they had access to the iPads. (Building Leader A, personal communication, July 5, 2012)

Professional development. Professional development is an absolute must for a successful integration. Staff needs to learn how to use the technology and put it into their curriculum as an instructional tool.

The strategy used by the leaders of School District A was to imbed professional development into their school. The staff had a resource to assist them at any time in the school day.

> I think we provided some incredible professional development. We provided release time. We provided you know, time where they could go in and observe other classrooms. . . . what they observed, they found to be very, very impressive. And I will say a big part of that is we leaned heavily on our teacher leaders. It's not our principals providing the PD. It's not my technology coordinator providing the PD. It's teacher leaders who have already been using these iPads in their classrooms. (Superintendent A, personal communication, July 3, 2012)

Building Leader A (personal communication, July 5, 2012) detailed the role of the Director of Technology in the area of professional development strategy:

> Then our Director of Technology was very . . . very proactive I guess in getting as much training for teachers . . . [the Director of Technology] was in the classroom helping the teachers . . . So [the Director of Technology's] support, I think was really key. Most of my teachers, even the ones who aren't really tech savvy, were very . . . very, I don't know. . . . they were willing to jump in with both feet as long as they had the support. And having this . . . the fifth grade teacher who piloted plus the director [were] really involved [and] our computer room aide is another one who did a lot of trouble shooting . . . It wasn't the type of thing where they had a [lesson] plan for the day to do something and the technology wasn't working.

The strategy for integration was enhanced by the role of the technology committee.

> "I believe that the integration for the professional staff involved some professional development during the superintendent's conference days; and a technology committee . . . that was made up of teachers . . . that would support those teachers, kind of like a mentoring type relationship – teacher on teacher – In addition to that, there's a BOCES individual that is in our school on premises once a week for whenever the teachers have time to go ask questions you know, with whatever technology they're using. (Union Leader A, personal communication, July 25, 2012)

Pilot program. A pilot program is a testing ground for the leaders to determine whether the technology integration will meet their expectations as they relate to student needs. Within the strategy of the pilot program is another strategy of finding the correct person to lead the pilot program.

> Of course, I have to say that it's only successful if you have the teacher who's passionate about it. Because . . . obviously there's a lot of preparation time outside of the classroom . . . It was a very, very complicated thing that had to happen, and we made sure that we got the right person on the bus. (Superintendent A, personal communication, July 3, 2012)

The program started with a fifth grade teacher. This particular teacher was a pioneer in utilizing technology to enhance curriculum.

> It was actually piloted four years ago with a fifth grade classroom. And that was done because we felt that we had a real strong teacher leader who was very passionate about technology, and we knew that [this teacher] was the perfect individual to begin this initiative with. And we thought that with [this teacher], it probably enjoyed its best

chance of being successful. And we were not disappointed. (Superintendent A, personal communication, July 3, 2012)

Superintendent A and Building Leader A attributed the success of the program to this individual teacher. Building Leader A discussed how they were able to find the correct person to lead and assist other teachers in the integration process.

> . . . picking this particular educator to pilot. [This teacher] had the expertise. [This teacher] had the enthusiasm. [This teacher] had the desire to implement the iPads in [their] classroom. [This teacher] also is very willing to, you know, help out any other teacher who is interested in using the devices. So I think really finding that right person to kind of introduce it was key. . . . But as soon as you know, any of the tech savvy teachers saw what was going on in the classroom, they wanted in. (Building Leader A, personal communication, July 5, 2012)

The reason behind starting the pilot program in the fifth grade was, "because of a teacher who was extremely interested in using that technology and had quite a bit of knowledge of how [this teacher] would use that technology in [this teacher's] classroom" (Union Leader A, personal communication, July 25, 2012).

Supplemental tool. The handheld device would be used to amplify instruction rather than a replacement for instructional techniques (Hew & Brush, 2007).

> It's simply the principals job to go in and evaluate . . . the teacher. No differently than a teacher not using iPads. . . . the reality is that the iPads aren't going to be used 100% of the time . . . my expectation is . . . we want the kids actively engaged as learners and part of that is ensuring technology is a big part of that. (Superintendent A, personal communication, July 3, 2012)

Union Leader A described the introduction of the iPad as a supplemental tool: "It was completely set up as a supplemental tool to be used in the classroom" (personal communication, July 25, 2012).

Showcasing. Showcasing provided numerous benefits. It provides the community and other stakeholders the opportunity to see the success and benefits of integrating handheld technology into a school's curriculum. "But we've kept this initiative front and center to the board and they've seen the progress. They've seen the kids and teachers in action and it's something that they continue to see value in and continue to support" (Superintendent A, personal communication, July 3, 2012).

Expanding the classroom. Superintendent A and Building Leader A discussed how they expanded the classroom by allowing the devices to go home with the students.

> And that was a decision that we had to make about allowing the iPads to go home . . . the seven hours that we have the kids they're utilizing the iPads, but how about you know the other 17 hours when they're not here. You know when they could be responding to a blog or working on a presentation. So a decision was made to allow these to go home. (Superintendent A, personal communication, July 3, 2012)

Building Leader A (personal communication, July 5, 2012) stated "the sixth graders did take them home last year."

Summary of strategies for School District A. School District A discussed six strategies to their technology integration: data collection, professional development, a pilot program, supplemental tool, showcasing, and expanding the classroom.

Strategies: School District B.

Professional development. Imbedded professional development was offered by the district. They also hired two instructional support teachers (IST).

> Well we had our BOCES district. We had two folks who came in on a regular basis . . . they would come into our classrooms, and they would work with us one on one. But these two IT specialists were fantastic. They had a lot of information with web based learning that we could access. They gave many seminars during our lunch hours. There was a lot of professional development available. (Union Leader B, personal communication, September 14, 2012)

The middle school offered the leaders an opportunity for their own staff to provide professional development during their team planning time. The planning time was for the teacher leaders to share their integrated lessons. The sharing was a means to ensure the other teachers were effectively integrating the technology into their own lessons.

> We have team planning time every day. And you know, I would ask what are you doing? . . . The rest of the team members would talk about what they were doing and the other person had nothing to offer. And they'd say, when we talk about it next week let's make sure that everyone has done something. . . . They were more than willing, and they just wanted some guidance . . . if they weren't able to attend professional development during the summer, we had it throughout the year. And again, the support teacher was here all the time. But you know, their colleagues, they really shared. And no one wanted to be the one who didn't do it. (Building Leader B, personal communication, August 8, 2012)

Superintendent B (personal communication, July 17, 2012) reinforced the team planning time opportunity for professional development:

> Well, I think the biggest thing is we used the peer mentoring. That was huge. You know, we really had those people who were the high flyers using faculty time to demonstrate what they were doing. And the good thing about the middle school, we're in a team setting. So you know, we had high flyers on every team. So they would take the lead and then provide support and coordinate with the instructional support people.

Professional development was not only coming from the instructional support staff and teachers, but from the students as well. "Professional development was the strongest without a doubt. . . . the interesting twist was also the students. Because they were definitely more comfortable, and they then give teachers tips to adjust" (Building Leader B, personal communication, August 8, 2012).

Directives. Superintendent B used his leadership authority and issued a directive as a strategy to ensure the teachers were putting the integration into place. "Also, you know, it wasn't an option. The other thing we did is that you had to develop a unit within the first ten weeks of school. That would rely on the use of the handheld devices" (Superintendent B, personal communication, July 17, 2012).

Pilot program. The pilot program began in the middle school, specifically in grades five through eight. The current curriculum in the middle school aligned with handheld technologies.

> . . . in grades five and seven. And the why is because in grades six and eight . . . they were doing some virtual learning and building virtual worlds, and in the eighth grade they were looking at a STEM initiative dealing with renewable energy. So I thought . . . it only makes sense to pilot this in grades five and seven and then the middle school would really be the pilot site for the technology integration. (Superintendent B, personal communication, July 17, 2012)

The teachers in the middle school building were already considered *tech savvy*. Building Leader B (personal communication, August 8, 2012) stated:

> I believe initially the middle school started . . . one of the reasons is that I'm ready to try just about anything. And we had used a lot of technology overall in the building, the middle school. The teachers had tried to integrate it as much as possible. And unlike the other buildings we had teachers who definitely would try to go to war over being able to get into the labs. I went from there to getting carts for every grade level. So at that point then the next step was this opportunity for us to do this.

Expanding the classroom. Expanding the classroom gives the integration a broader base, allows students to continue learning beyond the confines of a 45 minute instructional period, gives students the ability to interact with peers throughout the school and even outside the school, and effectively does away with *dead time*. These aspects of expanding the classroom aid the leader in fulfilling the vision of the integration.

School District B went from smartphones to netbooks. The change to netbooks expanded the established curriculum.

> I think it gave more possibilities, especially at the high school level . . . because all of the seniors have to do a thesis project. . . . they do a lot of project and a lot of Internet based research. . . . I think it was much more flexible and I think that was the reason. (Union Leader A, personal communication, July 25, 2012)

There was a data plan with every netbook. This gave the netbook Internet access not only in the school, but also at home, on the bus, and essentially everywhere. Constant access provided teachers and students the possibility to continue learning beyond the confines of the classroom walls.

> You know, we walk through our hallways at 3:00, school is out, and you see groups of kids sitting around with their netbooks. Working . . . because everybody, you know they have connectivity, so you can work everywhere, anywhere. You can work together. . . . The kids were going to a swim meet. They got stuck in traffic. . . . They were late for the swim meet. They knew the swim meet was going to be over late anyways because it was a long trip back. Kids opened their netbooks and started working; started asking each other questions, asking for help. I mean it was on the bus. (Superintendent B, personal communication, July 17, 2012)

The data plan and the extension strategy allowed the district to stay connected with parents. Even parents without Internet capabilities could retrieve assignment information, school announcements, and their children's grades.

> Well, I guess when everyone or parents do not say, well, I couldn't get that information because I don't have the Internet. I couldn't find it. Which, that to me was just a lot this year, so it was very successful. . . . We had quite a few parents who could not get to the Internet . . . But now it's wonderful to say, Ma'am your son has a netbook at home so you should have been able to go on there and see all of his grades and every missed assignment. . . . The parents were using it as well . . . As long as it's being used . . . for them to find their student's grades or their attendance problems or what have you, let them use it. . . . Rarely do you get someone saying that they couldn't find information. (Building Leader B, personal communication, August 8, 2012)

Moving to netbooks expanded the classroom, and there were definite benefits with the data plan.

> So I thought the way to allow students to not only have access in the classroom but also to be able to be connected and able to use this technology at home to continue their work. And to be able to . . . especially those who don't have any public transport to be able to connect with their classmates and work cooperatively outside of the school setting on projects and so forth. For instance, I teach a college level course, and these students would be going on college visits, but they would still have access to their work, so they wouldn't be falling behind. And that was a big positive that we've heard. That . . . or if students were out sick they weren't falling behind. I've heard this from a number of parents that the students were able to work cooperatively with one another and weren't hampered by being unable to connect physically with each other. (Union Leader B, personal communication, September 14, 2012)

Supplemental tool. Superintendent B described how the netbooks would be used as a supplemental tool for research. "So you give them a couple of links that would assist them, but then you also challenge them to identify links with valid information to also use in solving a problem or conducting their research" (Superintendent B, personal communication, July 17, 2012).

Building Leader B discussed how one teacher created a collaborative project and the students used the netbooks as a way to amplify their communication abilities.

> The students were working on the project, but they weren't in the same place. . . . They were on this thing called Skype . . . the teacher had said, look, you guys need to find a way to work on it. . . . They were using the one student's study hall and the other two students were in a class, and they're working on their project, and they're not saying a word. (Building Leader B, personal communication, August 8, 2012)

Union Leader B spoke of how the teachers utilized netbooks to test their students. "A lot of people are having their pre-tests on . . . netbook(s), and the system can grade it automatically, so we don't have to involve other co-workers" (Union Leader B, personal communication, September 14, 2012).

Summary of strategies for School District B. Five strategies emerged from the data of School District B: professional development, directives, pilot program, expanding the classroom, and supplemental tool.

Strategies: School District C.

Professional development. The district had two positions directly responsible for technology and professional development, a Director of Technology and a Director of Innovation and Enrichment.

> That involved myself . . . and we have a position called Director of Innovation and Enrichment . . . and [the Director of Innovation and Enrichment] kind of does staff development with me. . . . because we are so small, we didn't take the traditional route of saying OK, everybody come in, we're going to do staff development. We had the ability to go in and talk to one or two teachers at a time, and talk to them for an hour or two and just kind of showed them some of the things you can do on the iPad . . . teaching ELA using iPads. Teaching math using iPads. Like that, and then had them come back to us you know, to see how they felt about what they saw. And that was kind of the engaging, energizing piece for them. (Building Leader C, personal communication, August 27, 2012)

The professional development opportunities empowered the staff and allowed them to learn on their own. Professional development opportunities were provided by the Director of Technology and the Director of Innovation and Enrichment.

> We've trained our faculty extraordinarily well, which is also very important because, . . . I know that probably one of the biggest problems in education is the fact that teachers may have technology, but they don't use them . . . Our Director of Innovation and Enrichment has been offering what we call Tech Tuesdays on Tuesday afternoons. And any needs that were requested are met by teachers coming in. . . . They come in when they need it for how long they need it. So there was a continual integration within the classroom. (Superintendent C, personal communication, July 31, 2012)

Superintendent C spoke of how they extended the professional development training to the parents of the district: " . . . we have required parent meetings and training that our parents actually go through. So they have an understanding of how the technology is used" (personal communication, July 31, 2012).

Building Leader C also spoke of how they extended the professional development opportunities to the parents:

> One of the strategies that we're using . . . we started . . . three years ago . . . working with parents is we started giving iPods to our incoming Pre-K families, so they come in in May to do their Pre-K screening . . . [the Director of Innovation and Enrichment] and I would meet with the parents while their kids were being screened, show them the iPod . . . show them some of the apps and what our goals are. . . . Then we let that family take the iPod home for the summer to use it. . . . we have a blog that they comment on, you

know just to kind of let us know how it's going and get some good feedback. (personal communication, August 27, 2012)

Professional development offered opportunities to learn from the directors and other staff members.

> Well, our technology . . . coordinator and our enrichment coordinator have both held a variety of after school workshops on use of the technology that were voluntary and available to all teachers, whether they did or didn't have handhelds in their classrooms. As an entire faculty, we've been engaged in sort of on-going professional development on how to be web-based. The fact that it was phased in fifth grade, then fifth and sixth, then fifth, sixth, seventh, eighth gave . . . veterans in the process . . . the opportunity to be advocates for it, to be mentors to those who are beginning. . . . So I think that the roll out has been not so abrupt as to cause alarm or undue stress. (Union Leader C, personal communication, August 3, 2012)

Voluntary staff participation. The integration was rolled out slowly and teachers were not forced into the integration process. The rollout gave teachers the opportunity to showcase their lessons. The integration spread out on its own because the device was perceived by staff to increase student engagement and enhance their learning, rather than replace already established instructional techniques. This strategy allowed the integration to be seen as an opportunity. "Right now, it's voluntary . . . it's been offered as opportunities. It hasn't been offered as mandates" (Union Leader C, personal communication, August 3, 2012).

Pilot program. Their pilot program was started in the elementary school. "They were actually integrated . . . at the elementary level first. And with the understanding that the kids in 3

through 5 would then just grow into them as they moved into the middle level" (Superintendent C, personal communication, July 31, 2012).

The pilot was placed in the middle school. The catalyst for placing the pilot in the middle school was two staff members who had a technology background and were ready for the integration.

The integration was rolled out slowly, and techniques were not forced into the integration process. This strategy allowed the integration to be seen as an opportunity for teachers to have another tool to increase student comprehension of instruction.

