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iOS Deployment Methods in Wisconsin K-12 Schools

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Kenneth W. Fager
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This Capstone Project was approved by:

Advisor: _____
Dr. Eileen Schroeder

Seminar Instructor: _____
Liesl Hohenshell, Ph.D.

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Abstract

Wisconsin K-12 school districts are adopting iOS devices (iPad, iPod Touch, iPhone) to address their technology needs. This study examines what general deployment methods are used in conjunction with these devices. Forty-four participants from Wisconsin school districts contributed data through an online survey, and in select cases a follow up interview, that addressed various aspects of iOS device deployment. According to the data the iPad was the most popular iOS device by a nearly 3:1 ratio. Additional findings suggest that school staff is driving deployment, that the devices are being used in Special Education, and that management issues are the most significant difficulty encountered. Recommendations for iOS device deployment in K-12 are provided based on the findings of this study.

Keywords: Apple, education, iOS, iPad, iPod Touch, iPhone, mobile, technology, Wisconsin

Chapter One

Introduction

Since the introduction of the personal computer in the late 1970s, progressive educators have been eager to incorporate modern technology into their classroom. With the widespread adoption of computers in schools, the 1980s ushered in a wave of digital interactive learning tools. Technology in the 1990s introduced students to rich multimedia experiences that could be shared worldwide on the internet. The education technology landscape at the dawn of the new millennium looked almost ancient a decade later as entire industries became uprooted by innovation.

The transformation of technology of the past few decades represents a digital form of Darwinism at work. Innovative technologies that are adaptive to environmental change will survive to pass their features on to the next generation. Since the introduction of the personal computer there have been millions of incremental iterations to make the all-in-one computing devices we now use today. Computers with complex operation codes gave way to screens with logical graphic representations. Heavy desktop computers became portable with improved battery technology. Cellular and wireless technology eventually integrated directly into handheld devices. In the past decade the desktop computer, modem, phone, camera, camcorder, personal audio player, television, VCR, DVD player, street map, videogame console, flashlight, clock, fax machine, calculator, compass, address book, textbook, encyclopedia, calendar, notepad, file cabinet, and mailbox have been amalgamated into a singular device that fits in your back pocket.

The current path of technological evolution has been particularly disruptive for educators. If contemporary students are to participate in contemporary society, they must be equipped with both the tools and skills required to navigate the digital world. Perhaps more pressing is the need

for educators who know how to leverage the potential of these tools to create new learning opportunities within the curriculum for their students. Dismissing the changes brought about by technology in the classroom is an evolutionary dead-end that will leave current students behind their tech-enabled peers. Educators must adapt to technological evolution or become obsolete.

Educators with a finger on the pulse of technology are understandably eager to incorporate these off-the-shelf consumer devices with such broad functionality in the classroom. Technology frameworks set forth by the Partnership for 21st Century Skills ([P21], 2011), American Association for School Librarians ([AASL], 2007), and International Society for Technology Standards in Education ([ISTE], 2007) overlap somewhat in their general focus areas on student technology use, research skills, ethical behavior, communications and products. The Wisconsin Department of Instruction Model Academic Standards for Information and Technology Literacy share several key features of the aforementioned frameworks (Fortier, Potter, Grady, Lohr & Klein, 1998). As of this writing the proposed updates to the Wisconsin standards indicate alignment with AASL and ISTE standards (which is subject to change in the final version). At the core of these standards is an underlying assumption that the technology is present and equitably accessible for the learner. The frameworks of these common standards recognize that students need flexible technology skills in the present if they are to adapt to an uncertain future.

In alignment with the standards educators are expected to guide students on the use of technology to research, communicate, collaborate, problem solve, develop skills, and participate as model citizens in the digital world. With these standards comes the implicit acknowledgement that literacy in the modern world has expanded beyond the confines of just the ability to read, write, and do arithmetic. Literacy now incorporates the studied comprehension of multiple types

of digital resources including online textual media, visual media, social media, and other new media forms made possible by current technology. Inevitably the technology of today will quickly be rendered obsolete, but digital literacy skills are intentionally designed to teach adaptation. The current technology that exists within a classroom is a tool to build a better tomorrow. In order for that to happen, those tools must be within the hands of both educators and students.

One of the greatest challenges for educators in the digital age has been obtaining technology that is not only readily accessible, but also cost-efficient, reliable, and user-friendly at the same time. From the 1980s up to the present the primary technology tool other than the pencil in the classroom has been the computer. Although there is little doubt that computers in the hands of teachers who properly leverage the technology can provide students excellent education opportunities, the computers are fundamentally limited by physical form factor, high cost, number, space and time that they are available to students. Within the immediate future the computer will remain an indispensable tool in schools, but their once unassailable position is currently being eroded by the rapid proliferation of mobile computing devices. In the contemporary context the definition of a mobile computing device is capable of computing, has a portable form factor, and is able to access the internet.

It is in this current mobile computing realm that some of the shortcomings of desktops and even laptops can be mitigated. A mobile computing device that has a smaller cost per unit than a dedicated computer workstation, yet still accomplishes most of the same tasks, can offer a better overall student-to-device ratio within the same budget. Mobile computing devices also have the advantage of not being limited to a single physical location. People can use the devices wherever the need arises. As long as the user is within range of a wireless network they will be

able to leverage features that require internet access. Although the current mobile computing generation cannot entirely replicate the functionality of a dedicated computer workstation, progress is being made to overcome those limitations. Mobile computing devices with faster processors, larger storage limits, improved human input methods, and better network connectivity are supplanting dedicated workstations.

Whereas a school with only computers may have a 20:1 student to computer technology access ratio, a school equipped with mobile computing devices may significantly improve that ratio. Just as an ideal math class is properly outfitted with a 1:1 ratio of students to calculators, so too is the ideal contemporary classroom outfitted with a 1:1 student to computer technology access ratio. Barring the most wealthy public schools nationwide, it is a fair assumption that the vast majority are unable to provide a 1:1 ratio of expensive desktop and/or laptop devices to every student. Significant advances in mobile computing, however, may be the pathway to achieving that goal.

Rather than wait for research which validates the use of mobile computing devices as educationally sound, several progressive Wisconsin school districts and many others across the country have already invested, or are contemplating investing, in iOS technology. The research question that this study sought to answer was: What iOS device deployment methods are currently being used in Wisconsin K-12 schools? This study identifies common themes concerning the acquisition, distribution, management, general user feedback, difficulties, and in select cases the rationalization for method application with iOS device deployment. The collected data was used to develop recommendations for future iOS deployment methods in K-12 school districts. Although the data was collected exclusively from within Wisconsin, the recommendations may be applicable to K-12 schools nationwide.

Schools in the 21st century are adapting to the use of mobile computing technology within the classroom in order to meet technology standards, provide students and staff with the tools necessary to participate in modern society, and to pave an evolutionary pathway to the future. As I have delved into the research behind this report I have often reflected on the influential pathways that have led me to this point.

The Apple II in the back of my 1st grade classroom ignited a passion that burned brighter as technology improved. As a child of the 1980s I have been fortunate to observe the personal computer transform from niche product to household necessity, the proliferation of the internet into everyday life, the upheaval of traditional media forms, and the very beginnings of mobile computing ubiquity in the American mainstream. There are very few technologies that I have observed over the past three decades that have generated so much universal interest among a diverse demographic of users as the iPad, iPod Touch, and iPhone. It is my opinion that these devices, and others like them, are the culmination of the technological revolutions that merit study.

As a student I desperately wanted my teachers to understand and use technology as I did. A part of me wants to give students the learning experience I longed for. It is partly why I sought a Bachelor of Education degree from UW-Oshkosh and am continuing my studies in the UW-Whitewater Library Media & Technology program. I may have been an awkward computer nerd that was an exception to the norm in my time, but today's students are much more tech savvy. If today's educators do not incorporate modern technology into their environment, America's students will continue to fall further behind their global peers in the 21st century.

Chapter Two

Literature Review

The body of available supporting evidence relevant to this study revolves around the themes of mobile computing, education standards, the 21st century learner, the education technology revolution, examples of iOS in the classroom, and iOS deployment. These sources provide a conceptual framework to understanding iOS deployment methods.

Mobile Computing

Mobile computing has coexisted alongside desktop computers in various forms throughout the years: the pocket calculator, Palm Pilot, Apple Newton, Blackberry, and numerous other tablet format computing devices. While each of these devices enjoyed varying degrees of market success, the most recent major evolution for mobile computing occurred in 2007 with the announcement of the Android and iPhone OS platforms. The Android operating system, maintained by Google, can operate on devices from any technology vendor that can produce a device meeting the system requirements. In contrast iPhone OS, which was renamed iOS in 2010, operates on Apple hardware produced exclusively by the company.

Since their introduction both platforms have been widely adopted by the general public. The rapid adoption of mobile phones with Android and iOS technology eventually led to the development of other consumer devices incorporating their respective technologies. As a result internet enabled smartphones, handheld personal media players, and tablet computers are now a part of the American zeitgeist.

Apple released the iPhone in the United States on June 29, 2007 bound to a mandatory

two year AT&T service contract. The iPhone price has subsequently dropped, though it is still tied to service contracts with major cellular service providers unless it is purchased unlocked. On September 7, 2007 the company released the iPod Touch, a device with all of the same capabilities of the iPhone sans cellular features and the costly cellular service carrier contract. Building off of the mobile computing foundation laid out by the iPhone and iPod Touch, Apple released a tablet form factor device called the iPad on April 3, 2010. As of this writing Apple has sold over 365 million iOS devices (Lardinois, 2012). This statistic includes the iPhone (original, 3G, 3GS, 4, and 4S), iPod Touch (original, 2nd, 3rd, and 4th generation), and iPad (original, 2G, 3G in both WiFi and cellular models).

In the smartphone market the iPhone is the second most popular platform, with Android firmly in the lead. According to a comScore (2012) report Android accounted for 50.1% market share, with Apple accounting for 30.2% of a total of 104 million American smartphone users in February, 2012. Nielsen (2012) reported similar findings in a report published in the same month. According to this report the Android platform is the dominant smartphone OS accounting for 48% of the total market, with iOS taking a 32% share. In a survey of 5,600 high school students Piper Jaffray reported in spring of 2012 that 34% of respondents owned an iPhone, with an additional 40% indicating that they would like to get one within the next six months (Elmer-DeWitt, 2012). While iOS may not be the dominant platform for smartphones, it has been able to firmly establish itself as a competitive mobile computing platform.

While Android currently has the lead in the smartphone market, statistics from overall internet traffic from mobile computing devices including personal media players and tablets puts the iOS platform ahead in terms of internet use. The web monitoring company Chitika (2012) reported that tablet computers accounted for approximately 7% of all internet traffic. Of that 7%

segment, approximately 90% of the devices were iOS, 9% Android, and the fractional remainder split across other mobile computing platforms. In a report on digital media consumption patterns comScore (2011) also reflects a strong iOS device presence by reporting that the iPad alone accounted for 97.2% of all mobile internet traffic for the month of August, 2011. The authors explained that "Apple's relative strength with non-phone devices like the iPad and iPod Touch helped it expand its OS reach considerably" (p. 16). These additional mobile computing devices running iOS bolstered the total user base over the Android platform, 43.1% to 34.1% comparatively.

The strong web traffic statistics for iOS are reinforced by Apple's significant early lead in the tablet market. After the introduction of the first iPad in 2010 Apple vaulted itself to an initial 94% lead in the tablet market, but has since held onto a comfortable 61% stronghold as of July, 2011 as competitor Android tablets with formidable rival technical specifications have been introduced (Brian, 2011). Research from comScore (2011) asserts that while tablets currently represent a small relative percentage of adoption among the U.S. population, their numbers are anticipated to see tremendous growth.

Apple's dominance in the tablet market is also reflected in raw device sales statistics for iPads versus the competition. The competition frequently reports shipments to retailers, instead of actual sales, to make it appear that their product is gaining market ground against the iPad (Panzarino, 2011). Despite Android vendors' obfuscation through actual sales versus shipped statistics, in February, 2012 Android chief Andy Rubin put the total tablet count for the platform at approximately 12 million devices (Patel, 2012). In the first three months of 2012 Apple reported in an earnings call that it had sold 11.8 million iPads for the quarter alone (Apple, 2012b). In April, 2012 comScore reported that of all Android devices, the Kindle Fire from

Amazon is the most popular with 54.4% share, followed by a number of Galaxy Tab models at 15.4%, and Motorola Xoom at 7%. Strategy Analytics concluded in its tablet market study that "no Android vendor yet offers a blockbuster model to rival the iPad, and demand for many Android vendors' products remains patchy" (Brian, 2011, para. 3).

Apple appears to have a dominant, and in some cases monopolistic, lead in the mobile computing space within schools. In October, 2011 Piper Jaffray conducted a small survey of 25 K-12 technology decision makers at an education technology conference and found that 100% of respondents were considering implementing iPads in schools, while 0% were considering Android tablets (Elmer-Dewitt, 2011; Paczkowski, 2011). Piper Jaffray addressed the issue again in early 2012 in a survey of 18 K-12 Information Technology (IT) managers and found 78% to be testing iPads or Chromebooks, while just 6% were testing Android tablets (Paczkowski, 2012).

Apple's lead in the education market may be aided by the opaque education-focused strategy that highlights its own solutions for school technology needs (Apple, 2011a). The usual marketing propaganda, video profiles of schools that have adopted Apple technology, special hardware and software pricing, and dedicated staff devoted to providing Apple solutions within schools provides a competitive edge over the myriad of technology vendors with Android products.

21st Century Skills: Frameworks and Standards

Guiding the role of education technology in K-12 are sets of standards at the international, national, and state level. While each set differentiates its focus, the standards share a common thread in preparing students for an uncertain future. The American Association of

School Librarians state that students must learn in an environment with "the exponential expansion of information, ever-changing tools, increasing digitization of text, and heightened demands for critical and creative thinking, communication, and collaborative problem solving" (AASL, 2009, p. 5). The Wisconsin K-12 standards for technology literacy assert that the only way to prepare students for a "rapidly changing technological world is to set clear, high academic standards... [for students] to be successful in their adult lives" (Fortier, Potter, Grady, Lohr & Klein, 1998, p. v). The Partnership for 21st Century Skills (n.d.) notes that schools face irrelevance brought upon by accelerating economic, technological, informational, demographic and political changes if they do not bridge the gap between how students live and learn. According to a report from The MacArthur Foundation the "values and norms in education, literacy, and public participation are being challenged by a shifting landscape of media and communications in which youth are the central actors" (Ito et al., 2008, p. 4). In the ensuing disparity between how students live and learn, many are "taking their educational destiny and future into their own hands... and implementing their own version of a 21st century education vision" (Project Tomorrow, 2010a, p. 3). While students with computer skills were once considered exceptional, they are now considered a mainstream norm in modern society (Jones-Kavelier & Flannigan, 2006).

The challenge for contemporary educators teaching these skills can be illustrated in a paradox (Barnett, 2011). The paradox asks how schools can "fulfill the... traditional mission and adapt to changing conditions" as a school "can only prepare children for the future -the unknown- by teaching them what is known" (p. 38). One of the ways to address this challenge is for students and teachers to construct a "unifying set of principles [to] inform present action and future opportunities" (p. 38). Sturdy frameworks for an uncertain future have been developed by

the AASL, P21, ISTE, and *Wisconsin Model Academic Standards for Information and Technology Literacy*. Information and computer technology "literacy is the interest, attitude, and ability of individuals to appropriately use digital technology and communication tools to access, manage, integrate, and evaluate information, construct new knowledge, and communicate with others in order to participate effectively in society" (Lennon, Kirsch, Von Davier, Wagner & Yamamoto, 2003, p. 8). From Kindergarten to grade 12 the "progression in the development of [information and communications technology] skills... supports the notion of creating independent information users and lifelong learners" (Andrews & Gann, 2011, p. 22).

The ideal learning environment according to P21 is one that has "systems that accommodate the unique learning needs of every learner and support the positive human relationships needed for effective learning" (Bestwick & Campbell, 2010, p. 18). The P21 framework identifies six key elements to promote the development of 21st century skills in areas for core subjects, lifelong learning skills, education tools, cultural context, modern content, and assessment. The P21 framework provides an "education that prepares students for learning in this complex, digital society [that] will be more meaningful to students and, ultimately, more effective in preparing them for the future" (P21, n.d., p. 7). This framework has been implemented in Wisconsin and 14 other states to date (P21, 2007).

The International Society for Technology in Education has developed a differentiated set of technology standards for students (2007), teachers (2008), administrators (2009), technology coaches (2011a) and computer science educators (2011b). Each individual set is written in cohesion with the others to form a mutual framework. These cohesive themes are as follows: the need for current technology, proper access to the technology, appropriate use of the technology, and demonstrative use of the technology by students and staff.