> Seventh graders were in that first pilot. And why we picked them was, we had two teachers at that grade level that we thought were ready to take on that type of a challenge and kind of volunteered for it. And that's where it started. Just based on teachers' willingness. (Building Leader C, personal communication, August 27, 2012)

Union Leader C described the pilot as starting in the special education department and then with the elementary students:

> . . . iPods rather, . . . were first made available to Special Education. The rationale being that kids who struggled to take notes and to organize themselves through more traditional paper and pencil means might find success with iPods and might be more likely to actually do it because iPods are . . . would be attractive. Second, they were introduced right at the elementary level. (personal communication, August 3, 2012)

The data displayed some contradictory information as to where the pilot program first began. However, the consistent message by all three leaders was a pilot program did occur. The reason behind the apparent contradiction was the device integrated. iPods were first introduced

in the elementary level and special education department. The iPads were first introduced to the seventh grade population.

Expanding the classroom. The classroom was expanded beyond the 45 minute time frame and seven hour day. The leaders trained parents and added software. At the time of the data collection, the leaders were discussing changing their method of instruction from traditional to a flipped classroom.

> When we talked about flipping the classroom . . . We'd like to know that the parents are able to see these videos so that they can further help their kids. . . . The goal in all of this is to bring parents into the classroom. And so by doing this flipped classroom model and having kids being able to take iPads home and show their parents how they work . . . Because education is vastly different than when we went to school...when a kid uses his iPad and logs into Schoology . . . it's going to show up in his recent activity or any notices or messages he has. You know, along with the ability to see any homework that was posted right to everybody's calendars. (Building Leader C, personal communication, August 27, 2012)

Superintendent C detailed the districts efforts to expand the classroom by training the parents in the district:

> One of the nice things about technology is it does link the work that was done in the classroom to the home site. So when kids are doing homework, they have ways of returning to the classroom. . . . They have ways of returning to the instruction that happened either during that day or during the last week. And as I said, we have required parent meetings and training that our parents actually go through. So they have an understanding of how technology is used and . . . as a tool and not as the instructional

practice. You know I think what most people get concerned about is that it's . . . it's . . . somehow technology is replacing the teacher and they understand . . . What it does is it helps support the teaching. (personal communication, July 31, 2012)

The district utilized pilot programming to begin the integration process with each device in an effort to expand the classroom. They rolled out the integration in different areas and informed staff it was a better way to engage students and give them another opportunity to increase their ability to learn. Procedures were put in place, such as, providing each pre-K student with an iPod and training their parents on how it would better prepare their child for kindergarten. They also, purchased software and began utilizing the flipped classroom method to expand their instruction beyond the walls of the school.

Supplemental tool. Superintendent C explained the devices as a supplemental tool for learning:

We also are very cognizant of the fact that they are just a tool and used only as a tool. They're not the education of the child. They are actually a tool used to help in the education of the child. (personal communication, July 31, 2012)

Building Leader C also described the device as a supplemental tool for learning and how the district communicated this to their faculty:

The other piece too in kind of getting this going . . . is we let the faculty know ahead of time . . . what we're giving you is a very portable internet enabled device that does create some content. But think of apps as skill building, not teaching. (personal communication, August 27, 2012)

Showcasing. Superintendent C spoke of their students showcasing the devices: "You know, we've had many presentations where the kids show us how they're using technology and

some of the new methodologies they've figured out that will help support their learning" (personal communication, July 31, 2012).

Summary of strategies for School District C. School District C demonstrated six strategies utilized in the integration process: professional development, voluntary participation, pilot programming, expanding the classroom, supplemental tool, and showcasing.

Strategies: School District D.

Data collection. Data collection was the determining cause in lifting the district's no use policy.

> We did a lot of survey work before we did that to say . . . what is the percentage of our families in school communities, school taxpayers that have Internet. And so that helped us gauge whether or not we could actually launch this. (Superintendent D, personal communication, August 31, 2012)

Data were collected from other districts to garner support for lifting the ban on technological devices during the school day.

> You know and again I think a lot of schools are probably in this situation . . . we also had sent out a listserv question to [all the] districts in the…[local] BOCES and most of them were [unintelligible] in our situation. Where they had these policies that are basically banning the devices in school, and they're not being terribly well followed, and they're not being terribly well enforced. (Building Leader D, personal communication, September 2, 2012)

Building Leader D surveyed neighboring districts and examined data retrieved from their own district, as well.

> OK, so we tried to collect both quantitative and qualitative data. So for example, we would do some comparative things that would look at you know, types of infractions in discipline referrals, you know, instances of cyber bullying, sexting, and those types of things. . . . you know what do you notice in the lunch room. What do you notice in the halls? What do you notice with kids learning in the classrooms? And you're not going to get scientific data from that, but you're going to get people who can sort of write narratives of qualitative responses. (Building Leader D, personal communication, September 2, 2012)

Professional development. The district provided professional development for the staff within the school day. They created a split position, half time teacher and half time professional developer.

> [The individual is] actually a teacher on special assignment for half a day, and [this individual is] a technology professional developer. So [the professional developer] offers a lot of workshops on the handheld devices. [The professional developer] does a lot of Google apps with the staff. And so [the professional developer has] really taken this on. So [the professional developer] started with the tablets and then [the professional developer] went to the iPads. Sometimes [the professional developer] combines the two . . . [the professional developer] designs professional development to get the same technology out into the teacher's hands. So [the professional developer] goes over to the elementary school for two days a week, and [the professional developer] teaches out of the secondary building. But [the professional developer] comes over, and [the professional developer] sits, and [the professional developer] has office hours so to speak where staff can come in and talk to [the professional developer] about certain apps and

technology integration whether its desktop, laptop, or handheld. It doesn't matter. And then [the professional developer] also runs workshops after school for staff. [The professional developer] also pushes it and coaches staff through some of that . . . instructional piece. (Superintendent D, personal communication, August 31, 2012)

Building Leader D also spoke of the professional development opportunities offered by the district as a strategy: "There are some deep sort of professional development opportunities that give people a chance to see what they could do" (personal communication, September 2, 2012).

Shared decision making. Shared decision making allowed all stakeholders in the district to provide input on how their specific group would be affected by the integration. The members participating in shared decision making were expected to provide problem solving ideas to assist in the integration process. The district employed a shared decision making strategy to change the ban policy.

We had a policy that said no electronic devices during the school day. . . . And I felt like . . . a lot of schools that it wasn't very well enforced. So you know, we went back and did a lot of work with our shared decision making team to try out sort of a new policy for electronic devices. . . . It was a pretty transparent process. (Building Leader D, personal communication, September 2, 2012)

The strategy of shared decision making determined what devices and how many would be purchased for the students, how the devices would be integrated into the curriculum, and how to sustain the initiative.

And then we have a technology committee that actually reviews that data. You know we have curriculum now that's in place, UPK through twelve through the integration of

technology. We do start our kids at grades four, six and eight now in terms of measuring their technology understanding as it aligns with you know, college and career readiness. So we did a lot of work with that technology committee in terms of doing a long range plan for how we were going to begin phasing in handheld technology. (Superintendent D, personal communication, August 31, 2012)

Pilot program. The pilot began in a seventh grade classroom. The district used two devices: the Samsung Galaxy tablet and the iPad. The school leaders discussed the importance of the teacher who ran the pilot program.

> We first did it with seventh grade, mainly because we had a staff member that was really into technology. [The teacher] is actually a teacher on special assignment for half a day and [the teacher] is a technology professional developer. So [the teacher] offers a lot of workshops on the handheld devices. . . . And so [the teacher] has really taken this on. So [the teacher] started with the tablets and then [the teacher] went to the iPads. . . . [the teacher] designs professional development to get the same technology out into the teacher's hands. [The teacher] has done some tremendous projects. . . . But what we've been doing is we've again, tried pilot groups that have gathered data regarding impact on student learning. And really studied that and communicated that with staff. (Superintendent D, personal communication, August 31, 2012)

Building Leader D stated:

> Probably the most important reason actually has to do with the individual. Our seventh grade social studies teacher. [The teacher] is a .5 social studies and .5. . . technology staff developer. . . . You know, [the teacher] has been to a lot of conferences

. . . [the teacher] was the real driving force behind it. (personal communication, September 2, 2012)

Once the lead teacher's pilot program was completed and the funds secured to buy more devices, the program was expanded. They purchased 163 more devices and put a *grant process* in place.

> We've done what's called a technology grant process. . . . what that has involved is that teachers . . . apply for it, but there were some specific questions that they had to answer regarding how did they feel it was going to impact student achievement. What types of instructional strategies did they want to incorporate? What types of professional development do you need? How do you see this benefitting students? Or how do you see this impacting unit or lesson plans? So there were a lot of questions and lots of thought process and reflection on what that was going to look like and sound like. How it's aligned to the common core. How it's aligned to preparing our kids for college and career readiness. So really aligning it to our plan . . . strategic plan. That kind of thing. And so that's been how we've distributed that. (Superintendent D, personal communication, August 31, 2012)

Showcasing. Building Leader D discussed the showcasing of the integration process by Superintendent D:

> So, one of the things that our superintendent has made a conscious effort of doing is . . . regularly updating the board on different things that are going on at schools related to electronic devices. So, for example, we've had people that have presented in NYS conferences on the use of tablets and different technologies . . . So they presented to the board and did a great job, and so the board can see how this ties into the bigger

> educational picture. . . . I presented to the board a couple of different times on our electronic use policy and practice. (Building Leader D, personal communication, September 2, 2012)

Voluntary participation. "Well we haven't forced it. We haven't mandated it. . . . We've done what's called a technology grant process" (Superintendent D, personal communication, August 31, 2012). The technology grant process provided teachers with an opportunity to have handheld devices in their classrooms. The application for participation in the program required the teachers' to inform administration on how the technology would be incorporated into their instruction.

Building Leader D also told of how the district is not mandating the integration: "They're not being forced to use them . . . " (personal communication, September 2, 2012).

Summary of strategies for School District D. School District D demonstrated six strategies: shared decision making, pilot programming, data collection, professional development, showcasing, and voluntary participation.

Summary of strategies.

The strategies of the four districts are displayed in Table 12.

Table 12

Strategies of the School Districts

	School District			
Strategy	A	B	C	D
Data collection	X			X
Pilot program	X	X	X	X
Professional development	X	X	X	X
Expanded the classroom	X	X	X	
Directives		X		
Voluntary staff participation			X	X
Shared decision making				X
Supplemental tool	X	X	X	
Showcasing	X		X	X

Research Question 4

What factors caused the school leader to decide to implement the use of handheld technology?

A factor is defined as "one of the elements contributing to a particular result or situation" (Factor, 2013). Research revealed five factors which led School Districts A, B, C, and D to implement handheld devices.

Factors: School District A.

Pre-Existing Conditions. The pre-existing condition of a district can act as a catalyst for change. An example of a pre-existing condition is an already established continuum of technology. Another example would be staff who have made integration a priority.

School District A had already established technology as a priority. The district utilized existing staff to launch the implementation. Staff knowledge and their desire to integrate the latest technology into the curriculum was a large factor in the decision to move forward with the handheld integration process. "We felt that we had a real strong teacher leader who was very passionate about technology" (Superintendent A, personal communication, July 3, 2012).

"And what we did was we found a teacher that we knew would really take the ball and run with it . . . a fifth grade teacher . . . who is just outstanding" (Building Leader A, personal communication, July 5, 2012).

"Possibly because of a teacher who was extremely interested in using that technology and had quite a bit of knowledge of how [to] use that technology in [the] classroom" (Union Leader A, personal communication, July 25, 2012).

School District A's culture was one of collaboration and trust. These two attributes were a factor in the decision to begin the implementation process.

> I think it's because we've created an environment of trust and collaboration here. I think we have teachers who are willing to accept risk taking. . . . So I think because we've created that environment of trust and collaboration that people are willing to try new things. (Superintendent A, personal communication, July 3, 2012)

School District A had just completed a technology integration initiative and was ready to take the next step into handheld devices.

> We had just completed an initiative where we had put SMART Boards in every classroom or every teaching space in our district . . . in consultation with our Director of Technology about what our next major initiative would be. It hasn't changed our budget

because we went right from the SMART Board initiative to the one to one initiative. (Building Leader A, personal communication, July 5, 2012)

District resources. District resources are elements within in a district that enhance the leaders' ability to complete the vision for a successful integration process. Community partnerships, the local BOCES, and the Board of Education are examples of district resources. School District A collaborated with BOCES and Apple to fund their initiative.

> We're approaching it differently today than we did two years ago. We actually worked with BOCES and Apple. . . . instead of purchasing the iPads directly, we could do a three-year lease, and what that did is that increased our purchasing power . . . since it's through BOCES, we do get aid back on those expenses. . . . We've actually taken the Is . . . , there's a company that . . . will buy them from us for a couple hundred dollars, and we reinvest that money into our . . . school district to purchase additional iPads. . . . All of our classrooms . . . have iPad IIIs. I should say Apple's been very involved with us. They've been very pleased with what's doing here. They gave us a distinguished program designation. We met with . . . the Apple financial person, the BOCES person, myself, and my tech guy, and we reached an agreement on a lease. And the nice thing is . . . we also get PD from certified Apple people. And we also have large purchasing power for apps that are also embedded within that lease; which is nice. (Superintendent A, personal communication, July 3, 2012)

School District A was able to rely on the community for financial support and received educational grants for funding.

> They started looking for creative ways to get the devices in their rooms, and our Special Education Director used some of the 611 and 619 grants. . . . We used a little bit of the

> Title II grants and . . . the Education Foundation bought us 16 iPads for the entire first grade. (Building Leader A, personal communication, July 5, 2012)

Leadership. "Leadership is the process of persuasion or example by which an individual (or leadership team) induces a group to pursue objectives held by the leader or shared by the leader and his or her followers" (Gardner, 2007, p. 17). In terms of the integration of handheld devices, leadership can be the catalyst and provide individuals with an end goal. Leadership provides support and facilitates the change.

Building Leader A described the leadership and support of Superintendent A and the Board as a factor in the success of the implementation: " . . . and I should say the support of the superintendent and the school board" (personal communication, July 5, 2012).

Union Leader A (personal communication, July 25, 2012) discussed the efforts of the district's leadership as a factor:

> I believe the district has been on the forefront of pursuing the technology that we can use in the classroom. Their pursuing of grants and we have a technology person on site all the time . . . who formally works for BOCES. . . . And I believe that they've done a very good job at making all of those opportunities available that can be realized in our district.

Benefits. School District A's increased attendance rate, student achievement scores, and student engagement were powerful factors in the decision to implement handheld devices.

> This is our . . . third year. So, not a lot of data to look at, but so far the data we have looked at, we have seen improvements in learning; attendance has improved. There is less misbehavior on the part of students. And we think we're doing a good job of getting kids to embody those 21st century skills that we look for in students. (Superintendent A, personal communication, July 3, 2012)

Increasing a student's ability to be college and career ready was a factor. Building Leader A stated:

> We talked about . . . the fact that adults come to school or go to work every day and the first thing they do is they turn on their computer, yet our students turn on a computer or sit in front of a computer once a week for 45 minutes. And that just did not seem like the right way to be preparing kids, even at this young age, for the work place. So we stared doing some research about one to one computer access. (personal communication, July 5, 2012)

District size. The size of the district was also a factor.

> Our size . . . You know . . . we're rolling out to 90 fifth graders. It's not rolling out to 300 or 400 or 500 fifth graders. So I think that has helped us. [I] know [someone who] works in [a larger district], and it just couldn't happen there. Although eventually, years down the road, it will have to. . . . So I think our size helped us. (Building Leader A, personal communication, July 5, 2012)

> Building Leader A verbalized several factors: "We've kind of had the perfect storm of the right size, the right teacher, the right technology director" (personal communication, July 5, 2012).

Summary of factors for School District A. School District A presented five factors that were the impetus for their integration process: pre-existing conditions, district resources, leadership, benefits, and district size.

Factors: School District B.

Pre-existing conditions. School District B was utilizing technology in their curriculum. They already had programs that leadership wanted to enhance with technology integration.

> The reality for me was that students were bringing a whole set of skills to the educational setting that truly educators were not tapping into. . . . They were coming here with the understanding of how the digital world is working . . . it . . . became immediately apparent that we are missing a huge part of the picture. (Superintendent B, personal communication, July 17, 2012)

Superintendent B expanded on the factor of a pre-existing condition in the curriculum: "They were doing some virtual learning and building virtual worlds, and in the eighth grade, they were looking at a STEM initiative dealing with renewable energy" (personal communication, July 17, 2012).