The American Association of School Librarians (2007) published *Standards for the 21st Century Learner* to guide information literacy instruction from Kindergarten to 12th grade. The four main standards are student-focused to develop the foundation for lifelong learning. The four standards address inquiry-based knowledge acquisition, application of new knowledge, sharing information both ethically and productively as a democratic citizen, and the ongoing pursuit of personal growth. The goal of the standards is to "support learning until students can work independently" through scaffolding as their skills progress (Andrews & Gann, 2011, p. 22).

The standards framework currently in use in Wisconsin are the *Wisconsin's Model Academic Standards for Information and Technology Literacy* (Fortier et al., 1998). As of the writing of this report these standards are over a decade old and refer to some technologies that have been rendered obsolete. Video Cassette Recorders (VCR) are no longer widely used in light of DVD and online video media sources. Knowledge of File Transfer Protocol (FTP) has been deprecated in favor of cloud computing and other file-sharing methods. References to the "World Wide Web" throughout the standards fall short of being applicable to the incalculable environments where users interact with digital content. Even non-digital resource concepts such as the almanac, encyclopedia, and catalog are not all too accurate in describing digital resources available today. As of this writing the Wisconsin Department of Public Instruction is updating the standards. These updates are still being revised, but are anticipated to align with national standards.

Despite references to obsolete or deprecated technologies mentioned previously, the Wisconsin standards are still applicable within the classroom. The standards are arranged into four categories along the lines of student knowledge and demonstrative use. The standards ensure that students "know how to operate and use these technologies, and make sound

judgments regarding the most effective technologies to use in specific situations" (p. 4). The Information and Inquiry standards interact with a variety of information resources, evaluate content, and incorporate the information into their learning (p. 8). The standards section immediately following, Independent Learning, develops acquired technology skills into a means for students foster personal growth and expression (p. 12). The final Learning Community standards section models good citizenship for students in the digitally connected age (p. 14).

21st Century Learners

For the majority of the last century reading, writing, and arithmetic skills were the foundations of education. In the 1980s a new skill set emerged as businesses and homes began finding practical uses for computers. Information and communication technology skills thus became an essential part of a complete education (Luterbach & Brown 2011). While some schools grapple with adopting new technology, today's students have already incorporated the internet, e-mail, messaging, online gaming and other media sources into their personal lives (P21, n.d.).

In 2010 the Pew Internet & American Life Project released findings from a study of internet use by American adolescents (Lenhart, Purcell, Smith, Zickuhr, 2010). The study surveyed 800 teens aged 12-17 across the United States in 2009. The findings showed that internet use within this demographic appears to be approaching ubiquity as 93% responded that they go online. Of those teens who go online 63% use the internet daily. Compared to previously collected Pew research data, cell phone ownership among teens can also now be considered mainstream. Three-quarters of the survey participants responded that they own a cell phone, with those rates on an upward trend. Internet enabled features on cell phones is further driving

ubiquitous internet usage among teens.

This generation of teens with internet access in the palm of their hands has been dubbed by Larry Rosen as the "iGeneration" (2010, p. 8), taking a naming cue from the iPad, iPod Touch, and iPhone. For the iGeneration the technology to do an internet search, watch a video, or send a message has always been available. Rosen notes that today's preteens and teens are constantly wired and "omnipresent in their cyberworlds" (p. 12). He found that preteens ages 9-12 average one hour of internet use a day. Rosen also reports that the weekly internet use average exceeds 30 hours per week for high school age students. For many in the iGeneration their internet-enabled phones are not merely phones, but also computers that can access information 24/7 (Rosen, 2011).

This deluge of electronic and video data from a multitude of devices is used "transparently, without thinking about it, marveling at it, or wondering about how it works" (Jukes, McCain & Crockett, 2010, p.15). With constant access to the internet teens are not only consuming content, but are also contributing their own creations. The Pew Internet & American Life Project reported that 64% of teens participated in media creation activities online, a figure that was trending upward (Lenhart, Madden, Macgill & Smith, 2007). These activities include blogging, creating videos, sharing photos, and communicating with other people on social networks. In fact today's students take for granted access to the internet, cell phones, digital cameras, and other technology staples that were impractical a generation earlier (Jukes, McCain & Crockett, 2010).

In a three-year ethnographic study of young people's participation in new media technology Mizuko et al. (2008) found that teens use it to experiment with methods of public engagement, social norms, peer evaluation, culture creation, and self-directed learning. The

autonomy young people experience online often stands in stark contrast to the predefined goals of classroom learning. It is common for schools to have stated public agendas that recognize the value of social communication and participation in popular culture, yet block students' access to these forms of online resources. Many schools outright prohibit the use of mobile computing devices during school hours citing safety and discipline concerns (Apple, 2008). Some students report that these types of policies prohibit them from using both personal and school-owned mobile computing devices for learning (Project Tomorrow, 2010b).

According Jukes, McCain, and Crockett (2010) there exists a disconnect between teachers using traditional 20th century instructional methods and 21st century student learning preferences. Whereas reading, writing, and arithmetic may have been sufficient literacy skills for the 20th century, the current wave of learners are expected to "communicate, create, manipulate and design to self-actualize" using technology (Jones-Kavelier & Flannigan, 2006). Information and communications technology (ICT) skill proficiencies are now a prerequisite for students, yet many schools still use technology sparingly instead of as a core component (ISTE, P21 & SETDA, 2007). The Partnership for 21st Century Skills (2008) recognizes that digital literacy empowers students "to assess the credibility, accuracy and value of information, analyze and evaluate information, make reasoned decisions and take purposeful action" (p. 10). In a world where information is available 24/7 it becomes democratized and "shifts the locus of control to the student, enabling them to pursue learning both in school (formal learning) and outside of the school (informal learning)" (Apple, 2008).

Education Technology Revolution

The annual *Horizon Report 2011 K-12 Edition* from the New Media Consortium

examines six emerging technologies and hypothesizes their impact on education in the next five years (Johnson, Smith, Levine, & Haywood, 2011). The iPad is identified in the e-books category along with a number of rich-media reading apps that are "self-directed, interactive experiences... and [have] other deeply engaging approaches to learning" (p. 9). The mobile technology category recognized the fact that a large segment of the American public have already incorporated a smartphone into their lives. The report states that the mobile iPad is challenging consumer notions of portability and becoming a viable alternative to traditional computers.

The *NMC Horizon Project Short List 2012 K-12 Edition* is a truncated precursor to the full annual report, but nonetheless identifies education technology trends that will be present in the final version (The New Media Consortium, 2012). The report makes a statement about the current state of tablet computing and Apple's momentum:

> Led by the incredible success of the iPad, which in 2011-12 was selling at the rate of more than 3 million units per month, other similar devices such as the Samsung Galaxy and Sony's Tablet S have also begun to enter this rapidly growing new market. (p. 4)

The report also mentions Apple technology in categories involving user interaction. The iPad, iPod Touch, iPhone and a number of other consumer electronic devices can recognize input from various forms of touch input as well as gestures. Apple's Siri is identified in the report as a technology capable of understanding the nuanced meaning of natural human speech. These intuitive "natural interface" technologies are anticipated to improve how users manipulate content, provide the opportunity to engage in more realistic simulations, and give users with special needs more technology access.

In another report the Intel Corporation (2010) outlines their justifications for why digital

content will supplant the traditional textbook. Digital content is a "powerful way of providing today's students with high quality, relevant and up-to-date instructional materials" (p. 8). Some schools across the United States are opting for digital alternatives due to rising costs, size and weight concerns, and content inflexibility of textbooks. Digital content has the advantage of incorporating various forms of multimedia, game functions, tools, language options, assistive technology, and the ability to be updated frequently. Rather than solely relying on traditional textbook publishers to provide digital textbooks, Apple has provided users with an application to create their own in the form of the iBooks Author (Chen & Wingfield, 2012).

Two research entities, The Greaves Group and The Hayes Connection, conducted a joint study called *America's Digital Schools 2006: A Five-Year Forecast* (2006). Three key findings from the study are still relevant six years after the fact. The first key finding was that 1:1 ubiquitous computing technology programs that pair a single student and teacher with a single device are on the rise. The second key finding showed that up to 87% of schools with a 1:1 program that tracked academic achievement showed moderate to significant positive results in academic performance. Another key finding of the study showed that in 1:1 ubiquitous computing environments, a dollar spent per device is equal to a dollar per student. In contrast to the traditional computing environment, one dollar is divided "20 cents per student as in a 5:1 student [per] computer ratio" (p. 17). The report also quotes a prescient eSchool News (2006) article that stated "there also are an increasing number of hybrid-style computing devices that give educators concerned about the cost of laptops or tablets--and the limited functionality of handhelds--new options" (para. 12).