Superintendent B also commented on the world and society as a factor:

> There's a real new world of opportunity out there. That's the world our kids are competing in. . . . If you have a computer and the Internet you can compete . . . you have kids in India that . . . didn't go to formal education, but they're connected. And they're seeing the opportunity, and they're hungry. And they're going to kick the pants off of our kids just because they're hungry. . . . You can't make them hungry by taking things away from them that will only make them see the possibilities and expand the opportunities for them. (personal communication, July 17, 2012)

Building Leader B discussed what they were already doing with technology: "We had used a lot of technology overall in the building, the middle school. We didn't use it in isolation. The teachers had tried to integrate it as much as possible" (personal communication, August 8, 2012).

Union Leader B saw the current conditions of the community as a factor:

> Well, first of all, we're a rural district and I'm very much aware and we're not exactly the most affluent . . . we've gone from being [nearly the] poorest county in the state to being [only a little higher] . . . I know that the access to Internet technology is not as great as it would be in a more urban setting. . . . I thought the way to allow students to not only have access in the classroom, but also to be able to be connected and able to use this technology at home to continue their work . . . outside of the school setting. (personal communication, September 14, 2012)

The current curriculum was another factor. Union Leader B stated:

> And preparing for college and the theory was that they could . . . because all of the seniors have to do a thesis project, and there's a lot of project orientation . . . and we are the two years humanities program with the global and the English classes, and they do a lot of project and a lot of internet based research. (personal communication, September 14, 2012)

District resources. The board of education, the superintendent and the district's senator were resources.

> The board of education has supported it. There are several people on the board who are involved . . . in [a local company] and . . . information technology . . . They realized that this is the wave of the future . . . so they're willing to get in on the cutting edge. . . . Our superintendent and our board foresaw and acted on it and were able to get some grants and some people to support this. One of the reasons we got the netbooks is that [our senator] got a grant for us for the initial round of netbooks, and then we've been able to shift monies to continue the process. So it's the willingness to make choices and support

the technological wave of the future. (Union Leader B, personal communication, September 14, 2012)

Benefits. Union Leader B described the benefit factor:

. . . and make this type of technology . . . available to the students so . . . our kids are prepared when they go out into the world. . . . With this kind of asset in our repertoire, they'll be much more competitive when they enter college and the workforce, to have experienced this. (personal communication, September 14, 2012)

Leadership. Superintendent B spoke of leadership as a factor:

It does start at the top. I mean you've got to have that vision. . . . You've got to be able to get that buy in. . . . You know, that culture of always looking to continually improve. And that's what I've tried to do there. I've tried to create . . . that whole culture of continuous improvement. That we're really good at what we do but . . . we really want to be great. And it really is that culture of moving people in that direction and getting them to understand that. (personal communication, July 17, 2012)

Building Leader B described the leadership of Superintendent B was the catalyst for the integration process:

But our superintendent now . . . definitely . . . gets really excited about it. And when [our superintendent] sees something, [our superintendent] goes . . . [Our superintendent is] one of those guys . . . [who is] definitely somewhat of a daredevil. I think that's the main reason that we are with quite a few things. (personal communication, August 8, 2012)

And Union Leader B commentated that:

Our superintendent and the person who initially got us going with the little handheld devices in the middle school had a real vision. That this is the way things are going, and

I think the board of education has supported it. (personal communication, September 14, 2012)

Summary of factors for School District B. School district B described four factors which led to their implementation process: pre-existing conditions, district resources, benefits, and leadership.

Factors: School District C.

Pre- existing conditions. What led the district towards handheld devices was a generational learning gap within the school. The district had already established technology integration, and Superintendent C (personal communication, July 31, 2012) knew the students were walking into the building with sound technological skills:

> We actually have a generation gap, even in technology use here in the building, where our high school kids were not as technologically savvy or as comfortable in their use of, as our elementary kids were. . . . at the same point where we integrated handheld technology, we also had the integration of SMART Board technology throughout the district. And our kids were much more interactive with all of it at the elementary level than they were the secondary. Now the kids at that point are now in the middle level and entering the high school. So we're starting to see the spread of technology use as they grow.

The laptop carts were deemed insufficient, making handheld technology a necessity. According to Building Leader C:

> The laptop cart initiatives in the past were, well they were dismal failures in my perspective just because it was too difficult for teachers to implement, moving a big cart of 25 computers into their rooms, plugging it in, setting up the wireless, etc., and the

printing and all of the issues that came with it. And we found that we're not really integrating technology if we have to bring technology to the kids or take them to the technology. (personal communication, August 27, 2012)

There were two teachers ready to volunteer for the implementation of handhelds. Building Leader C described how they were utilized: "We had two teachers at that grade level that we thought were ready to take on that type of a challenge and kind of volunteered for it. And that's where it started. Just based on teachers' willingness" (personal communication, August 27, 2012).

The Internet connectivity was a factor. "I think it's successful to this point because two years ago we surveyed our community, grades four through twelve, and we had 94% Internet access at home in those grades" (Building Leader C, personal communication, August 27, 2012).

State demands were a factor.

The school is attempting to address the demands of the state (so) we raised the bar. I think we're looking for ways to differentiate instruction and reach a broader spectrum of students, and it's our hope that exploring new technologies will enable that. (Union Leader C, personal communication, August 3, 2012)

District resources. Superintendent C discussed the internal resources of staff and students, and the external resources of the community, as vital factors to the integration:

We have a community that's willing to support education that includes handheld technologies. . . . my Director of Technology and my Director of Innovation and Enrichment . . . are always on the cutting edge and are excited about what they do and pull us along with them. It's a faculty that embraces the use of technology and understands the importance of it. And basically students that, at this point, I don't think

could learn . . . or would want to learn . . . without that important tool with them because it helps strengthen and engage our kids and keeps them going. (personal communication, July 31, 2012)

Community resources were a factor.

> We're fortunate . . . to have a community that established a foundation to raise money to accelerate the process of going digital. We're in a community that's pretty darn supportive of education, that wants us to be leaders. That wants our school to produce kids that will go to other good schools . . . we live in a college town. So I think that's . . . an important factor. I think that we've got a very intelligent faculty that is open to change and wants to be excellent teachers. (Union Leader C, personal communication, August 3, 2012)

Leadership. Building Leader C detailed how the leadership of the district was a factor in the implementation:

> We just did it. We didn't sit around and talk about it. We made the decision four years ago that this mobile cart, going to the labs, just isn't going to do it. Because going to the labs just ended up being Internet research and word processing. And we got to thinking that that's just not going to cut it. And it's not a good use of resources for one. (personal communication, August 27, 2012)

Union Leader C discussed the impact of the board of education goals on the staff: "We've got staff that have made a commitment to educating themselves on technology integration. So all that stems from the board's goals . . . " (personal communication, August 3, 2012).

Benefits. A benefit described by Superintendent C was the ability of the device to create a link between the classroom and the home: "One of the nice things about technology is it does link the work that was done in the classroom to the home" (personal communication, July 31, 2012).

Building Leader C spoke of the benefit of increased communication: "I see a better relationship between students and teachers because I think with the iPads and the ability to communicate with this learning management system that we're using . . . we can increase or make a more positive . . . student-teacher relationship" (personal communication, August 27, 2012).

Union Leader C also described the benefits of technology as a factor: "We're looking for ways to differentiate instruction and reach a broader spectrum of students, and it's our hope that exploring new technologies will enable that" (personal communication, August 3, 2012).

District size. Building Leader C described how the size of the district was a factor in their ability to provide individual professional development opportunities. This individualized professional development led to the success of the integration.

> Because we are so small, we didn't take the traditional route of saying OK, everybody come in, we're going to do staff development. We had the ability to go in and talk to one or two teachers at a time. (Building Leader C, personal communication, August 27, 2012)

Summary of factors for School District C. Five factors allowed School District C to move forward in the implementation process: pre-existing conditions, district resources, leadership, benefits, and district size.

Factors: School District D.

Pre-existing conditions. The major factor in the implementation was the pre-existing desires of the staff. "We had a staff member that was really into technology . . . actually a teacher on special assignment for half a day . . . a technology professional developer . . . offers a lot of workshops on the handheld devices" (Superintendent D, personal communication, August 31, 2012). Building Leader D expanded on the staff as a factor:

> Probably the most important reason actually has to do with the individual. Our seventh grade social studies teacher . . . .5 social studies and .5 . . . technology staff developer . . . [has] been to a lot of conferences and . . . was the real driving force behind it. The other part of it is . . . we've got some really energetic staff members, some really talented educators. (personal communication, September 2, 2012)

Benefits. Superintendent D told of the benefit of increased student engagement: "You know, reaching out to at-risk kids. Making sure that we're engaging them in school" (personal communication, August 31, 2012).

Building Leader D described the possible benefit of the staff teaching proper etiquette and having students connected throughout the school day: "We want to teach kids to be responsible users, and we certainly want them to be 21st century learners, so that they can use these devices to access information and to create" (personal communication, September 2, 2012).

District resources. Superintendent D spoke of Verizon as one of their resources and how the district dedicated their own resources to enhance the implementation:

> The tablet came out of Verizon. . . . We started because Verizon had a deal where they were at least getting the technology in your hands. And then, of course, you had to pay for the extra . . . you know, obviously the ability to be able to be on their network. And

> so we started to look at that. And we thought let's try it for a year. And we were able to manage it cost wise. . . . But . . . we also knew that if we were going to go iPads that we were going to have to change to something different. So we have a 22 million dollar project right now, and part of that is we now have connected both buildings onto the same network. (personal communication, August 31, 2012)

The district's senator proved to be another resource. "[Our senator] called and . . . had 20 to 40 thousand dollars . . . to give and I said great, I know what I'm going to do with that money already . . . that's going to go right to iPads" (Superintendent D, personal communication, August 31, 2012).

Leadership. Superintendent D, discussed the rollout process and long term support for it: "We've been very thoughtful regarding implementation and policy and long term planning and making sure that there's integration and professional development to support that" (personal communication, August 31, 2012).

Building Leader D spoke of Superintendent D's leadership throughout the implementation:

> I think its probably just listening to certain key staff members. So I think you know. . . certainly the vision from our superintendent. [The superintendent] reads a lot. [The superintendent] talks a lot. [The superintendent] thinks a lot about 21st century learning and how learners now may be different than learners in past years. But part of it is that top down vision . . . being confident that you're doing what's right. This stuff is not going away. Listening to kids and moving forward. So I think it probably is just having some key staff members in important positions. (personal communication, September 2, 2012)

Summary of factors for School District D. Four factors emerged from the data of School District D: pre-existing conditions, benefits, district resources, and leadership.

Summary of Factors

The factors reported by the four school districts are displayed in table 13.

Table 13

Factors reported by the School Districts

	School District			
Factor	A	B	C	D
Pre-existing conditions	X	X	X	X
District resources	X	X	X	X
Leadership	X	X	X	X
Benefits	X	X	X	
Size	X		X	

Research Question 5

How do the change and transition steps of a school leader who has implemented handheld technologies into instructional programs, compare to the change steps of Kotter and Cohen and the transition steps of Bridges?

Kotter and Cohen's steps of change. Kotter and Cohen (2002) coauthored *The heart of change: Real-life stories of how people change their organizations*. Their book and the eight sequential change steps were used as the foundation for this study. Their eight step change process is detailed in Table 14.

Table 14

Kotter and Cohen's Eight Steps of Change

Step	Action	New Behavior
1	Increase Urgency	People Start telling each other "Let's go we need to change things!"
2	Building a guide Team	A group powerful enough to guide big change is formed and they start to work together well
3	Get the vision right	The guiding team develops the right vision and strategy for the change effort.
4	Communication for buy-in	People begin to buy into the change, and this shows in their behavior
5	Empower action	More people feel able to act, and do act, on the vision
6	Create short-term wins	Momentum builds as people try to fulfill the vision, while fewer resist change.
7	Don't let up	People make wave after wave of changes until the vision is fulfilled
8	Make change stick	New and winning behavior continues despite the pull of tradition, turnover of change leaders, etc.

Note. Adapted from *The heart of change: Real-life stories of how people change their organizations* by J. P. Kotter & D. S. Cohen, p. 7. Copyright 2002 by Harvard Business School Press, Boston, MA.

Each school district researched was in the process of change from traditional instructional techniques to instructional techniques that incorporated handheld technologies. How each district compared with the change steps of Kotter and Cohen (2002) are detailed in Table 15.

Increase urgency. Kotter and Cohen (2002) describe the sense of urgency as an idea that motivates individuals toward the change process. Kotter and Cohen also mention that this sense of urgency is not only discussed by the leaders of change, but also discussed throughout the entire organization.

Table 15

Alignment of Participating School Districts with Kotter and Cohen's (2002) Eight Steps of Change

	School District			
Change Step	A	B	C	D
Increase urgency	"ensure . . . kids embodied . . 21st century skills" (S)	"students were bringing a whole set of skills . . . that . . . educators were not tapping into" (S)		"It's the 21st century, and it's 21st century learning and they're 21st century learners" (S)
Building a guide Team	"A technology committee . . . was made of teachers . . . that . . . support teachers . . . like mentoring" (U)			"We did a lot of work with our technology committee in terms of long range plans" (S)
Get the vision right	"create an environment that was technology rich" (S)	"students would have access . . . in the classroom but also be connected . . . at home" (U)	"Technology is…seen as an integral part of the educational process" (S)	"Our kids are going to be college and career ready and compete with anybody else" (S)
Communication for buy-in	"It was just encouraged continuously" (U)	"colleagues they . . . shared . . . no one wanted to be the one not doing it" (B)	"Our faculty has done a lot of sharing . . . its . . . word of mouth, understanding, working together" (S)	" . . . has done some tremendous projects and . . . been able to model . . . has quite a following" (S)
Empower action	"We leaned heavily on teachers" (S) "[A teacher] had the desire to implement iPads in his classroom" (B)	"We had high flyers on every team . . . they would take the lead" (S)	"We had two teachers . . . volunteered for it"(B)	"We've been able to . . . expand it . . . seventh and eighth . . . a sixth grade team . . . and special education teachers" (S)
Create short-term wins	"Most of my teachers, even the ones who aren't really tech savvy were willing to jump in with both feet" (B)	"They're working hard and . . . finding ways to get things done" (S)	"Teachers were able to see them in use . . . it became more of a demand" (B)	"people getting really excited . . . of the things their able to do" (S)
Don't let up	"We continued to add a grade level each year . . . next year . . . eighth grade" (S)	"We had handhelds for everyone 5-8 . . . this past year we expanded 5-12" (B)	"It was phased in . . . gives people . . . opportunities . . . to . . . advocate . . . mentor" (U)	
Make change stick				

Note. (S) = Quote from Superintendent. (B) = Quote from Building Leader. (U) = Quote from Union Leader.

The data acquired from School District C did not show a sense of urgency toward the change process. The leaders of the school district communicated that technology integration was the expectation of their community and that handheld technologies would be an additional tool to enhance the students' ability to comprehend concepts and increase their overall engagement. "We're in a community that's pretty darn supportive of education, that wants us to be leaders. That wants our school to produce kids that will go to other good schools and . . . we live in a college town" (Union Leader C, personal communication, August 3, 2012). " . . . the integration of handheld technology. It was a new tool for our students to use to help them learn better" (Superintendent C, personal communication, July 31, 2012).

Building the guide team. Two of the four schools provided evidence of a guide team. School District B and School District C did not reference a guide team during the data collection process.

The school leaders of District B did not reference a guide team. Superintendent B and Building Leader B mentioned their Instructional Support Staff (IST) from BOCES and the fact that they had placed "high flyers" on every middle school team. There is no reference to any support in the high school or a guide team in the data.

Building Leader C described their ability to communicate and support the integration with the Director of Innovation and Enrichment:

> Because we're such a small district, we didn't take the traditional route of saying OK, everybody come in, we're going to do staff development. We had the ability to go in and talk to one or two teachers at a time. (personal communication, August 27, 2012)

Get the right vision. Kotter and Cohen (2002) described that vision for the change efforts come from the guide team in step 2, "Because the world is complex, some cases do not

rigidly follow the eight step flow. But the eight steps are the basic pattern associated with significant useful change" (p. 6). The data revealed that School District B and School District C did not rigidly follow the eight sequential steps.