Additional research shows the educational advantages of providing each student with a device. Initiatives to incorporate 1:1 ratios in schools are now feasible due to decreasing device

costs, increased functionality, and the proliferation of wireless networks (Apple Computer, 2005). Ubiquitous computing makes it easier for students to access learning resources and become fluent in the use of 21st century tools (Roschelle & Pea, 2002). A 1:1 ratio allows students "to work independently and pursue the facts... that were of greatest interest to him or her" and that "they could proceed at their own pace and devise their own search strategies to seek the answers" (Dunleavy, Dexter, & Heinecke, 2007, p. 445). An overview study of 1:1 programs in five different schools found positive "measurable changes in teacher practices, student achievement, student engagement, and students' research skills" (Bebell & Kay, 2010, p. 11) along with "increased student and teacher technology use... and modest increases in student achievement" (Bebell & O'Dwyer, 2010, p.12). Though the 2005 report from Apple predates the proliferation of their own iPad, iPhone, and iPod Touch devices, the results are no less valid. Results for 1:1 technology ratios are "generally positive, especially with respect to laptop programs' effects on technology use, and technology proficiency" (p. 13). Not preparing schools for ubiquitous computing scenarios may be shortsighted as it is highly probable that "some form of 1:1 computing will be the norm for the majority of American classrooms at some point in the future" (Bebell & O'Dwyer, 2010, p. 12).

iOS in the Classroom

The state of Virginia ran a pilot program beginning in 2010 entitled *Beyond Textbooks* that distributed 350 iPads to 4th, 7th, and 9th grade students (Quillen, 2011). In their 18-month progress report Dunleavy et al. (2011) examined how digital instructional materials were used to improve education outcomes and teacher practice, how costs could be reduced while delivering high-quality instructional materials, and the various technical, social, and policy implications

thereof. The iPad was selected for use in the pilot due to device capability, high levels of interest from participants, and volume of instructional content from providers. Schools participating in the pilot used the iPads e-readers in conjunction with rich multimedia apps in history and biology classes. The preliminary findings of the ongoing study were positive. The study found that student levels of engagement with the content had increased. Oftentimes this engagement was self-directed by the student. Students noted that they appreciated being able to interact with the content at their own pace. The students also appreciated interactive components, such as quizzes or instructional games, that helped them better comprehend the subject matter. Of all the policy ramifications that introducing iPads has had, the study identifies the most pressing concerns from students and educators to be ubiquitous internet access and available infrastructure.

In the 2009-10 school year the Canby, Oregon district adopted over 850 iPod Touch devices for use in over 50 classrooms (Morelock, 2011). Groups of students in third through fifth grade that were provided an iPod Touch consistently performed above average than their regular Canby School District peers. The district was also able to demonstrate consistent improvement in academic performance among students with disabilities, the economically disadvantaged, migrant, and English Language Learner populations. Based on the significant statistically positive outcomes, the school has acquired more than 1675 iPod Touch units and 260 iPads.

In 2008 Grey Culbreth Middle School in North Carolina adopted nearly 700 iPod Touch devices as part of a pilot program with North Carolina Virtual Public Schools (Crompton, Goodhand, & Wells, 2011). In this one-to-one program each student and teacher received a personally designated iPod Touch. Devices were required to be kept at school and placed in a designated charging station at the end of the day. Despite legitimate concerns from parents who would have to bear the cost of replacement should a device be broken, there were no incidents of

loss or damage to the iPod Touch units. Policies regulating usage included contracts for students and parents regarding inappropriate material, cyber-bullying, and various communications functions. The iPod Touch devices are used by students to access the internet to look up information, use apps to augment class content, and review with digital flash cards. Preliminary results from the pilot program showed an immediate positive effect on Culbreth's performance. The school obtained the Honor School of Excellence with High Growth award and met its No Child Left Behind adequate yearly progress requirements.

Widespread mobile device adoption among the American mainstream, very strong sales of iOS devices, and a targeted education strategy is driving interest in education. In response to the momentum, several school districts around the country are adopting iOS technology. An article from reporter Stephanie Reitz (2011) mentions all students of Brookfield High School in Connecticut, Burlington High School in Massachusetts, and Woodford County High School in Kentucky receiving iPads instead of textbooks. In Madison, Wisconsin the school district is using a $3.4 million dollar settlement from a lawsuit with Microsoft to acquire 1,400 iPads for use in 20 elementary, 10 middle, and three high schools (DeFour, 2012). The Journal reported Houghton Mifflin Harcourt has commissioned a third-party to study a pilot program with 400 iPads in six California schools that replaces algebra textbooks (Nagel, 2010). Gibbon-Fairfax-Winthrop High School in central Minnesota purchased 375 iPads, or one device for every student (Moe, 2011). At Central Elementary School in Escondido, California the school used a 1:1 iPod Touch program with 4th graders to improve math, reading, and other academic skills (Apple, 2011b). Teacher Jeannetta Mitchell offered anecdotal evidence that math scores in her class are improving and the students are engaged at a level she has never experienced in her 20 years (Barseghian, 2011). Even smaller iOS device deployments have been able to grab headlines in

the New York Times. Roslyn High School on Long Island distributed 47 iPads to two classes and anticipates distributing them to all 1,100 students in the future (Hu, 2011).

iOS Device Deployment in Education

A majority of the available resources on iOS device deployment address scenarios that relate to a corporate enterprise environment. While these scenarios are adequate from a technical perspective, they fail to incorporate the specific needs of a K-12 environment. To aid in the deployment of iOS devices Apple (2012a) provides a comprehensive manual specifically designed for deployment in education. The manual takes into account certain considerations specific to deployment in education including recommended deployment steps, professional development, usage of roaming carts, the Volume Purchasing Plan, and deployment strategies. The manual outlines considerations typical for hardware deployment such as Wi-Fi network design, feature explanations, device configuration, account management, and administration hardware and software utilities. This manual also provides links to additional Apple knowledgebase articles relevant to iOS device deployment.

Apple Education Mentor David Baugh (2010) also provides education specific deployment advice. Baugh approaches the consideration of deployment of iOS devices with a number of questions for management staff. These inquiries address ownership, use by students, device-to-student ratio, control of, and delivery of content to the devices. Following these considerations are two use case scenarios: one for teacher controlled usage and another for student controlled usage.

One of the more publicly prominent iOS device deployments in K-12 has been documented by the Canby School District (n.d.) in the *iPod & iPad User Group Wiki*. The wiki

contains articles with pictures and plain English explanations of iOS devices, features, and instructions for use. The wiki also includes information on how specific devices, features, and apps are being implemented for use.

Technological advancements in mobile computing and widespread adoption by the general public has altered the education technology landscape. Education standards prescribe the incorporation of technology in order to better prepare today's students for an uncertain future. 21st century learners have already acclimated to a climate where using technology is the norm. At present the iOS platform appears to have an advantage over the Android platform in K-12 environments. Although resources for enterprise iOS deployments exist in abundance, most do not address the needs of K-12 environments. With this conceptual framework a survey of iOS device deployment methods in Wisconsin K-12 schools was developed. The methods used in conjunction with this survey are detailed in the next chapter.

Chapter 3

Methods

This research seeks to answer the following question: What iOS device deployment methods are currently being used in Wisconsin K-12 schools? This chapter contains a description of the study participants, data collection instruments, and other procedures pertaining to this study.

Participants

Participants for the study were individuals employed by a Wisconsin school district and use iOS technology in some capacity. At the district level 25 technology administrators, nine technology support/technicians, and one administrator contributed data. At the school level one administrator, two school technology administrators, and one technology support/technician contributed data. Two teachers and three librarians also provided data. In sum 44 individual participants from 40 different Wisconsin school districts and one Cooperative Educational Service Agency (CESA) were involved with this study.

Online Survey Instrument

Initial research data was obtained through an opt-in online survey. The survey was developed on the SelectSurvey.NET platform hosted by UW-Whitewater. Screenshots of the survey are shown in Appendix A.

The survey was available for participants to respond from March 5 to April 8, 2012. Participants with a current web browser and an active internet connection were able to complete the survey at their own pace. The participant was allowed to opt out of the survey at any time by

navigating away from the survey or closing the browser window. I distributed the link to the survey via social networking, the Wisconsin Educational Technology (WETECH) e-mail listserv, and direct e-mail. See Appendix B for the contents of the recruitment e-mail.

After a short message on a landing page describing the general details of the survey, participants were required to agree to the informed consent terms in Appendix C before being allowed to proceed to the questions. The survey consisted of a variety questions that were yes/no style, numeric response, open-ended, and conditional based on type of response. These questions are listed in Appendix D.