However, the evidence collected pointed to a common vision that was described by the leaders of every district. Table 15 displays this quality of a common vision among the districts.

Communicate for buy-in. All the districts were able to find a teacher who would begin a pilot program and showcase the change effort. These teachers were able to communicate the change they were experiencing. This led others to incorporate technology into their lessons.

Empower action. Every district detailed how their pilot programs created momentum for others to join the integration process. The leaders described their role in supporting and providing professional development opportunities through teacher leaders or other support staff to enhance the success of the integration process.

Create short term wins. The leaders of every district discussed the success of their pilot programs. They mentioned the excitement the integration created throughout their districts. This excitement led to other teachers wanting to acquire the technology or learn about the technology.

Don't let up. The integration process of School District A spread from one fifth grade classroom to the entire fifth grade, and the next year into the entire sixth grade, and finally into their entire seventh grade.

Superintendent A spoke of the integration spreading to the eighth grade in the 2013-2014 school year. The superintendent also mentioned the vision for the district was a full integration. The data collected displayed the district's ability to not let up in this process until they fulfill their mission, which was to have full integration throughout the entire district.

School District B's integration spread from their middle school into their high school. Their mission was for every student to have access to information instantly. They currently have full integration of netbooks in their middle and high schools.

School District C's integration spread from Pre-K through their eighth grade. They are looking to provide every student with the latest technological tool to enhance their curriculum. The leaders of the district described how they are working to meet this vision with a data collection process.

School District D began the integration in one classroom in the 2011-2012 school year. This past September (2012), the plan was to roll out 163 devices. The devices were strategically placed throughout the school. School District D had just completed the process of changing their acceptable use policies. This change allowed students to utilize handheld devices during the school day. The next phase was upgrading their infrastructure and distributing the handheld devices throughout the district.

Limitations of the time of the study make further research necessary to reveal if "People make wave after wave of change until the vision is fulfilled" (Kotter & Cohen, 2002, p. 7).

Making change stick. None of the districts are at this level of Kotter and Cohen's change process. The expectation of every leader was for every student to have some type of handheld technology or one to one computer access. None of the schools are fully integrated with one to one technology or have a "new behavior" throughout their entire district (Kotter & Cohen, 2002, p. 7).

All of the leaders have been in their districts since the start of the integration process. This is evidenced from the data in Table 1 (years in the position) and Table 3 (student population and number of devices data). The integration process began and continued with the same

leadership. According to Kotter and Cohen (2002), an indicator of the final change step is the change process continues with changes of leadership.

Bridges transition steps. Bridges (2009) is a renowned expert in the field of change. The three transitional phases used in this study are from his book, *Managing transitions: Making the most of change*. Bridges' three transition phases are detailed in Table 16.

Table 16

Bridges' Three Phases of Transition

Phase	Description
Ending, losing, letting go	Letting go of the old ways and the identity people had
The neutral zone	Going through an in-between time when the old is gone but the new isn't fully operational
The new beginning	Coming out of the transition and making a new beginning

Note. Adapted from *Managing transitions: Making the most of change* by W. Bridges, pp. 4-5. Copyright 2009 by Da Capo Press, Philadelphia, PA.

Each school district in this study was working towards transitioning their instructional methodologies to incorporate handheld technologies. The leaders were asked how far the integration process had taken them toward their vision (Interview Question 10). Table 17 displays where each district was in their transition as related to Bridges' transitional phases at the time of the study (2012).

All the leaders in the study expressed that their vision was to have one to one computer access for all students. "The integration is complete . . . when our entire middle and the high school will be utilizing a technology to enhance and deliver instruction and learning" (Superintendent A, personal communication, July 3, 2012). "It will be an interactive, flexible learning environment. It will be fully integrated" (Superintendent B, personal communication,

July 17, 2012). "That's pretty straight forward . . . that every kid has one" (Building Leader C, personal communication, August 27, 2012).

> My vision is to get one in every student's hands. . . . looking into the future, I'm going to see every kid just carrying an iPad, opening it up, taking notes. You know, logging in, doing projects, leaning over to a neighbor and sharing what they're doing. (Superintendent D, personal communication, August 31, 2012)

Table 17

Alignment of Participating School Districts with Bridges' (2009) Transitional Phases

	School District			
Transition Phase	A	B	C	D
Ending, losing, letting go	"In the upper grades, I know when they're tied to the curriculum so strictly, . . . they're very, very attuned to the curriculum that they have to cover. . . . It's like we have no time to supplement." (U)	"I'd say we're probably about 30% to 35% there" (S) "Well, we're still working on it. . . . It's just an ongoing process of getting more . . . comfortable with it and more . . . staff sold . . . using it seamlessly with the curriculum." (U)	"I think we're at the very, very beginning of this process. At least for me, I'm developing my curriculum now and my students . . . will have their iPads for the first time in the upcoming year, so I'm at the very beginning of the process." (U)	"I mean change, you know, true change, successful change is a three to five year cycle. So I'm trying not to be too impatient, but also trying to make sure that we are moving forward." (S) "I've got some staff members that don't own cell phones, don't own the iPads." (B)
The neutral zone				
The new beginning				

Note. (S) = Quote from Superintendent. (B) = Quote from Building Leader. (U) = Quote from Union Leader.

Research determined the vision as defined by the leaders of School District's A, B, C, and D was incomplete, and every district was still engaged with instruction that did not utilize handheld technology. Therefore, every district was still in Bridges' "Ending, Losing, Letting Go" transitional phase (Bridges, 2009, p. 4).

Chapter 5: Summary of Findings, Conclusions and Recommendations

A qualitative study was performed using the frameworks of change developed by Bridges (2009) and Kotter and Cohen (2002). The study's purpose was to examine the phenomenon of change and the barriers public school leaders faced in incorporating the latest technologies of smartphones and tablets into the classroom. The study examined how public school leaders initiated and sustained the change. Research focused on how the leaders in selected NYS public school systems integrated smartphone and/or tablet technologies into instruction.

Integration at this time is absolutely necessary because of the overwhelming popularity and use of handheld devices. The iPad was introduced in January of 2010, and 4.69 million iPads were sold from January to March worldwide (Statistica.com, 2013a). Thirty-two million iPhones were sold in the U.S. in 2011 (Statistica.com, 2013b). IPad mini sales were projected to hit 24 million by March of 2013 and Apple iPhone 5 is currently sold in 240 countries, and sales for December of 2012 were expected to be 47.5 million units (Bedigian, 2012; Forbes.com, 2012).

This qualitative study investigated the specific skills of leaders during the integration process, what barriers they faced, what strategies they used, what factors caused them to decide to implement the technologies, and the steps of the integration process itself. Conclusions were based on the data collected from the selected population and are sequenced according to the research questions.

Recommendations include the importance of utilizing the change steps of Kotter and Cohen and the transition phases of Bridges. Also, suggested topics for further research include: researching handheld technology integration at the high school level, expanding the sample

population to larger school districts with different demographics, and examining the effects of handheld integration on student achievement.

Summary of Findings

The summary of findings is displayed in five tables. All the tables are formatted with the data acquired from the research questions on the left and the school districts set across the top. Specific leaders are represented with a key: (S) = Superintendent, (B) = Building Leader, (U) = Union Leader.

During the data collection process, specific topics were not articulated by certain leaders. These are represented as vacant spaces on the tables. These areas provided the researcher with a source of findings as well.

Research question 1. *What specific skills are associated with a school leader's ability to integrate handheld technologies into the curriculum of a New York State Public School?*

The findings in this study indicate that the specific skills associated with a school leader's ability to integrate handheld technologies into the curriculum of a NYS public school are vision, management of staff, interpersonal skills, and data utilization (see Table 18).

Every leader was able to articulate a vision for the direction of the integration. Having a vision aligns with Standard I of the NETS-A: "Leadership and Vision – Educational leaders inspire a shared vision for comprehensive integration of technology and foster an environment and culture conducive to the realization of that vision" (ISTE, 2002, para. 1).

All the superintendents described managing staff and data utilization as necessary skills when integrating handhelds into the curriculum.

All the superintendents and building leaders claimed the interpersonal skills of communication and collaboration were attributes critical for a successful integration.

Table 18

Leadership Skills of the Leaders (Research Question 1)

	School District			
Skills	A	B	C	D
Vision	(S), (B), (U)	(S), (B), (U)	(S), (B), (U)	(S), (B)
Management: Accountability	(S), (B)	(S), (B)		(S)
Management: Staff	(S), (B)	(S), (B)	(S)	(S), (B)
Management: Finances	(S), (B)	(S)		
Management: Decision making	(S)			(B)
Management: Students		(B)	(S)	
Management: Time	(S)	(S)		
Interpersonal skills: Communication and collaboration	(S), (B)	(S), (B)	(S), (B)	(S), (B)
Data utilization	(S), (B)	(S)	(S), (B)	(S), (B)
Adaptability	(B)			(S)
Risk taking		(S), (B)	(B)	
Knowledge of curriculum		(S), (B)	(B)	
Community awareness	(U)	(U)	(S), (U)	
Reflection		(S)	(B)	

Note. (S) = Superintendent. (B) = Building Leader. (U) = Union Leader.

Community awareness was not found to be an essential skill. However, all the union leaders understood technology integration was a priority in their community. The

superintendents and building leaders of Districts A and C reported that the success of their integration was partially due to the support of their communities' local educational foundations.

Vacant spaces in Table 18 were evident in the skills of knowledge of curriculum, risk taking, reflection, management (finances), management (decision making), management (students), management (time), and adaptability.

An inconsistency apparent in Table 18 was in the skill of knowledge of curriculum. Only the leaders of School District B displayed this skill, which was their ability to align the integration with their current STEM programs and senior projects.

School Districts A and D did not report the skills of risk taking or reflection during their integration process.

School Districts A and B were able to manage their finances through partnerships with vendors or BOCES. The data acquired did not reveal that either School District D or C utilized a partnership with a vendor.

Another vacant space in the table emerged in the skill of management (decision making). This study defined decision making as the ability of the leader to articulate their decision to start the integration process. "Quite frankly, as a leader, I gave my blessing for this thing to move forward" (Superintendent A, personal communication, July 3, 2012). This action was articulated by two of the eleven leaders.

A vacant space was also evidenced in the skill of Management (students). Building Leader B managed the students in their use of the devices by collaborating with the staff. If the use of the devices did not align with the vision of the school leaders, the students would lose their opportunity to have the devices as instructional tools. Superintendent C managed students by utilizing them to showcase the devices at board of education meetings.

Management (time) showed another vacant space. School Districts A and B allowed time for staff observation, collaboration, and internal professional development. School Districts C and D did not speak of staff release time for observation or of time for their staff to share best instructional practices.

Adaptability as a skill was not reported in School Districts B and C. Adaptability was necessary for School Districts A and D because the initial devices chosen did not align with their schools' infrastructures.

With the economic climate of today, the question arises of why all the districts did not articulate an ability to utilize partnerships for the management of finances to acquire devices and provide professional development.

Another surprise from the data was only one district provided evidence of aligning the devices with their current curriculum. In a climate of intense accountability measures in the area of student achievement and engagement, as well as the current push for STEM integration and technology integration, it is surprising that all of the schools did not provide data about their knowledge of their curricula.

The data displayed two of the 11 leaders employed reflection and risk taking during their integration. Another surprising element in the area of leadership skills that evolved out of the data was the lack of risk taking and reflection upon previous technology integrations and a lack of understanding the past to develop the sense of urgency required for an integration process.

Research question 2. *What barriers does a school leader face when implementing handheld technologies such as smartphones and tablets into the instructional programs of a New York State public school?*

The largest barrier school leaders faced was fear. Nine of the 11 leaders interviewed spoke of fear as a barrier to the implementation process. Fear was also identified in the literature as a barrier by Staples et al. (2005), Hew and Brush (2007), and Hokanson and Hooper (2004).

Another large barrier was gathering measurable data for the success of the implementation. The leaders of School Districts A and B stated the length of time was not long enough to provide them with valid data to prove the implementation had an effect on student achievement. The leadership of School District C spoke of the lack of a control group to measure their success. Building Leader C expressed this concern, observing that if the district were larger with more than one elementary school building they could have measured their success one building against another; one with technology and one without (Building Leader C, personal communication, July 5th, 2012).

A major barrier for School Districts B and D was a policy that banned the use of handhelds. The policy had to be changed before integration was possible.

The largest vacant space in Table 19 is in the area of curriculum integration. Only one of the 11 leaders saw this as a barrier due to staff not seeing the devices aligning with their curricula. The other ten leaders spoke of how their staff saw curriculum integration as an opportunity to enhance their curricula. Considering it is the 21st century, technology and educational standards demand that curriculum integration be a priority.

Another vacant space in Table 19 is in the area of current polices. School Districts A and C were already moving forward with an established technology continuum, where as School Districts B and D were in the beginning stages of their technology integration.

Even with the current demographics of the selected populations along with the present economic conditions, it was unexpected that all of the leaders did not recognize finances as a barrier to implementation.

Table 19

Barriers of the School Districts According to the Leaders (Research Question 2)

	School District			
Barriers	A	B	C	D
Fear	(S), (U)	(S), (B), (U)	(B), (U)	(S), (B)
Infrastructure	(B)	(U)	(B), (U)	(S)
Current policies		(S), (B)		(S), (B)
Finances	(S), (B)		(S), (B)	(S)
Data collection for success	(S), (B), (U)	(S), (U)	(S), (B)	
Curriculum Integration	(U)			

Note. (S) = Superintendent. (B) = Building Leader. (U) = Union Leader.

Research Question 3. *What strategies does a school leader use to plan and implement the change process which will move a district from one that doesn't yet use handheld (i.e.: smartphone, iPod, or tablet) technologies to one that does?*

The strategies school leaders used for implementation were pilot programming, professional development, and expanding the classroom.

All the leaders determined pilot programming and professional development were essential strategies to utilize to insure the success of the implementation. Pilot programming is consistent with the thoughts of Scharmer (2009), who describes this as prototyping.

"Prototyping is the first step in exploring the future by doing and experimenting" (Scharmer, 2009, p. 203).

Seven of the 11 leaders spoke of expanding the classroom by letting students take their devices home. "These devices are inexpensive, compared to classroom laptop carts or computer labs. Their portability and durability provide students with potential learning tools that traverse the classroom, bus stop, and home" (Banister, 2010, p. 122).

The leaders of School Districts A and C spoke of how they were supporting the expansion of a classroom through the use of *Schoology* software. *Schoology* is designed to aid teachers in communicating with each other and their students.

The leaders of School District C described expanding the classroom by using the instructional technique of *flipping*. Flipping involves the lecture sections of instruction taking place at home using the handheld devices and then teachers supporting those lectures in the classroom.

The vacant spaces displayed in Table 20 were directives, shared decision making, and voluntary staff participation.

Superintendent B was the only school leader to issue a directive as a strategy. "Also, you know, it wasn't an option. The other thing we did is that you had to develop a unit within the first ten weeks of school. That would rely on the use of the handheld devices" (Superintendent B, personal communication, July 17, 2012). Superintendent B used the directive to ensure the integration of the handhelds. The other school leaders spoke of pilot programs as their means to ensure integration.

Shared decision making was reported only in School District D. School District D reported shared decision making as a means to lift their policy ban. Districts A and C did not need to lift a policy ban, and the leadership of District B made the policy change arbitrarily. School Districts C and D utilized voluntary participation to initiate their integration. School District A chose a teacher to showcase their pilot program, and School District B used a directive.

The current expectation for school leaders is to use data collection in the decision making process. It could not be predicted that all the leaders would not use data collection as a strategy.