Questions 1 through 4 captured some biographical information about the participant in the form of name, e-mail address, school district, and job category (see Appendix E for job categories). If the job category selected by the participant was at the school level, an additional question (4b in Appendix D) appeared. The purpose of this question was to delineate data from individual schools within the same district. Although this supplemental question was implemented, no data from two school level participants from within the same building was recorded. Participants who selected district level job categories were not asked this supplemental question.

Question 5 asked for data regarding the number of iPad, iPod Touch, and iPhone devices. The phrasing of this question varied based on the job category of the participant. This was done to delineate which iOS devices were to be accounted for. All district level participants were instructed to answer question 5a in Appendix D. Participants who identified as school administrative staff, school technology administrator, school technology support/technician staff were instructed to answer question 5b. Participants who identified as school teacher, librarian, aide, and the “other” option were instructed to answer question 5c.

Questions 6 through 11 contained a list of multiple answers where the participant could select all that applied. Each of these questions included an "other" option allowing participants to write in their own answer. This was followed by questions 12 and 13, which contained a comment box for qualitative feedback. Question 14 was a conditional yes/no question (14a in Appendix D). Participants who selected "yes" for question 14a were then provided supplemental question 14b and a comment box to reply.

In total the survey logged 87 respondents. In surveys where the participant failed to agree to the terms in Appendix C, did not provide proper identification, provided inappropriate responses, did not have at minimum one iOS device, or did not complete the survey were not included in the final data. Data from 43 respondents was determined to be unusable by the qualifications listed. Data from 44 respondents was determined to be usable. To insure the integrity of the remaining respondent data I cross-referenced the participant e-mail address and school district information to confirm that each did in fact work for a Wisconsin school in some capacity. This was accomplished by either looking up their contact information on the school district website or via a search on Google that confirmed their position.

Of the respondents from the 40 individual school districts and one CESA (see Appendix F), three school districts had two participants respond to the survey: Chilton, Green Bay, and Edgerton. In the three cases where data overlaps the school district hierarchy was taken into consideration. For example a district technology administrator's quantitative data about the number of iPads in the district took precedence over information provided by the teacher. Quantitative data for three participants from the same district were compared and adjustments made to account for the overlap. Where quantitative data is reported for questions 5 (5a, 5b, 5c combined) and 14a, n=41. Respondents who answered "yes" to 14a were asked question 14b,

and for this data n=31. Where qualitative data is reported for questions 12 and 13, n=44. Questions 6 through 11 collected quantitative statistics for default answers and qualitative comments for those selecting the "other" option for participants to provide their own answer. Data from school districts with two participants responding to the online survey were compared. Quantitative data for questions 6 through 11 was adjusted if answers from both participants overlapped. All qualitative data from the "other" option was retained. For questions 6 through 11, n=44.

After the conclusion of the online survey period I compiled all data into a spreadsheet stored on Google Docs. Data from each survey question was placed into an individual sheet. See Appendices G through R for the online survey data. Spelling errors input by participants for the "other" answer option on questions 6 through 11 and comment boxes in questions 12 and 13 were copied verbatim. To insure participant anonymity, identifying information such as name and e-mail address are not reported. School districts that contributed data are listed alphabetically in Appendix F, but have been disassociated from possible identification information to protect or maintain the anonymity of the participants.

Follow Up Interview Instrument

Once data from the online survey had been compiled I selected 10 participants who provided interesting answers to questions 12 and 13 in Appendix D. These ten selected participants were contacted via e-mail on May 15, 2012 to inquire as to whether they would be willing to conduct a brief follow-up interview. Each of these e-mails used the format found in Appendix S, with slight personalized variations for the line stating what topics the follow up questions would address. Participants were given the choice of conducting the follow up

interview by e-mail or phone.

Three participants agreed to conduct the follow up interview via e-mail. These participants were e-mailed the informed consent terms along with custom follow up questions in the format found in Appendix T. One participant returned their response promptly and it is logged in Appendix U. The other two participants never replied to the questions posed in the follow up interview e-mail.

Two participants agreed to conduct the follow up interview via phone. These participants were sent via e-mail the informed consent terms in Appendix V. Before the phone conversation I verbally confirmed with each participant that they had received the informed consent terms via e-mail. Once the participant indicated that they agreed to the informed consent terms the follow up interview proceeded. Shorthand notes were recorded on a Google Docs document as the conversation transpired. The interview questions and participant responses to this follow up interview are generally summarized in Appendices W and X.

Data Analysis

From the online survey data and follow up interviews I identified emergent themes and data trends by examining frequency of responses. I then organized them into categories relevant to the study of iOS deployment methods in Wisconsin K-12 schools. Findings from the data can be found in the following Results chapter.

Chapter Four

Results

Schools across the United States are implementing mobile computing technology into the classroom. Wisconsin is no exception and several school districts have already welcomed mobile computing technology in the form of iOS devices. Because of the relative lack in research directly addressing the deployment of iOS devices in K-12 environments, many school districts are devising their own deployment strategies. This research seeks to address this information gap by asking the following: What iOS device deployment methods are currently being used in Wisconsin K-12 schools?

Online survey participants were asked to provide numeric data on iOS devices within their district or school. The data collected for each category of iOS device is inclusive for all generations of the device category. For the iPad this includes the first and second generation, for iPod touch the first to the fourth, and for the iPhone the first through fourth. It should be noted that during the online survey data collection period Apple released a third generation iPad. The data from the online survey indicates that the iPad is the dominant iOS device (73.7%), followed by the iPod Touch (27.7%), and the iPhone (0.5%) across the 39 Wisconsin schools districts and one CESA polled (Figure 4.1). The total number of iOS devices represented in the survey amounted to 7,710 (Table 4.1).

Figure 4.1 iOS Device Totals and Percentages

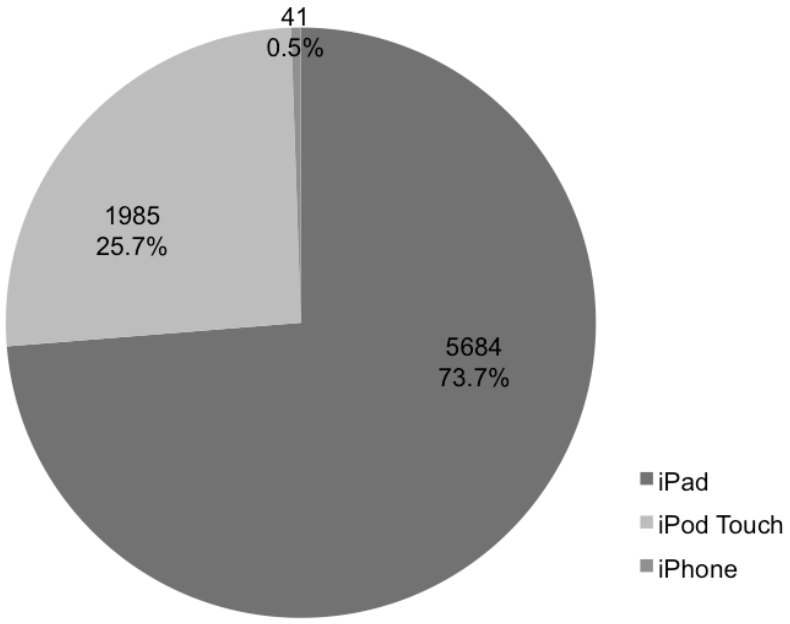

Figure 4.1. Pie chart of numeric data and percentages for iPad, iPod Touch, and iPhone devices. The total number of iOS devices represented by the chart is 7,710.

Table 4.1

iOS Device Totals by Survey ID#

Survey ID#	iPad	iPod touch	iPhone	iOS Devices
3	7	0	0	7
6	24	36	0	60
7	10	30	0	40
9	9	1	0	10
11	900	500	0	1400
14	5	2	0	7
17	54	8	0	62

19	200	20	0	220
20	10	0	0	10
21	15	0	0	15
23	15	0	0	15
25	40	8	0	48
26	40	20	0	60
30	75	20	0	95
34	2	0	0	2
37	0	5	0	5
38	20	30	0	50
40	15	0	0	15
41	300	100	0	400
43	32	20	0	52
44	1	0	0	1
45	20	30	0	50
46	1700	300	30	2030
47	35	0	1	36
49	140	115	0	255
50	300	100	0	400
55	22	20	0	42
58	25	50	0	75
59	30	25	0	55
60	90	40	0	130
61	32	25	0	57
63	75	10	0	85
64	16	0	0	16
65	60	0	0	60
67	100	0	0	100

69	40	20	0	60
71	135	15	5	155
77	60	0	0	60
80	30	5	0	35
81	500	400	5	905
86	500	30	0	530
	iPad	iPod Touch	iPhone	Total
Total	5684	1985	41	7710

Note. The device totals for the following three survey ID numbers were not used: 51, 72, 84. Data from survey ID numbers 23, 30, and 50 represent device figures from the same school district as the three unused surveys. The individual iPad, iPod Touch, iPhone, and cumulative iOS device totals are tabulated with n=41 participants.

When asked about the factors driving iOS device acquisition participants responded that staff interest was the most significant factor (Figure 4.2). Pilot programs also were a substantial factor in driving adoption, which most likely bolstered support among staff. Distribution methods followed accordingly indicating that the most frequent allocations of iOS devices were assigned directly to staff, available for staff checkout, or were assigned to a department (Figure 4.3). Staff-assigned and staff using personal iTunes accounts with iOS devices accounted for 41.25% of all total account management methods (Figure 4.4). Four participants who selected the “other” option indicated that the iOS devices were on a cart available for staff checkout.

Figure 4.2 Factors for iOS Device Acquisition

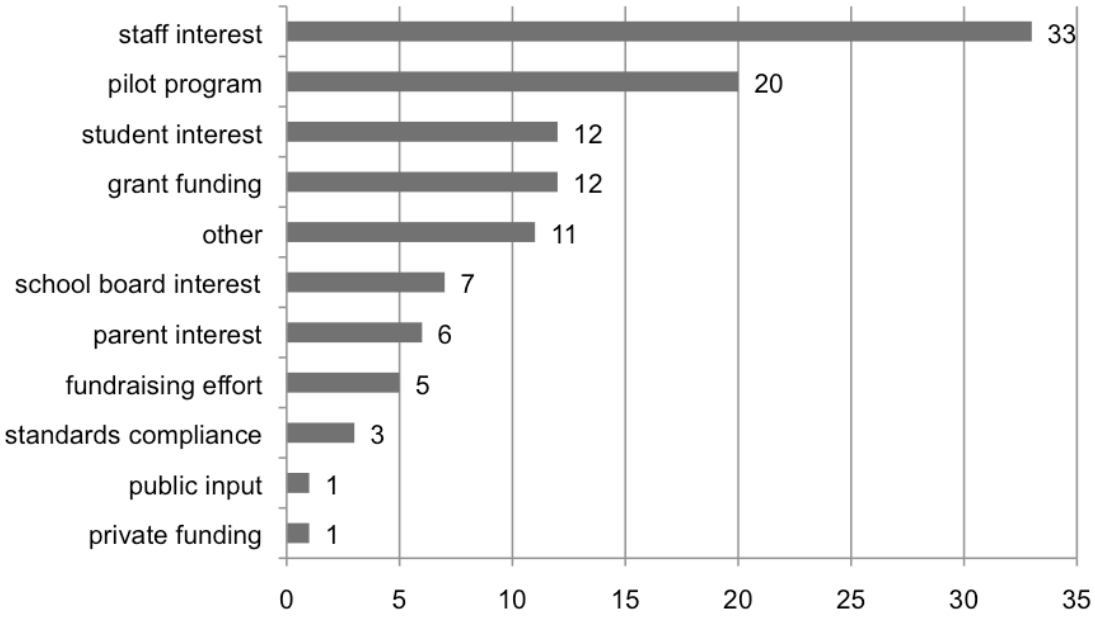

Figure 4.2. Bar graph of factors driving iOS device acquisition in schools ordered by frequency.

Figure 4.3 iOS Device Distribution Methods

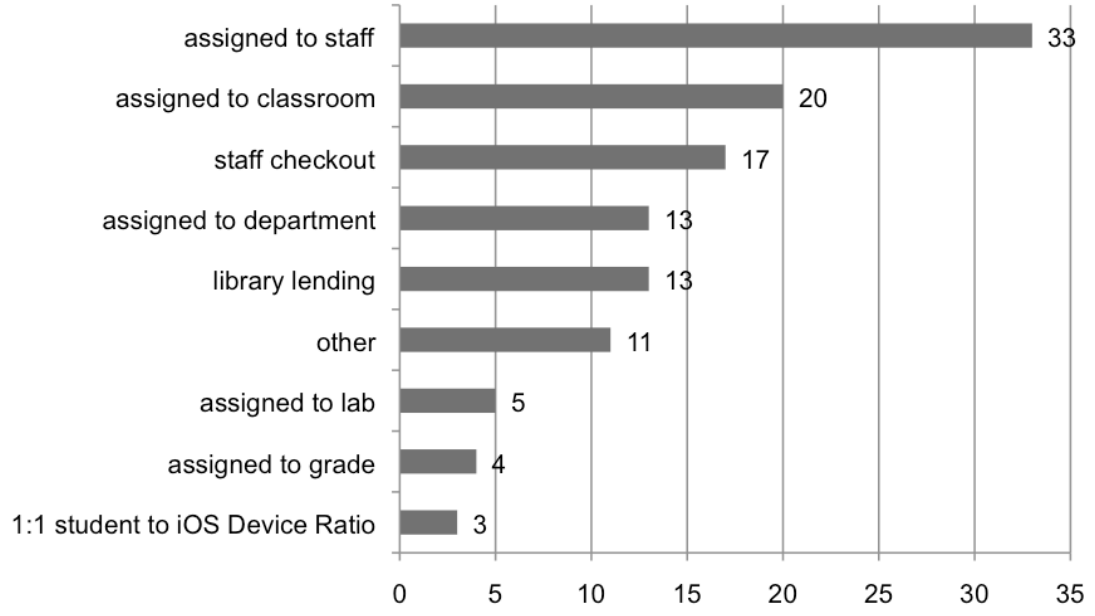

Figure 4.3. Bar graph of iOS device distribution methods used within schools ordered by frequency.

Figure 4.4 Account Types Used With iOS Devices

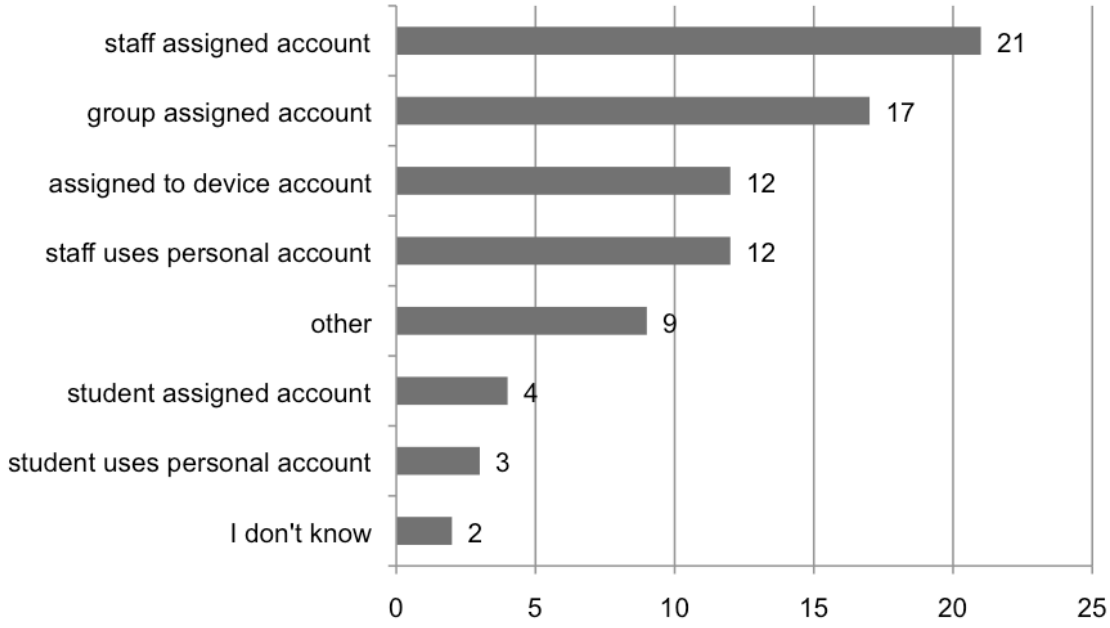

Figure 4.4. Bar graph of account types used with iOS devices ordered by frequency.

Collected data suggests that although staff is a considerable factor in iOS device deployment, student-related data supplements it. Options that make iOS devices available to students within Figure 4.3 show that deployments to individual classrooms and library lending were the most popular. Other options such as assigned to department, assigned to grade, and assigned to lab were not as frequent, but nonetheless indicate that there is a demand for iOS device use among students. Three participants indicated that they have a 1:1 student-to-device ratio. Five participants that selected the "other" option wrote in that iOS devices are used in circumstances with Special Education students.