Table 20

Strategies Used by the Leaders (Research Question 3)

	School District			
Strategies	A	B	C	D
Data collection	(S), (B)	(S)		(S), (B)
Pilot program	(S), (B), (U)	(S), (B), (U)	(S), (B), (U)	(S), (B)
Professional development	(S), (B), (U)	(S), (B), (U)	(S), (B), (U)	(S), (B)
Expanded the classroom	(S), (B)	(S), (B), (U)	(S), (B)	
Directives		(S)		
Voluntary staff participation			(B), (U)	(S), (B)
Shared decision making				(S), (B)
Supplemental tool	(S), (U)	(S), (B), (U)	(S)	
Showcasing	(S)		(S)	(B)

Note. (S) = Superintendent. (B) = Building Leader. (U) = Union Leader.

Research question 4. *What factors caused the school leader to decide to implement the use of handheld technology?*

Factors that led the school leaders to implement handheld technology were pre-existing conditions, district resources, leadership, benefits and size.

School Districts A and C already had SMART Board technology in every classroom. They also had community support in the form of outside educational foundations. The foundations assisted in the purchasing of the devices.

School Districts B and D were able to acquire support from their local senators to purchase devices. Every leader mentioned a staff member who wanted to implement technology and lead their pilot program as a pre-existing condition.

> Teacher leadership: It is important for teachers to take lead roles and model the expectations for the integration. The teachers need to become peer mentors and coaches for the staff. The teachers need to be resources for technology integration and curriculum alignment, not just custodians of the equipment. The principal cannot be the only expert. (Staples et al., 2005, p. 301)

All the districts saw the benefits of handheld devices as a factor. The benefits included college and career readiness, increased engagement, increased student and staff collaboration and communication, and increased student comprehension. These benefits are consistent with Cowan (2008), Robson (2003), Schachter (2010), and Song (2007).

All the building leaders and union leaders credited the leadership of their superintendents and their boards of education as factors for the implementation process.

> Administrators must understand both the capabilities and limitations of technology. Only then can they plan for, budget for, purchase carefully, install properly, maintain dutifully,

schedule adequately, distribute appropriately, and replace systematically the electronic technology best suited for their needs. (Dawson & Rakes, 2003, p. 33)

The only vacant space found in Table 21 was in the area of size. School Districts B and D did not mention size as a factor. The building leaders of School Districts A and C identified the small size of their districts as a factor for making their integration easier.

Every leader in the study spoke of one or more pre-existing conditions as a factor in the decision for integration within their school district.

Table 21

Factors for the Implementation (Research Question 4)

	School District			
Factors	A	B	C	D
Pre-existing conditions	(S), (B), (U)	(S), (B), (U)	(S), (B), (U)	(S), (B)
District resources	(S), (B), (U)	(S), (B), (U)	(S), (B), (U)	(S)
Leadership	(B), (U)	(B), (U)	(B), (U)	(S), (B)
Benefits	(S), (B)	(S), (B), (U)	(S), (B), (U)	(S), (B)
Size	(B)		(B)	

Note. (S) = Superintendent. (B) = Building Leader. (U) = Union Leader.

Research question 5. *How do the change and transition steps of a school leader who has implemented handheld technologies into instructional programs, compare to the change steps of Kotter and Cohen and the transition steps of Bridges?*

To answer research question 5, the data that emerged from the coding process was compared to the existing frameworks of Kotter and Cohen (see Table 14) and Bridges (see Table 16). In reviewing the data, all the leaders provided evidence of four of the eight change steps:

get the right vision, communicate for buy-in, empower action, and create short-term wins. Increasing urgency, creating a guide team, not letting up, and making change stick were not evidenced by all the leaders.

Increasing urgency was addressed by three of the four districts. Superintendent A and Building Leader A saw the urgency behind implementing the iPad to increase their students' ability to be college and career ready and enhance their 21st century skills in order to compete globally. Union Leader A did not share this sense of urgency. Union Leader A saw handhelds as a supplemental tool for instruction.

In School District C, there was no sense of urgency. This can be explained by their ongoing commitment to be on the forefront of technology instruction. The handhelds for the district were introduced as supplemental tools and an extension of technology that was already integrated (SMART Boards).

Building a guide team was only used by two of the four school districts. The leaders of School Districts B and C did not reference a guide team at all. Union Leader A and Superintendent D were the only leaders to refer to a technology committee.

In order for the vision of a complete integration to be fulfilled, not letting up is a necessary step, yet only three of the leaders mentioned it. This was an unforeseen finding.

In School District A, Building Leader A only had one grade level of integration, and there was no mention of a plan for more integration into the building. Union Leader A told of how the integration had not reached the high school level and of how there was a fear of not being able to implement the devices into the curriculum because the high school must strictly adhere to state curricula.

Even though School District B had full integration in eight of the 13 grade levels, Superintendent B spoke of the need to upgrade the infrastructure in order to continue the waves of change for the integration. Union Leader B referred to the continuing needs of the staff for professional development to strengthen the change process.

School District C's integration had not reached the high school, but was moving from self contained classrooms to grade levels where students transition from classroom to classroom. Building Leader C could see the integration as moving along successfully dependent upon the students' care of the devices and how new teachers could implement it into their instruction. Not letting up was not applicable to School District D because 2011 was the first year of their pilot program and 2012 was their first attempt at the integration of 163 handheld devices.

The final step (making change stick) was completely absent from the data. All the districts were still trying to complete a full integration of handheld devices. In all the districts, at the time of this research, the leadership that had begun the process was still the same. There was no evidence the implementation had been passed to another leader.

The conclusions in Table 22 revealed three vacant spaces in the change step process: sense of urgency, building a guide team, and not letting up. The data collection process disclosed that a sense of urgency (step 1 of Kotter and Cohen) was not manifested by all the leaders. Considering the widespread use of handhelds and the emerging culture of technology integration, this was another unforeseen finding.

A guide team (step 2 of Kotter and Cohen), according to the data, is not an important foundational aspect of a leader's ability to initiate change. Only three of the 11 leaders mentioned the development of a guide team.

Table 22

Alignment of School Districts with Kotter and Cohen's Eight Steps of Change (Research Question 5)

	School District			
Change Step	A	B	C	D
Increase urgency	(S), (B)	(S), (B), (U)		(S), (B)
Building a guide team	(U)			(S), (B)
Get the right vision	(S), (B), (U)	(S), (B), (U)	(S), (B), (U)	(S), (B)
Communicate for buy-in	(S), (B), (U)	(S), (B), (U)	(S), (B), (U)	(S), (B)
Empower action	(S), (B), (U)	(S), (B), (U)	(S), (B), (U)	(S), (B)
Create short-term wins	(S), (B), (U)	(S), (B), (U)	(S), (B), (U)	(S), (B)
Don't let up	(S)	(B)	(U)	
Make change stick				

Note. (S) = Superintendent. (B) = Building Leader. (U) = Union Leader.

Bridges' transitional phases, as compared to the school districts, are displayed in Table 23. Ten of the 11 leaders described their districts as only a few years into the implementation process. None of the districts showed evidence that traditional teaching methods had been eliminated or that every teacher was implementing handheld devices.

Table 23

Alignment of School Districts with Bridges' Transitional Phases (Research Question 5)

	School District			
Transition Step	A	B	C	D
Ending, losing, letting go	(S), (B), (U)	(S), (U)	(S), (B), (U)	(S), (B)
The neutral zone				
The new beginning				

Note. (S) = Superintendent. (B) = Building Leader. (U) = Union Leader.

Implications for System Leaders

Recommendation 1: Use Kotter and Cohen's eight steps of change model as a template. When the actual integration of the four districts researched was compared to Kotter and Cohen's eight step change model, it was determined that seven of the eight steps were used by one or more of the system leaders. However, it was found that four of the steps were used by all the leaders: get the right vision (step 3), communicate for buy-in (step 4), empower action (step 5), and create short term wins (step 6) (see Table 22).

A recommendation as a result of the data analysis is for a system leader to use Kotter and Cohen's change model as a template for an integration process. The system leader would first evaluate where the district's technology integration is located within Kotter and Cohen's eight step change model. For example, if the district has a ban policy on handhelds, as in the case of School Districts B and D (see Table 19), then the leader would utilize the template and start with step one (sense of urgency). If there is an established technology continuum, as in the case of School Districts A and C, then the leader would begin with step three (create a vision).

The data showed step two (building a guide team) is not a vital step in the integration process. According to all the building and union leaders, the leadership of their superintendent was a deciding factor for implementing handheld technologies (see Table 21). Only one of the system leaders, one of the building leaders, and one of the union leaders made reference to a guide team.

Recommendation 2: Communicate a vision. A system leader must communicate a vision. Every leader in the study discussed the skill of articulating a vision (see Table 18). The vision must be articulated precisely, clearly, and as simply as possible. A vision must be continuously referenced throughout the integration process and must have a clear direction.

School Districts A and C's vision was to extend the classroom and make technology integration a priority within the instructional methodology of their districts. School District A had a vision of their students leaving the district with strong 21st century skills. It is recommended for the system leader to create a vision, to support the vision, as well as to communicate the vision to the entire school community.

Recommendation 3: Determine evaluative techniques prior to integration. In order for the integration to be effective, the system leader must have processes and procedures for monitoring and evaluating the use of the technology integrated. Evaluative techniques need to be determined prior to the integration, be applied in a pilot program, and be a continuous part of the implementation. Data utilization was described as a leadership skill associated with the integration process by every system leader (see Table 18).

All the leaders expressed a desire to measure the success of their program through test scores. Data collection for success was a barrier described by three of the four system leaders in this study (see Table 19). Data collection was also a strategy employed by three of the four

system leaders to implement the change process (see Table 20). None were able to use test scores as a measure of success. Since this type of measurement could not be taken, a less objective form of measurement was used, for example: attendance, behavior, engagement, student cooperation and collaboration, and feedback from teachers through surveys. However, whatever measurement is used must still be determined by the system leader.

Recommendation 4: Build urgency. It is recommended a system leader employ interpersonal skills and data utilization to create a sense of urgency (see Table 18). Current district policies and statistics associated with the used of handhelds need to be reviewed. System leaders are advised to examine current statistics associated with the popularity of the devices and how frequently students are using them as a prerequisite to Kotter and Cohen's first step (sense of urgency). The following examples are given on how to develop a sense of urgency.

Children are being introduced to touch screen technology very early in their lives. This early integration leads them into new ways of processing information. "It leads to new ways of thinking, and thereby changes fundamentally how people work and interact with each other" (Song, 2007, p. 38).

> Over the past five years, the proportion of 8- to 18-year olds who own their own cell phone has grown from about four in ten (39%) to about two-thirds (66%). The proportion with iPods or other MP3 players increased even more dramatically, jumping from 18% to 76% among all 8- to18-year-olds. (Rideout, Foehr, & Roberts, 2010, p. 3)

Currently children 8-18 years old are spending only 4% of their time on printed materials (i.e.: books, magazines, non-fictional texts) (Rideout et al., 2010). Educators can no longer ignore the popularity of handheld devices and their ease of use as an instructional tool.

Taking into account the overwhelming popularity and benefits as a deciding factor for all the system leaders to implement the use of handheld technology (see Table 21), ban polices are an antiquated practice. School Districts B and D amended their no use policies and created documents/contracts for the students and parents to sign off on in order to begin the implementation process. In 2010, 70% of schools in the United States were found to have a cell phone use ban during the school day (Morgan, 2010-2011). If there is a ban policy, the system leader must communicate the need to change this policy for the integration to occur.

Recommendation 5: Assess infrastructure. Prior to integration the infrastructure needs to be assessed. Six of the 11 leaders described infrastructure as a barrier to the integration process (see Table 19). Infrastructure must be capable of handling the number of devices incorporated into the integration process. Infrastructure and connectivity outside the classroom need to be assessed as well, especially if the leadership determines students will take the devices home. All the participating districts had to upgrade their wireless capabilities. In School Districts B and C, the devices were allowed to go home with the students. A system leader, prior to any attempt at integration, must assess the district's infrastructure and the connectivity of the entire school community.

Recommendation 6: Establish support. The system leader has to acquire the proper support to combat technical glitches that occur and to assist teachers in aligning their curriculum with the handheld devices. All the districts either created positions or utilized their relationship with BOCES to incorporate embedded professional development for their teachers. School District C had two positions for onsite professional development and support: a Director of Technology who possessed a building leadership certificate and a position entitled Director of Innovation and Enrichment. Every leader in the study utilized the strategy of professional

development to support the integration (see Table 20). The system leader needs to ensure there is embedded professional development combined with onsite personnel for immediate technological and instructional support.

If there are technical glitches or the teacher's lesson drags because the activities were not conducive to the integration, the possibilities of abandoning the process increase. Therefore, the system leader must try to make as many people accept the new technology as possible and encourage risk taking with the technology.

Every system leader spoke of fear as a barrier to the integration process (see Table19). When individuals begin to lower their fears toward the integration and begin trying the devices, proper support has to be in place. The support must be immediate. Dealing with teachers' beliefs has to be understood in order for a successful integration to occur (Hew &Brush, 2007). These aspects of integration cannot be ignored.

Recommendation 7: Empower action. Empowering action is an obligation of the system leader. It is the responsibility of the system leader to find technology teacher leaders and support them. Every leader described, as a pre-existing factor for integration, a teacher who was a pioneer in the area of technology that led a pilot program and assisted in embedded professional development (see table 21).

A pilot program needs to be incorporated into any integration process and is a way to empower action. Every leader discussed the importance of a pilot program as a strategy (see Table 20). As the technology teacher leaders and others become more involved with the integration process, opportunity arises for these individuals to train other staff members. Every system leader spoke of managing staff as a leadership skill associated with the integration process (see Table 18). School District A used their fifth grade teacher, who was classified by

the leaders as a technological pioneer, to lead the pilot program and to train other staff members. The system leader has the responsibility to assist in the development of pilot programs.

Also, system leaders must encourage the teacher leaders to showcase the integration process to other grade levels, central administrators, the board of education, or other districts. Showcasing was a strategy used by Districts A, C, and D (see Table 20).

Recommendation 8: Create partnerships to garner financial support. It is recommended for system leaders to create partnerships with vendors, BOCES, and community and/or governmental agencies in order to garner financial support for the integration. The system leader has to discover ways to acquire finances to keep up with increasing demand as the integration spreads. Further, the system leader must offer continued assistance for the staff in terms of technical support and professional development. The system leader must take charge in facilitating and obtaining funding for these resources.

The research discovered that School District A had an ongoing relationship with a provider (Apple). Apple worked with District A and their BOCES to negotiate a lease program which allowed the district to make large purchases of devices and apps. Apple also provided certified people for professional development to assist staff in learning the skills necessary to utilize the new devices.

School District A collaborated with BOCES for financial support and, as a result, quadrupled their purchasing power. In addition, School District A found financial support from an educational foundation. School District C also found financial support from an educational foundation. School Districts B and D utilized their respective senators for financial support. These district resources were described by every system leader as a deciding factor to begin implementing handheld devices (see Table 21).

Recommendation 9: Create a long-term plan for sustainability. System leaders should create long-term plans for the sustainability of the integration. School District A started with one class of fifth graders as their pilot program. The integration spread to all its fifth grade classes and then a grade level was added each year. As the integration moved from grade level to grade level, Superintendent A collaborated with representatives from Apple and established a lease program to ensure the students could transition with the handhelds and have the latest Apple tablet. This is an excellent example of long term planning for sustainability because, since 2007, the iPhone has changed five times and, since 2010, the iPad has evolved three times.

System leaders need to ensure students' have connectivity outside of classrooms in their long term planning. Students need to always have access to the information disseminated in the classroom. According to Franklin (2011), students must be able to re-enter the classroom outside of the traditional four walls and forty-two minute time frame. School Districts A, B, and C allowed their devices to be brought home. School District B utilized a Verizon data plan for each netbook, and School District C surveyed the community and found that over 90% of their students had Internet access.

Implications summary. All of the building and union leaders described the leadership of their superintendent as a factor in implementing the handheld devices into their districts (see Table 21). The importance of system leaders' roles in initiating and facilitating this technological integration process cannot be ignored.