The primary software management tool used in conjunction with iOS devices is iTunes (Figure 4.5). The online survey did not differentiate between the Mac OS X or Windows version as the iTunes application. Although iTunes on each platform is functionally and aesthetically identical, the option to select the version could have been provided for further clarity. The next

most frequently used tool was iPhone Configuration Utility for both Macintosh and Windows to image and configure the devices. During the online survey data collection time period Apple released an iOS device utility called Apple Configurator specifically for enterprise deployment, which was not provided as an option in the survey. Five participants responded that they use a third party application called Casper Suite. Four participants indicated with the "other" option that they use no management tools whatsoever. Two participants indicated that they use the Maas360 application for mobile device management (MDM). Another participant wrote that they use Absolute MDM. One participant stated that they had purchased a Mac Mini with an MDM solution, but did not specify which piece of software was to be used for MDM. Apple hardware running Mac OS X and Mac OS X Server was used more frequently than Windows hardware solutions for iOS device management.

Figure 4.5 iOS Device Management Tools

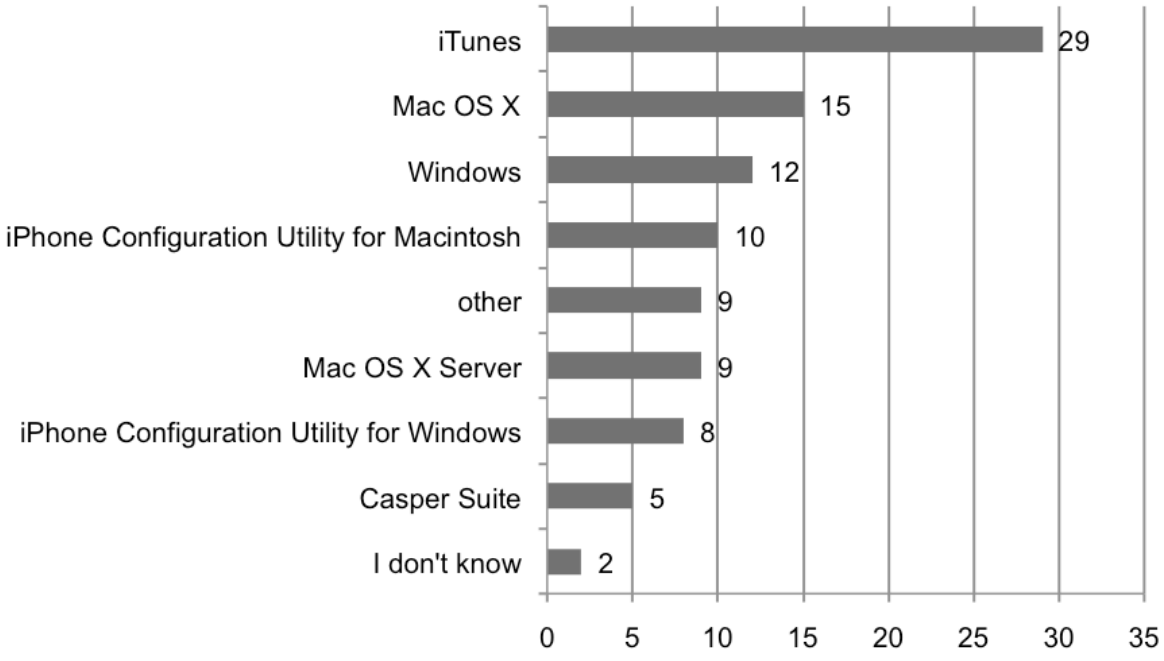

Figure 4.5. Bar graph of iOS device management tools ordered by frequency.

The top three accessories used with the iOS devices are products built to protect the devices from regular wear and tear (Figure 4.6). The magnetic screen cover offered by Apple also proved to be a popular item, though it does leave the rear of the iPad exposed. Accessories such as the cart and charging station/dock were also mentioned frequently, but these items could be paired with one another as many carts also feature built-in charging stations/dock connections. Accessories such as external keyboards, styluses, audio/video adapters, camera connection kits, external speakers, and microphones suggest that iOS devices are replacing traditional computers for tasks that make use of their specific features. The accessories question in the online survey incorrectly assumed that all users would have at least one accessory item to select from. Two participants chose the "other" option and wrote that they used no additional accessories. One participant wrote that they use an Apple TV. Although the Apple TV is a device that runs iOS, it does not fit the definition of a mobile computing device and is therefore not included in the total iOS device figures in Table 4.1. The remaining participant who provided an "other" answer reiterated in text the initial answers they selected for the question. These duplicate answers were not factored in to Figure 4.6 statistics.

Figure 4.6 iOS Device Accessories

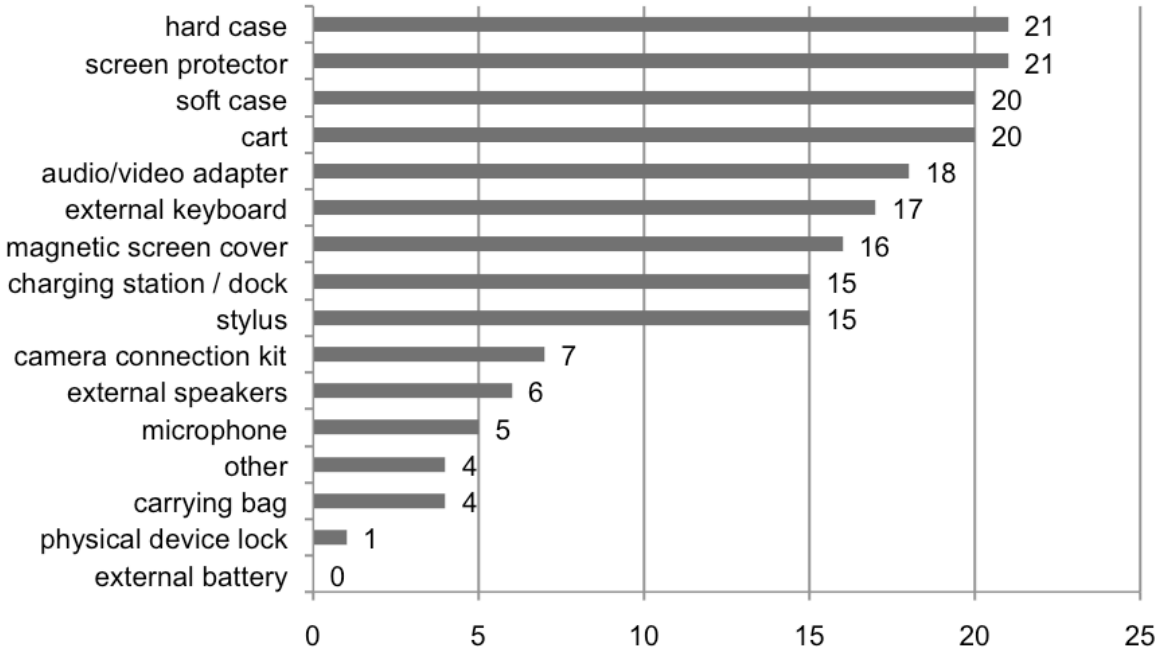

Figure 4.6. Bar graph of accessories used with iOS devices ordered by frequency.

When asked to identify what iOS device features were most compelling 38 of 44 (86.36%) participants identified available apps/software (Figure 4.7). Portability also ranked highly with 27 participants as the iPad is comparable in size to netbooks, while the iPod Touch is the same size as a cell phone. Although touchscreen technology has existed on mobile computing devices for over two decades, the touchscreen on iOS devices was a compelling feature for 25 participants. For 21 participants internet connectivity was important even though the majority of mobile computing devices have this capability as a standard feature. It is unclear whether the participants who chose this option are referring to the hardware/software feature or the WiFi infrastructure necessary to enable internet connectivity on iOS devices. Multimedia capability, available eBooks/literary content, camera capability, and communications features were not as compelling. In the "other" category participants mentioned games and entertainment, Response

to Intervention (RTI) apps, Special Education apps, low cost, ease of use, immediate user feedback, and battery life.