The research also proved that without being fully aware of the change theory of Kotter and Cohen, the districts showed evidence of being in accord with six of their eight steps. Therefore, it is recommended for system leaders currently in the field who are exploring the possibility of integrating handhelds in to their districts to utilize Kotter and Cohen's eight steps

of change as a template and to have an understanding of Bridges' three phases of transition. This study reinforces the effectiveness of Kotter and Cohen's and Bridges' change models.

None of the districts had reached the eighth step of the Kotter and Cohen change model. Change takes time. The vision of the system leader has to be constantly referred to during the entire integration process and even after a district fulfills the obligation of incorporating all grade levels with handheld devices. The final step in the change process occurs when the vision is completed and a new behavior has been established.

Recommendations for Future Research

It is imperative that any researcher who wishes to explore the integration of handhelds understands that finding sample populations was extremely difficult. This limits the population available for future study at this time.

One recommendation for further study entails researching districts that have incorporated handheld technologies at the high school level. "It's not like the cell phone issues and that kind of thing that you have in the high school…I don't know if it would be different in the high school where it is more content based" (Building Leader A, personal communication, July 5th, 2012). Three of the four districts in the study had incorporated handhelds into their elementary schools and middle schools but not in the high schools. School District B had incorporated the technologies into the high school, but this was after they had abandoned handhelds for netbooks.

All the schools in this study were central schools. The highest free and reduced lunch rate was 30%, and the lowest graduation rate was 79%. A study needs to be done in districts with over a 50% free and reduced lunch rate and a graduation rate that is lower than 75%. Building Leader A stated "We've been fortunate to be financially sound" (Building Leader A,

personal communication, July 5th, 2012). Research has to be conducted in a school district that is economically disadvantaged.

Another area for essential research on this topic is: Does the use of handhelds increase student achievement on summative and formative assessments, as well as on high stakes standardized tests, such as the NYS Regents exams? The result of the research showed that the success of the handheld integration could not be measured simply by using students' test scores.

> And, while I know that everything is based on test scores these days, much to my chagrin, I'm not sure that you can measure the effectiveness of this initiative based on test scores. Because that's what it's all about is getting the kids to be problem solvers and independent thinkers and not just sitting waiting for the teacher to feed them information. I'm not exactly sure how you measure that. (Building Leader A, personal communication, July 5th,2012)

"Absolutely. Absolutely. Absolutely. There is not a real true metric out there that will measure the impact of this integration because of the current evaluation system" (Superintendent B, personal communication, July 17, 2012).

"I think it's more qualitative than quantitative" (Superintendent C, personal communication, July 31, 2012).

Conclusion

Education is in a time of change. It is time to align education with the technological advances of the 21st century. With federal and state mandates, the new teacher evaluation methods and the economic crunch on district resources, integration of handheld technologies becomes inevitable. Limited resources demand it.

Utilizing the handheld technology students bring to school with them everyday is a way to use an untapped resource. Purchasing handhelds for students or utilizing the technology students are carrying with them to school is more cost effective than buying desk top computers for every student to access (Banister, 2010; Morgan, 2010-2011).

The unique aspect of this study was even though the population sampled for the research had no knowledge of the change steps of Kotter and Cohen or Bridges' transitional theory, the districts showed evidence of seven of the eight change steps. The leaders in this study did identify different entry points into the change process. This emphasizes, regardless of the advances in the hardware of technology or what technology is chosen, the same change theories can be applied.

Abundant evidence was reported for Bridges letting go phase but not for the other two phases. No school districts reported getting to phase three: The New Beginning. This is consistent with Williams et al. (2008) conclusion that a successful integration process takes three to five years.

References

Anderson, R. E., & Dexter, S. (2005). School technology leadership: An empirical investigation of prevalence and effect. *Educational Administration Quarterly, 41*(1), 49-82. doi:10.1177/0013161X04269517

Banister, S. (2010). Integrating the iPod Touch in K-12 education: Visions and vices. *Computers in the Schools, 27*(2), 121-131. doi:10.1080/07380561003801590

Bedigian, L. (2012, December 20). Apple to ship 12 million iPad mini units in 2012. Retrieved from Forbes.com website: http://www.forbes.com/sites/benzingainsights/2012/12/20/apple-to-ship-12-million-ipad-mini-units-in-2012/

Bridges, W. (2009). *Managing transitions: Making the most of change* (3rd ed.). Philadelphia, PA: Da Capo Press.

Cheung, W. S., & Hew, K. F. (2009). A review of research methodologies used in studies on mobile handheld devices in K-12 and higher education settings. *Australasian Journal of Educational Technology, 25*(2), 153-183. Retrieved from http://www.ascilite.org.au/ajet/ajet.html

Collins, A., & Halverson, R. (2010). The second educational revolution: Rethinking education in the age of technology. *Journal of Computer Assisted Learning, 26*(1), 18-27. doi:10.1111/j.1365-2729.2009.00339.x

Combined Wire Services. (2012, September 24). iPhone orders fall short. *The Albany Times Union*, p. D6.

Constructivism (learning theory). (2012, November 5). In *Wikipedia: The free encyclopedia*. Retrieved from http://en.wikipedia.org/wiki/Constructivism_(learning_theory)

Cowan, J. E. (2008). Strategies for planning technology-enhanced learning experiences. *The Clearing House: A Journal of Educational Strategies, Issues, and Ideas, 82*(2), 55-59. doi:10.3200/TCHS.82.2.55-59

Crompton, H., Goodhand, L., & Wells, S. (2011, February). The whole world in their hands. *Learning & Leading With Technology, 38*(5), 16-19. Retrieved from http://www.learningandleading-digital.com

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Thousand Oaks, CA: Sage.

Creswell, J. W. (2012*). Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Boston, MA: Pearson.

Danielson, C. (2011*). The framework for teaching evaluation instrument* (2011 ed.). Princeton, NJ: The Danielson Group. Retrieved from http://www.danielsongroup.org/article.aspx?page=FfTEvaluationInstrument

Dawson, C., & Rakes, G. C. (2003). The influence of principals' technology training on the integration of technology into schools. *Journal of Research on Technology in Education, 36*(1), 29-49. Retrieved from http://www.iste.org/learn/publications/journals/jrte

Enhancing Education Through Technology Act of 2001, 20 U.S.C. § 2401-2404 (2008).

Factor. (2013). In *Dictionary.com*. Retrieved from http://dictionary.reference.com/browse/factor

Forbes.com. (2012, December 3). Solid iPhone 5 sales in December will take Apple to $800. Retrieved from http://www.forbes.com/sites/afontevecchia/2012/12/03/solid-iphone-5-sales-in-december-will-take-apple-to-800

Franklin, T. (2011). Mobile learning: At the tipping point. *TOJET: The Turkish Online Journal of Educational Technology, 10*(4), 261-275. Retrieved from http://www.tojet.net/

Gardner, J. W. (2007). The nature of leadership. In *The Jossey-Bass reader on educational leadership* (2nd ed.) (pp. 17-26). San Francisco, CA: Jossey-Bass.

Hall, G. E. (2010). Technology's Achilles heel: Achieving high-quality implementation. *Journal of Research on Technology in Education, 42*(3), 231-253. Retrieved from http://www.iste.org/learn/publications/journals/jrte

Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development, 55*(3), 223-252. doi:10.1007/s11423-006-9022-5

Hill, R. A. (2011, October). Mobile digital devices: Dipping your toes in technological waters. *Teacher Librarian, 39*(1), 22-26. Retrieved from http://www.teacherlibrarian.com

Hokanson, B., & Hooper, S. (2004, October). *Integrating technology in classrooms: We have met the enemy and he is us*. Paper presented at the 27th Association for Educational Communications and Technology Conference, Chicago, IL. Retrieved from ERIC database. (ED485143)

International Society for Technology in Education (ISTE). (2000). *ISTE national educational technology standards (NETS) and performance indicators for teachers*. Retrieved from http://www.iste.org/standards/nets-for-teachers

International Society for Technology in Education (ISTE). (2002). *ISTE national educational technology standards (NETS) and performance indicators for administrators*. Retrieved from http://www.iste.org/standards/nets-for-administrators

International Society for Technology in Education (ISTE). (2012). *About*. Retrieved from author's website: http://www.iste.org/about-iste

Kotter, J. P., & Cohen, D. S. (2002). *The heart of change: Real-life stories of how people change their organizations*. Boston, MA: Harvard Business School Press.

Loertscher, D. (2010, October). Technology and tough economic times. *Teacher Librarian, 38*(1), 42-43. Retrieved from http://www.teacherlibrarian.com

McMillan, J. H. (2012). *Educational research: Fundamentals for the consumer*. Boston, MA: Pearson.

Merriam, S. B. (Ed.). (2002). *Qualitative research in practice: Examples for discussion and analysis*. San Francisco, CA: Jossey-Bass.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage.

Mobile device. (2012, October 23). In *Wikipedia: The free encyclopedia*. Retrieved from http://en.wikipedia.org/wiki/Mobile_device

Morgan, H. (2010-2011). Using handheld wireless technologies in school: Advantageous or disadvantageous? *Childhood Education, 87*(2), 139-142. Retrieved from http://www.acei.org/childhood-education

Murray, O. T., & Olcese, N. R. (2011). Teaching and learning with iPads, ready or not? *TechTrends, 55*(6), 42-48. doi:10.1007/s11528-011-0540-6

New York Principals. (2012, October 18). *APPR Paper*. Retrieved from http://www.newyorkprincipals.org/appr-paper

New York State Association for Computers and Technologies in Education (NYSCATE). (n.d.). *About us*. Retrieved from author's website: http://www.nyscate.org/aboutus.cfm

New York State Education Department, Office of Higher Education, Office of Teaching Initiatives. (2011, September 11). *New York State teaching standards: September 12,*

2011. Retrieved from http://www.highered.nysed.gov/tcert/pdf/teachingstandards9122011.pdf

New York State Education Department, Office of Prekindergarten Through Grade 12 Education, Information and Reporting Services. (2012). *New York State report card database*. Retrieved from https://reportcards.nysed.gov/databasedownload.php

New York State Education Department, Office of Prekindergarten Through Grade 12 Education, Office of Curriculum, Assessment, and Educational Technology, Educational Design and Technology. (2010, September 29). *Ed tech formula grants questions and answers*. Retrieved from http://www.p12.nysed.gov/technology/programs/QA.html

New York State School Boards Association, & New York State Bar Association. (2010). *School law* (33rd ed.). Albany, NY: LexisNexis.

Northeastern Regional Information Center (NERIC). (2008). *About NERIC*. Retrieved from author's website: http://portal.neric.org/SubSites/aboutUs.aspx

O'Hair, M. J., Reitzug, U. C., & McLaughlin, H. J. (2000). *Foundations of democratic education*. Fort Worth, TX: Harcourt College.

Peck, C., Mullen, C. A., Lashley, C., & Eldridge, J. A. (2011). School leadership and technology challenges: Lessons from a new American high school. *AASA Journal of Scholarship and Practice, 7*(4), 39-51. Retrieved from http://www.aasa.org/jsp.aspx

Project-based learning. (2012, October 11). In *Wikipedia: The free encyclopedia*. Retrieved from http://en.wikipedia.org/wiki/Project-based_learning

Reeves, D. B. (2011). *Reeves' leadership performance matrix*. Englewood, CO: The Leadership and Learning Center. Retrieved from http://usny.nysed.gov/rttt/teachers-leaders/practicerubrics/Docs/HoughtonMifflin_PrincipalRubric.pdf

Rideout, V. J., Foehr, U. G., & Roberts, D. F. (2010, January). *Generation M^2: Media in the lives of 8- to 18-year-olds*. Menlo Park, CA: The Henry J. Kaiser Family Foundation. Retrieved from http://www.kff.org/entmedia/upload/8010.pdf

Robson, R. (2003). *Mobile learning and handheld devices in the classroom*. Corvallis, OR: Eduworks. Retrieved from www.eduworks.com/Documents/Publications/Mobile_Learning_Handheld_Classroom.pdf

Rossman, G. B., & Rallis, S. F. (1998). *Learning in the field: An introduction to qualitative research*. Thousand Oaks, CA: Sage.

RSA: 21st century enlightenment. (2010, October 14). RSA animate: Changing education paradigms [Video file]. Retrieved from http://www.youtube.com/watch?v=zDZFcDGpL4U

Schachter, R. (2010, November). A call for technology leadership. *District Administration, 46*(10), 41-45. Retrieved from http://www.districtadministration.com/

Scharmer, C. O. (2009). *Theory U: Learning from the future as it emerges: The social technology of presenting*. San Francisco, CA: Berrett-Koehler.

Skiba, D. J. (2011, June). On the horizon: Mobile devices: Are they a distraction or another learning tool? *Nursing Education Perspectives, 32*(3), 195-197. doi:10.5480/1536-5026-32.3.195

Slentz, K. (2012, August). *Changing practice, changing culture through NYSED*. Presented at the annual educational leadership doctoral cohort welcome dinner of The Sage Colleges, Albany, NY.

Song, Y. (2007, September/October). Educational uses of handheld devices: What are the consequences? *TechTrends, 51*(5), 38-45. doi:10.1007/s11528-007-0068-y

Staples, A., Pugach, M. C., & Himes, D. (2005). Rethinking the technology integration challenge: Cases from three urban elementary schools. *Journal of Research on Technology in Education, 37*(3), 285-311. Retrieved from http://www.iste.org/learn/publications/journals/jrte

Statistica.com. (2013a). *Apple iPad: U.S. Revenue Q2 2010-Q2 2012*. Retrieved from http://www.statista.com/statistics/242293/apple-ipad-revenue-in-the-usa-since-2nd-quarter-2007/

Statistica.com. (2013b). *Apple iPhone: Sales 2007-2011*. Retrieved from http://www.statista.com/statistics/242289/apple-iphone-sales-in-the-usa-since-2007/

Staudt, C. (2001). *Handheld computers in education*. Retrieved from the Playspace website: playspace.concord.org/documents/learning from handhelds.pdf

Swan, K., van't Hooft, M., Kratcoski, A., & Unger, D. (2005). Uses and effects of mobile computing devices in K-8 classrooms. *Journal of Research on Technology in Education, 38*(1), 99-112. Retrieved from http://www.iste.org/learn/publications/journals/jrte

Tablet computer. (2012, November 6). In *Wikipedia: The free encyclopedia*. Retrieved from http://en.wikipedia.org/wiki/Tablet_computer

Thomas, K., & Orthober, C. (2011). Using text-messaging in the secondary classroom. *American Secondary Education, 39*(2), 55-76. Retrieved from http://www.ashland.edu/ase

Tooms, A., Acomb, M., & McGlothlin, J. (2004, November). The paradox of integrating handheld technology in schools: Theory vs. practice. *T.H.E. Journal, 32*(4), 14-17. Retrieved from http://www.thejournal.com

Tosun, N., & Baris, M. F. (2011). Using information and communication technologies in school improvement. *TOJET: The Turkish Online Journal of Educational Technology, 10*(1), 223-231. Retrieved from http://www.tojet.net/

United States Department of Education. (2012, July 11). *Race to the top fund: Purpose*. Retrieved from author's website: http://www2.ed.gov/programs/racetothetop/index.html

UserExperiencesWorks. (2011, October 6). A magazine is an iPad that does not work [Video file]. Retrieved from http://www.youtube.com/watch?v=aXV-yaFmQNk

Villano, M. (2007, December). A handful of learning. *T.H.E. Journal, 34*(12), 22-23. Retrieved from http://www.thejournal.com

Vogt, W. P., & Johnson, R. B. (2011). *Dictionary of statistics & methodology: A nontechnical guide for the social sciences* (4th ed.). Thousand Oaks, CA: Sage.

Waters, J. K. (2010, June/July). Enter the iPad (or not?). *T.H.E. Journal, 37*(6), 38-45. Retrieved from http://www.thejournal.com

The White House. (n.d.). *Race to the Top*. Retrieved from author's website: http://www.whitehouse.gov/issues/education/k-12/race-to-the-top

Williams, L. A., Atkinson, L. C., & Cate, J. M. (2008). Mutual support between learning community development and technology integration: Impact on school practices and student achievement. *Theory Into Practice, 47*(4), 294-302. doi:10.1080/00405840802329219

Wu, J., & Zhang, Y. (2010). Examining potentialities of handheld technology in students' academic attainments. *Educational Media International, 47*(1), 57-67. doi:10.1080/09523981003654977

Yin, R. K. (2009). *Applied Social Research Methods Series: Vol. 5. Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage.

Appendix A

Letter to Superintendents

Superintendent_____:

I am conducting a qualitative research study entitled: The implementation of smartphones and tablet technologies into the classroom by selected New York State public school leaders. Your district has currently integrated this technology into two or more grade levels. I would like your permission to interview at least three of your school leaders who were directly involved in the integration. These leaders are system leaders, building leaders and union leaders.

The research involves the completion of a brief personal interview. The audio taped interview will last no longer than ninety minutes. These interviews will be conducted at the convenience of the participant, be it face to face, via telephone or online using Skype or facetime.
In particular, I want to address the following research questions:

1. What specific skills are associated with a school leader's ability to integrate handheld technologies into the curriculum of a New York State Public School?
2. What barriers does a school leader face when implementing handheld technologies such as smartphones and tablets into the instructional programs of a New York State Public School?
3. What strategies does a school leader use to plan and implement the change process which will move a district from one that doesn't yet use handheld(i.e. smartphone, iPod, or tablet) technologies to one that does?
4. What factors caused the school leader to decide to implement the use of handheld technology?
5. How do the change and transition steps of a school leader who has implemented handheld technologies into instructional programs, compare to the change steps of John P. Kotter and Dan S. Cohen, and the transition steps of Dr. William Bridges?

As a result of participating in this study your district will benefit from the findings. The findings in this study will be utilized by other districts to develop a plan for integration of technology in other public schools. The study will also help administrators discover barriers to the integration, as well as, assist them in sustaining the integration.

All information gathered will be confidential and participants (including the school district) will be given pseudonyms. If you agree to participate in the study, The Sage Colleges' Institutional Review Board (IRB) requires a letter of consent on your district's letterhead. Please feel free to contact me at xxxxxx@sage.edu or my doctoral chair person Dr. Ann Meyers at xxxxxx@sage.edu with any questions or concerns. I thank you for your consideration and hope to work with your school district and leaders in my study.

Sincerely,

Richard R. DeMallie
Doctoral Candidate, Sage Graduate Schools

Appendix B

Consent Form

PARTICIPANT CONSENT FORM

TITLE: The implementation of smartphones and tablet technologies into the classroom by selected New York State public school leaders.

SAGE College of Albany

You are invited to participate in a study to research the barriers, philosophies and steps taken by New York State public school district and building level administrators to integrate smartphone and tablet technologies into instruction. You have been asked to participate because of your experiences related to the topic of this study. Please review this consent form and ask any questions before committing to participate in this study.

This study is being conducted by: Sage Doctoral student, Richard DeMallie, under the supervision of Dr. Ann Myers, Associate Professor and Principal Researcher.

Purpose of Study:

The purpose of the research is to study the phenomenon of change and the barriers that school leaders may face in incorporating the latest technologies. The study will also look at what type of information the administrators will use to support the sustainability of the changes.

Voluntary Study:

This study is strictly **VOLUNTARY.** If you choose to participate in the study you have every opportunity to withdraw from the study at any time. You are not obligated to answer any of the questions asked. If at the end of the interview you wish to withdraw your data, it will be destroyed immediately at your request.

Procedures:

If you agree to be a participant in this study, you will be interviewed by the student researcher and asked no more than fifteen questions related to the purpose of this study. The interview will last no longer than ninety minutes.

Risks and Benefits of Being in the Study:

There is a minimal risk associated in participating in this study. There is always a potential risk that data could be compromised and the identity of the participant identified. There is also a risk confidentiality could be breached by others in the study within the same educational setting. This internal breach could compromise trust or morale in a school setting depending on the data provided to the researcher.

The benefits of participating in this study are: the findings in this study could be used to develop a plan for integration of technology in other public schools. The study will help administrators discover barriers to integration, as well as, assist them in sustaining the integration.

Compensation: You will not receive any compensation for your participation in this study

Confidentiality:

All interviews will be audio taped and transcribed by Ms. Jamie Mroczko for your review. Ms. Mroczko has signed a confidentiality agreement and you may request a copy of this agreement prior to committing to the interview process. All data collected will be coded and stored in a password protected file or locked in a file cabinet. Pseudonyms will be used to protect confidentiality. Only the researcher will know who gave what response and only the researcher will know the passwords and codes. The researcher will also possess the keys to the storage unit where the digital audio files are stored. All audio files and transcripts will be destroyed at the completion of the study

Contacts and questions:
The Principal Researcher of this study is Dr. Ann Myers, Associate Professor at the SAGE College of Albany. The Student Researcher is Doctoral Candidate at the SAGE College of Albany Richard DeMallie. Mr. DeMallie will be conducting all the interviews and collecting data. If you have any questions concerning this consent form, or during and after the data collection process, do not hesitate to contact the Primary or Student Researcher at the contacts given below.

Ann Myers Ed.D
SAGE College of Albany
140 New Scotland Avenue
Albany, NY 12208-3425
Email – xxxxxx@sage.edu
518-xxx-xxxx

Richard DeMallie
xxx
xxxxx, NY 12068
Email – xxxxx@sage.edu
518-xxx-xxxx

<u>You will be provided a copy of this consent form for your records</u>

<u>STATEMENT OF CONSENT:</u>
I have read all of the above information and understand that my participation in this study is completely voluntary. I also understand that I can withdraw from the study at anytime. I have asked questions and received answers. I consent to participate in this study.

Signature _____Date: _____

Signature of Investigator_____ Date: _____

Appendix C

Notice of Confidentiality and Transcription

Confidentiality Agreement
Transcription Services

I, Jamie S. Mroczko, transcriptionist, agree to maintain full confidentiality in regards to any and all audiotapes and documentation received from Richard R. DeMallie related to his doctoral study on the phenomenon of change and barriers to handheld technology integration into instruction. Furthermore, I agree:

1. To hold in strictest confidence the identification of any individual that may be inadvertently revealed during the transcription of audio-taped interviews, or in any associated documents;
2. To not make copies of any audiotapes or computerized files of the transcribed interview texts, unless specifically requested to do so by Richard R. DeMallie;
3. To follow established protocols for my role in the project;
4. To not share any of the information on the tapes with anyone except the researcher listed on this form;
5. To store all study-related audiotapes and materials in a safe, secure location as long as they are in my possession;
6. To return all audiotapes and study-related documents to Richard R. DeMallie in a complete and timely manner.
7. To delete all electronic files containing study-related documents from my computer hard drive and any backup devices.

I am aware that I can be held legally liable for any breach of this confidentiality agreement, and for any harm incurred by individuals if I disclose identifiable information contained in the audiotapes and/or files to which I will have access.

Transcriber's name (printed) [redacted]

Transcriber's signature [redacted]

Date 2·23·12

Appendix D

Letter to NERIC

From: [redacted]@neric.org>
To: Richard Demallie <RDemallie@gloversvilleschools.org>
Date: 08/27/2012 02:08 PM
Subject: RE: Handheld Instruction

Rich,

Sorry for the delay. I was called away unexpectedly following our visit.

Both [redacted] and I wracked our brains to come up with some other possible for you. We are not aware of any other district meeting your criteria.

I have inquired to some people but have not heard back.

[redacted]

[redacted]

[redacted]

[redacted]

From: Richard Demallie [mailto:RDemallie@gloversvilleschools.org]
Sent: Monday, August 20, 2012 1:27 PM
To: [redacted]@Pearson.com
Subject: Handheld Instruction

[redacted]

I just wanted to inform you that I am still looking for one more school to add to my research project. At this point I am looking for any handheld technology integration. I am trying to stay away from laptops, however any netbook, xoom, ipad, ipod, smartphone or bring your own device integration will work.

Thanks for your help and have a wonderful work week.

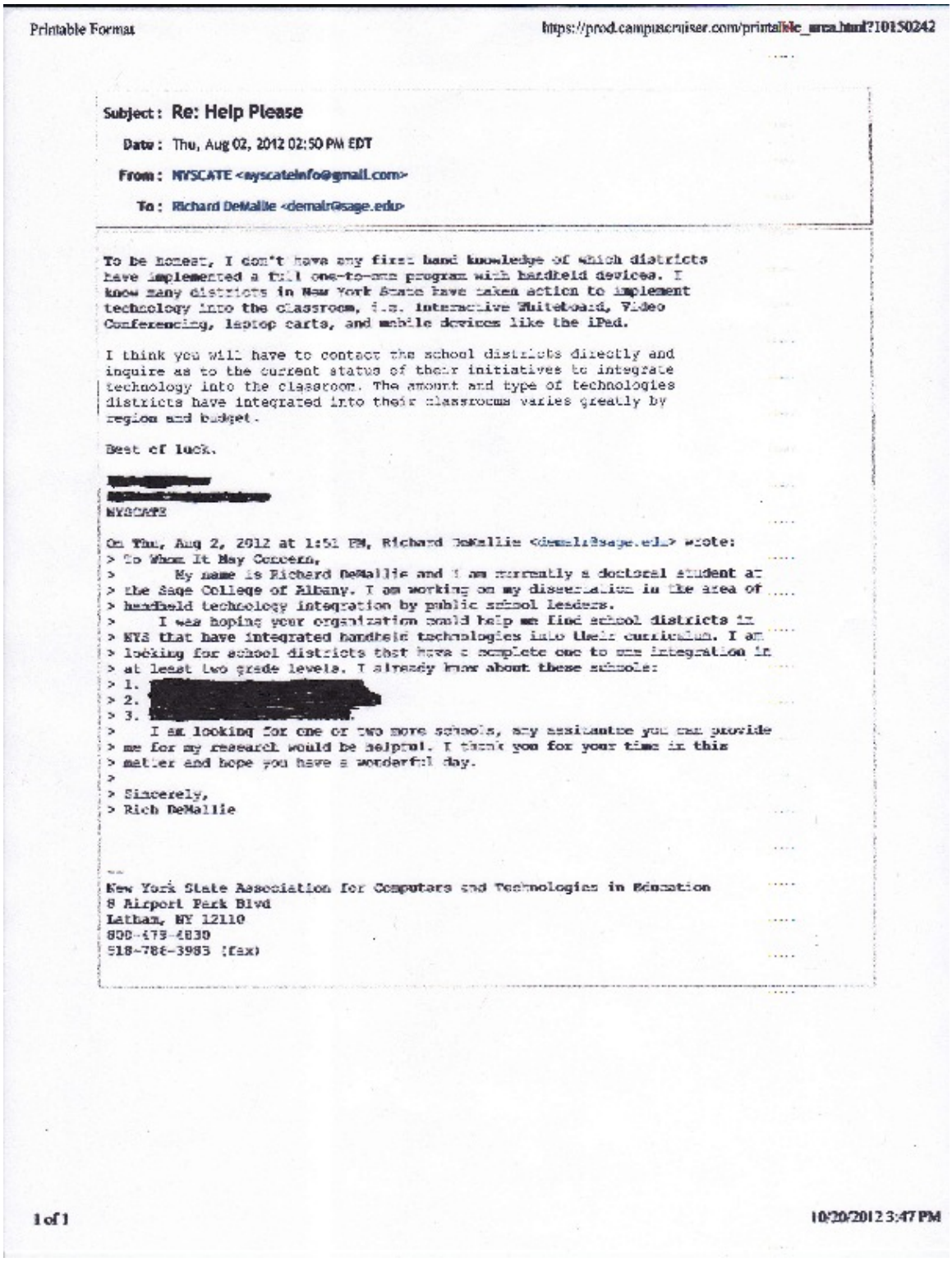
"A person's true character is revealed by what they do when no one else is watching."
-Unknown

Sincerely,

Richard R. DeMallie
Gloversville High School Principal

Appendix E

Letter to NYSCATE



Printable Format https://prod.campuscruiser.com/printable_area.html?10150242

Subject: Re: Help Please

Date: Thu, Aug 02, 2012 02:50 PM EDT

From: NYSCATE <nyscateinfo@gmail.com>

To: Richard DeMallie <demalr@sage.edu>

To be honest, I don't have any first hand knowledge of which districts have implemented a full one-to-one program with handheld devices. I know many districts in New York State have taken action to implement technology into the classroom, i.e. Interactive Whiteboard, Video Conferencing, laptop carts, and mobile devices like the iPad.

I think you will have to contact the school districts directly and inquire as to the current status of their initiatives to integrate technology into the classroom. The amount and type of technologies districts have integrated into their classrooms varies greatly by region and budget.

Best of luck.

[redacted]

NYSCATE

On Thu, Aug 2, 2012 at 1:51 PM, Richard DeMallie <demalr@sage.edu> wrote:

> To Whom It May Concern,
>
> My name is Richard DeMallie and I am currently a doctoral student at the Sage College of Albany. I am working on my dissertation in the area of handheld technology integration by public school leaders.
>
> I was hoping your organization could help me find school districts in NYS that have integrated handheld technologies into their curriculum. I am looking for school districts that have a complete one to one integration in at least two grade levels. I already know about these schools:
>
> 1. [redacted]
> 2. [redacted]
> 3. [redacted]
>
> I am looking for one or two more schools, any assistance you can provide me for my research would be helpful. I thank you for your time in this matter and hope you have a wonderful day.
>
> Sincerely,
> Rich DeMallie

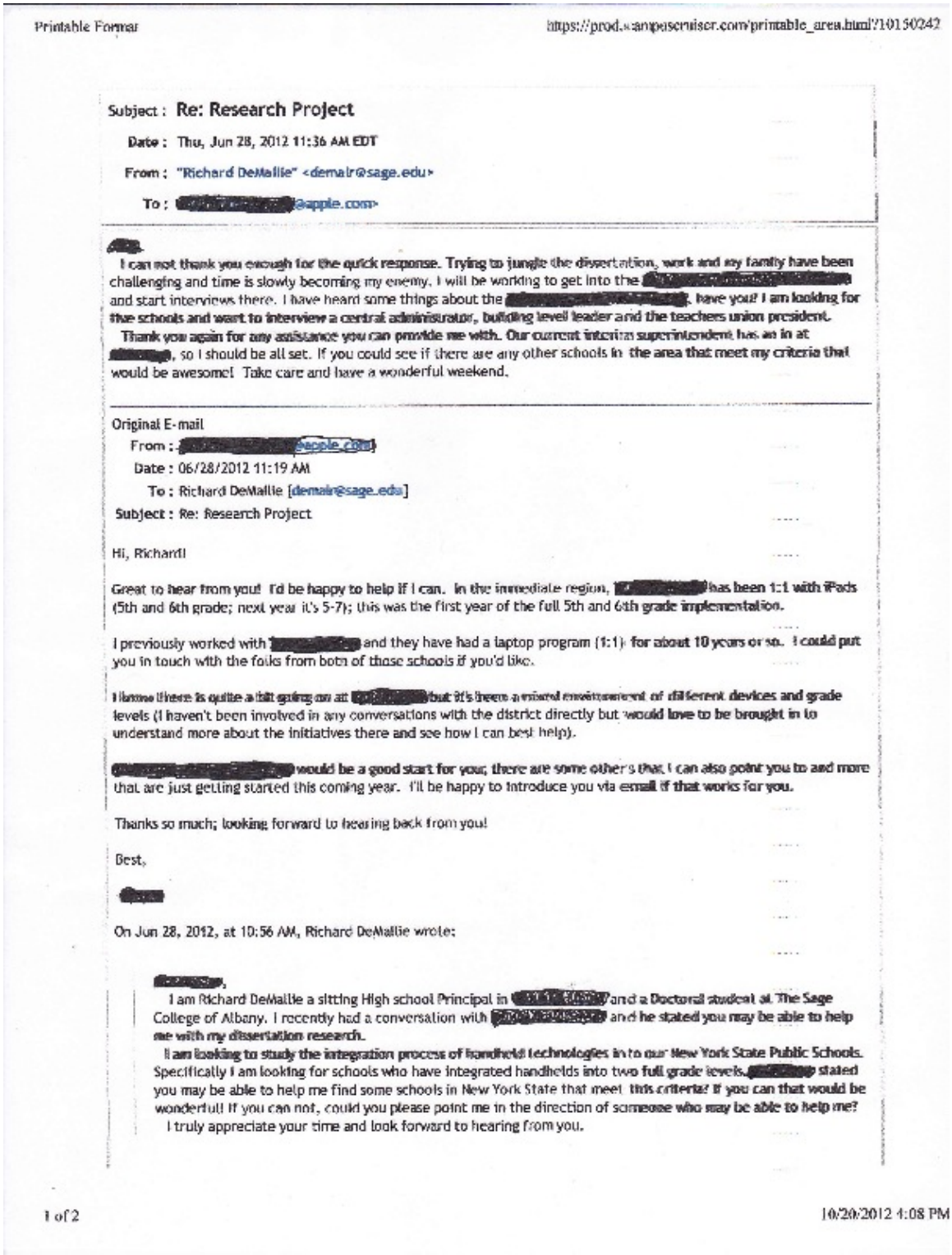
--

New York State Association for Computers and Technologies in Education
8 Airport Park Blvd
Latham, NY 12110
800-473-4830
518-786-3985 (fax)

1 of 1 10/20/2012 3:47 PM

Appendix F

Letter to Apple



Printable Format https://prod.campaignmonitor.com/printable_area.html?10150242

Subject : **Re: Research Project**

Date : Thu, Jun 28, 2012 11:36 AM EDT

From : "Richard DeMallie" <demalr@sage.edu>

To : [redacted]@apple.com>

[redacted]

I can not thank you enough for the quick response. Trying to juggle the dissertation, work and my family have been challenging and time is slowly becoming my enemy. I will be working to get into the [redacted] and start interviews there. I have heard some things about the [redacted]. have you? I am looking for the schools and want to interview a central administrator, building level leader and the teachers union president.

Thank you again for any assistance you can provide me with. Our current interim superintendent has us in at [redacted], so I should be all set. If you could see if there are any other schools in the area that meet my criteria that would be awesome! Take care and have a wonderful weekend.

Original E-mail

From : [redacted]@apple.com]

Date : 06/28/2012 11:19 AM

To : Richard DeMallie [demalr@sage.edu]

Subject : Re: Research Project

Hi, Richard!

Great to hear from you! I'd be happy to help if I can. In the immediate region, [redacted] has been 1:1 with iPads (5th and 6th grade; next year it's 5-7); this was the first year of the full 5th and 6th grade implementation.

I previously worked with [redacted] and they have had a laptop program (1:1) for about 10 years or so. I could put you in touch with the folks from both of those schools if you'd like.

I know there is quite a bit going on at [redacted] but it's been a mixed environment of different devices and grade levels (I haven't been involved in any conversations with the district directly but would love to be brought in to understand more about the initiatives there and see how I can best help).

[redacted] would be a good start for you; there are some others that I can also point you to and more that are just getting started this coming year. I'll be happy to introduce you via email if that works for you.

Thanks so much; looking forward to hearing back from you!

Best,

[redacted]

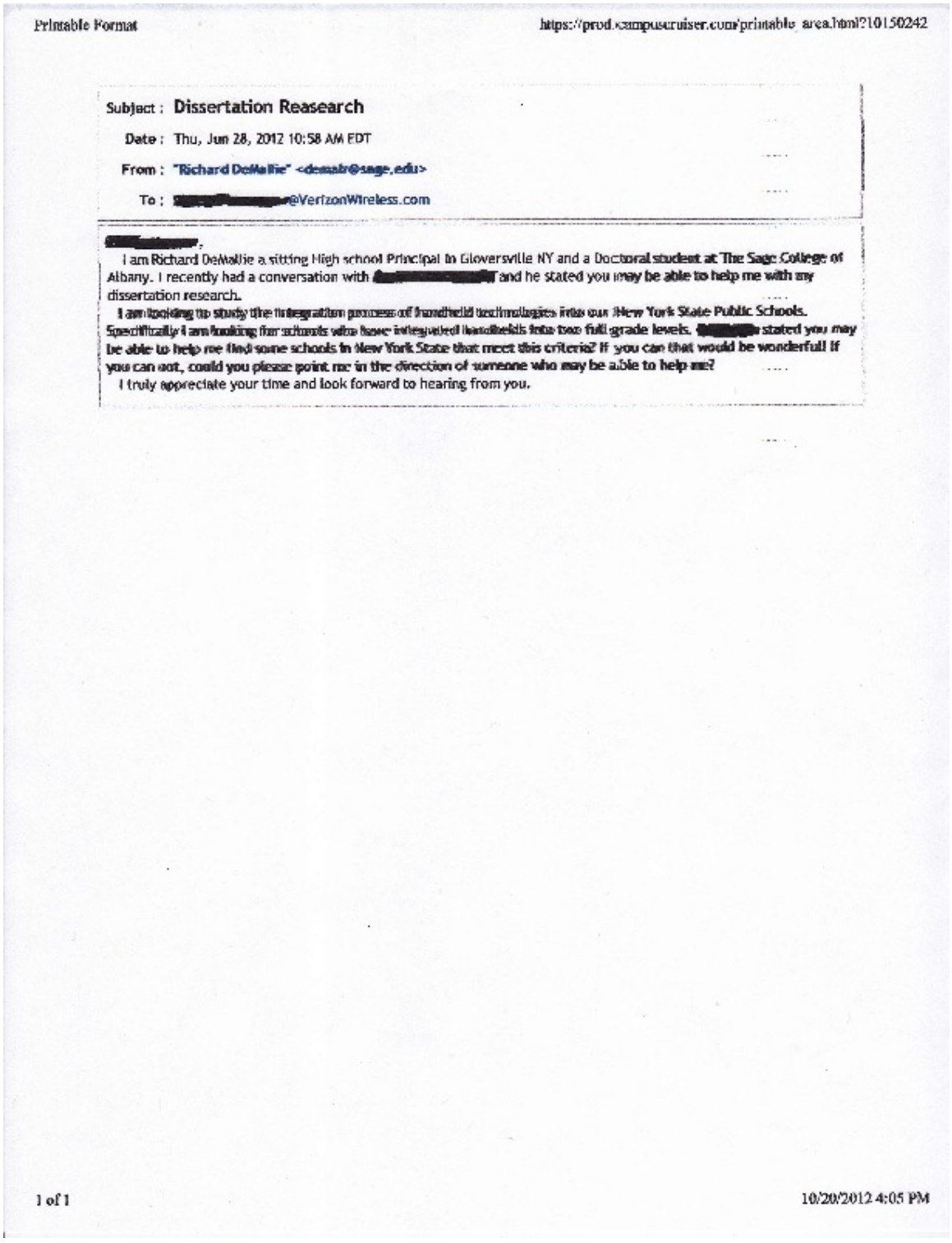
On Jun 28, 2012, at 10:56 AM, Richard DeMallie wrote:

> [redacted],
>
> I am Richard DeMallie a sitting High school Principal in [redacted] and a Doctoral student at The Sage College of Albany. I recently had a conversation with [redacted] and he stated you may be able to help me with my dissertation research.
>
> I am looking to study the integration process of handheld technologies in to our New York State Public Schools. Specifically I am looking for schools who have integrated handhelds into two full grade levels. [redacted] stated you may be able to help me find some schools in New York State that meet this criteria? If you can that would be wonderful! If you can not, could you please point me in the direction of someone who may be able to help me?
>
> I truly appreciate your time and look forward to hearing from you.

1 of 2 10/20/2012 4:08 PM

Appendix G

Letter to Verizon



Printable Format https://prod.campuscruiser.com/printable_area.html?10150242

Subject : **Dissertation Reasearch**

Date : Thu, Jun 28, 2012 10:58 AM EDT

From : "Richard DeMallie" <demalr@sage.edu>

To : [redacted]@VerizonWireless.com

[redacted],

I am Richard DeMallie a sitting High school Principal in Gloversville NY and a Doctoral student at The Sage College of Albany. I recently had a conversation with [redacted] and he stated you may be able to help me with my dissertation research.

I am looking to study the integration process of handheld technologies into our New York State Public Schools. Specifically I am looking for schools who have integrated handhelds into two full grade levels. [redacted] stated you may be able to help me find some schools in New York State that meet this criteria? If you can that would be wonderful! If you can not, could you please point me in the direction of someone who may be able to help me?

I truly appreciate your time and look forward to hearing from you.

1 of 1 10/20/2012 4:05 PM

Appendix H

Interview Questions and Protocol

INTERVIEW PROTOCOL AND QUESTIONS

PROJECT TITLE: The integration of smartphones and tablet technologies into the classroom by selected New York State public school leaders.

Date of Interview: _____
Time of Interview: _____
Place of Interview: _____
Interviewer: _____
Research Participant: _____

Purpose of Study:
The purpose of the study is to examine the phenomenon of change and the barriers school leaders may face in incorporating the latest technologies of smartphones and tablets. Further, the study will examine what type of information the administrators will use to support the sustainability of the change.

Interview questions:

1. What was your vision concerning the integration of handheld technologies in the classroom?

2. How did this integration align with board policy and regulation? What modifications were required if any?

3. At which level were handheld technologies integrated first? Why?

4. What were some of the strategies utilized to make a successful transition from traditional instructional methods to instructional methods that incorporate handheld technologies?

5. What were some of the barriers to the technology integration?

6. How did you address those individuals who did not want to move away from traditional instructional techniques?

7. What are the factors you considered in determining the success of the integration on students?

8. What are the factors you considered in determining the success of the integration on teachers?

9. What are the factors you considered in determining the success of the integration on school communities?

10. How far toward the realization of your vision did the integration process take you?

11. Describe your building when the integration of handhelds is complete?

12. Why is your school a leader in the utilization of handheld technologies?

At the conclusion of the interview, participants were thanked for their time and assured of the confidentiality of the study. Also, they were informed, follow up questions might occur when they review the transcripts for validity.

Appendix I

Cover Letter to Principals and Union Leaders

Dear _____,

My name is Richard R. DeMallie and I am a doctoral candidate at the Sage College of Albany, New York. I am currently the High School Principal in the xxxxxxxxxx School District located in Fulton County, New York.

I am conducting a qualitative research study for my doctoral dissertation. I am studying the integration of smartphone and tablet technology into instruction. Specifically, I will be researching the roles of central administrators, building leaders, and union leaders in this integration. The change that is occurring or has occurred within your district or building will be compared to the change steps of Kotter and Cohen's book, *The Heart of Change*, and to the transition phases of Bridges' book, *Managing Transitions.*

Given your role as a system, building or union leader, I would like the opportunity to interview you. The interview would last no longer than ninety minutes and you will be asked to answer between ten and fifteen questions. The questions will be related to your role in the transition from traditional classroom instruction to instruction that incorporates smartphone and/or tablet technologies. The interviews will be audio taped and conducted at a location that would be the most convenient for you. You can elect to do face to face or phone interviews.

If you agree to participate in this research, I will send you a more detailed description of the study. You will also be required by the Institutional Review Board (IRB) to sign a consent letter which I will send to you via email upon your verbal agreement to participate in the study. Once you receive the consent form please make two copies. Send one back to me and the other keep for your own records.

If you agree to participate in this study all administrators and union leaders who have the opportunity to integrate smartphone and tablet technologies into their classrooms will benefit from your knowledge and experience in the area of moving your district, building or teachers, from traditional instructional techniques to instructional techniques utilizing the aforementioned technologies.

All information provided will be kept confidential and participants (including your school district) will be given pseudonyms. If you are willing to participate in this study please contact me at xxxxxx@sage.edu within one week of ( ). I want to sincerely thank you in advance for your time and consideration concerning this project. I look forward to hearing from you and I also look forward to the opportunity to work with you. If you have any questions or concerns, please contact the principal researcher, Dr. Ann Myers at xxxxxx@sage.edu.
Sincerely,

Richard R. DeMallie

Appendix J

Research and Interview Question Grid for Bridges' Transitional Phases

Interview Questions:

1. What was your vision concerning the integration of handheld technologies in the classroom?
2. How did this integration align with board policy and regulation? What modifications were required if any?
3. At which level were handheld technologies integrated first? Why?
4. What were some of the strategies utilized to make a successful transition from traditional instructional methods to instructional methods that incorporate handheld technologies?
5. What were some of the barriers to the technology integration?
6. How did you address those individuals who did not want to move away from traditional instructional techniques?
7. What are the factors you considered in determining the success of the integration on students?
8. What are the factors you considered in determining the success of the integration on teachers?
9. What are the factors you considered in determining the success of the integration on school communities?
10. How far toward the realization of your vision did the integration process take you?
11. Describe your building when the integration of handhelds is complete.
12. Why is your school system a leader in the utilization of handheld technologies?

RESEARCH QUESTIONS	INTERVIEW QUESTIONS
1. What specific skills are associated with a school leader's ability to integrate handheld technologies into the curriculum of a New York State public school?	#1 , #4, #6, #7,#12, #3, #8
2. What barriers does a school leader face when implementing handheld technologies such as smartphone's and tablets into the instructional programs of a New York State public school	#2, #5, #6, #7,#8,#9
3. What strategies does a school leader use to plan and implement the change process which will move a district from one that doesn't yet use handheld(i.e. smartphone, iPod, or tablet) technologies to one that does?	#1, #3, #4, #6, #7, #11, #9
4. What factors caused the school leader to decide to implement the use of handheld technology?	#1, #3, #12
5. How do the change and transition steps of a school leader who has implemented handheld technologies into instructional programs, compare to the change steps of John P. Kotter and Dan S. Cohen, and the transition steps of Dr. William Bridges?	#1, #4, #6, #10, #11

Appendix K

Research and Interview Question Grid for Kotter and Cohen's Change Steps

Research Questions:
1. What specific skills are associated with a school leader's ability to integrate handheld technologies into the curriculum of a New York State public school?
2. What barriers does a school leader face when implementing handheld technologies such as smartphone's and tablets into the instructional programs of a New York State Public School?
3. What strategies does a school leader use to plan and implement the change process which will move a district from one that doesn't yet use handheld(i.e. smartphone, iPod, or tablet) technologies to one that does?
4. What factors caused the school leader to decide to implement the use of handheld technology?
5. How do the change and transition steps of a school leader who has implemented handheld technologies into instructional programs, compare to the change steps of John P. Kotter and Dan S. Cohen, the transition steps of Dr. William Bridges?

Interview Questions:
1. What was your vision concerning the integration of handheld technologies in the classroom?
2. How did this integration align with board policy and regulation? What modifications were required if any?
3. At which level were handheld technologies integrated first? Why?
4. What were some of the strategies utilized to make a successful transition from traditional instructional methods to instructional methods that incorporate handheld technologies?
5. What were some of the barriers to the technology integration?
6. How did you address those individuals who did not want to move away from traditional instructional techniques?
7. What are the factors you considered in determining the success of the integration on students?
8. What are the factors you considered in determining the success of the integration on teachers?
9. What are the factors you considered in determining the success of the integration on school communities?
10. How far toward the realization of your vision did the integration process take you?
11. Describe your building when the integration of handhelds is complete.
12. Why is your school system a leader in the utilization of handheld technologies?

Kotter and Cohen Change Steps	Research and Interview Questions
1. Increase Urgency	RQ#3, RQ#4, RQ#5, IQ#4, IQ#12
2. Build a guide team	RQ#1, RQ#2, RQ#5, IQ#3, IQ#4,
3. Get the right Vision	RQ#1, RQ#3, RQ#5, IQ#1, IQ#2, IQ#4,
4. Communicate for buy-in	RQ#1, RQ#3, RQ#5, IQ#1, IQ#3, IQ#7, IQ#8,IQ#9
5. Empower Action	RQ#3, RQ#4, RQ#5, IQ#3, IQ#4, IQ#8,
6. Create Short Term Wins	RQ#1, RQ#3, RQ#5, IQ#3, IQ#4, IQ#7,IQ #8, IQ# 9
7. Don't let Up	RQ#2, RQ#4, RQ#5, IQ#4, IQ #6
8. Make Change Stick	RQ# 1,RQ#3, RQ# 5, IQ #10, IQ# 11, IQ#12