Figure 4.7 Compelling iOS Device Features

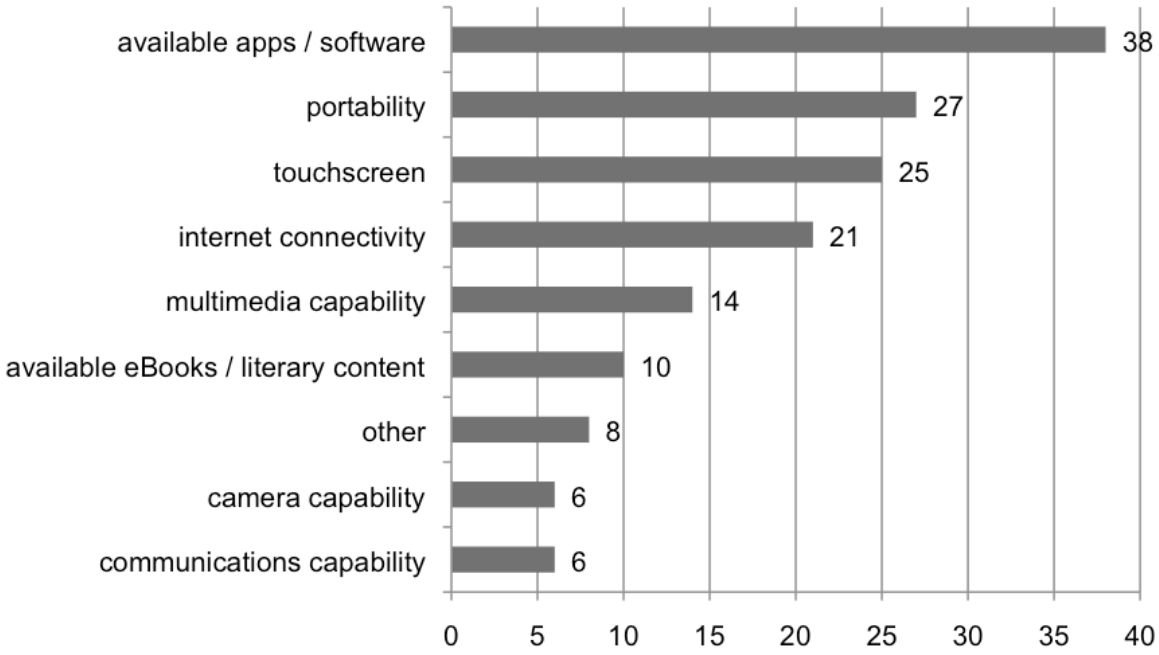

Figure 4.7. Bar graph of iOS device features users found most compelling ordered by frequency.

The trend of general user feedback comments (see Appendix O) to the iOS devices was positive. Participants observed that student and staff were enthusiastic about using iOS technology. Seven participants specifically used the word “love” to describe user feedback (Appendix O, Survey ID# 6, 7, 9, 30, 65, 69, 84) . One participant offered a snapshot of how well received iOS devices were in the school, “teachers at sites who check out carts don't want to give them up, and I also hear that staff keep borrowing them off carts” (Appendix O, Survey ID# 41). Some participants offered information as to why they are well received. One participant wrote, “we have a 1:1 high school and students are excited and engaged with the devices” (Appendix O, Survey ID# 46). Engagement was a recurring theme as participants noted that iOS

device users were motivated, remained on task, excited to use the devices, and used them frequently. Some of the general user feedback was also negative. Some of these negative themes included enterprise management issues, the inability to replace PCs, incompatibility with network devices, and uncertainty as to what educational role iOS devices have in the classroom. Some participants reiterated and/or elaborated these negative themes in the next question.

When asked to provide written feedback about any difficulty experienced with the iOS devices (see Appendix P) most participants cited management related issues. Eighteen of 44 total participants (40.9%) specifically used the terms *manage*, *management*, or *managing* in their responses to describe some of the difficulty with iOS devices they were experiencing. App acquisition handled through the Volume Purchase Program (VPP) was described by participants as cumbersome, difficult, hoop-jumping, impossible, and/or stupid (Appendix P, Survey ID# 7, 13, 43, 51, & 84). One participant wrote that "it is absolutely ridiculous to require four different logins to buy one app" with the VPP (Appendix P, Survey ID# 7). In follow up interviews over the phone, two participants expressed the same frustration about having to use multiple unique accounts with the VPP to distribute content to an iOS device (see Appendices W and X). Problems with the logistics of how to manage apps loaded onto devices followed (Appendix P, Survey ID# 34, 47, 49, 50, 71, 72, 77, 86). Using the iOS devices in a multiple user setting also appeared to be a recurring difficulty. One participant described how the devices could not be customized to personal preferences and using individual wireless credentials were not practical in a shared environment (Appendix P, Survey ID# 23). The sentiment that the iPad was a personal device and not ready for an enterprise environment was shared by seven participants (Appendix P, Survey ID# 6, 47, 49, 59, 69, 72, 80). Other general difficulties identified by participants included initial setup hurdles, network infrastructure issues, distractions the devices

cause in classroom, inability to connect to network devices, a complaint about Apple's magnetic screen cover, theft, loss, repairs, user skills, and the lack of Flash compatibility.

The final online survey question asked the participants whether or not their school district has considered using Android devices in the classroom (Figure 4.8). Thirty-one participants indicated that their district had considered it. Participants who responded "yes" were then asked whether or not Android devices had been deployed for "regular use in classrooms" and if so, indicate the numeric quantity. Five of the 31 respondents indicated that Android devices were deployed for classroom use (Figure 4.9). The number of Android devices provided by these five respondents totaled 80. Of these five respondents the total number of iOS devices outnumbered Android devices for each (Table 4.2). Six respondents indicated that their school had either evaluated or were in an ongoing evaluation process of Android devices (Appendix R, Survey ID# 3, 25, 46, 64, 71, 80), while one respondent indicated that they would be allowing students to bring their own devices to school (Appendix R, Survey ID# 20).

Figure 4.8 School Districts Considering Using Android Devices

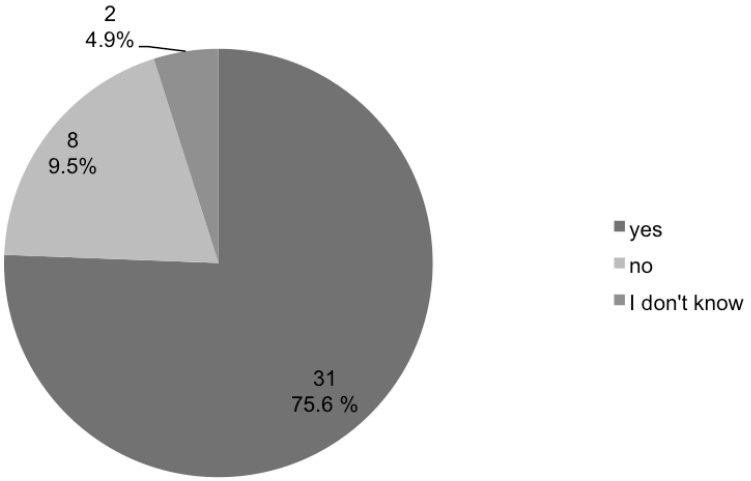

Figure 4.8. Pie chart of participants indicating that their school district has considered using Android devices. Data from Survey ID# 51, 72, and 84 for this question were discarded as their districts were already represented by Survey ID# 23, 30, and 50, thus n=41.

Figure 4.9 School Districts with Android Devices for Regular Classroom Use

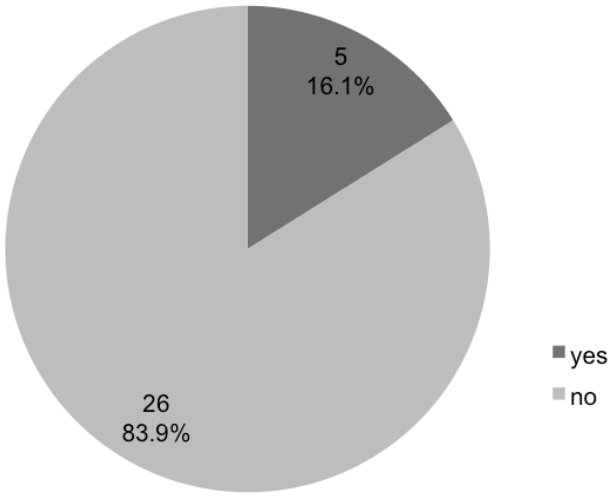

Figure 4.9. Pie chart of respondents indicating whether their schools have or have not deployed Android devices for regular classroom use. Respondents who selected "yes" in Figure 4.9 were asked supplemental question 14b in Appendix D.

Table 4.2

Total Android Devices Deployed for Regular Use in Classrooms

Survey ID#	Total Android Devices	Total iOS Devices
7	5	40
26	10	60
69	15	60
77	20	60
81	30	905
Total	80	1125

Table 4.2. Chart of participants who indicated that Android devices are deployed for regular use in classrooms, the total number of Android devices (see Appendix R), and the total number of iOS devices in the same school district for comparison (see Appendix H).

Throughout the online survey participants were given the option of providing their own answer by selecting the "other" option if it was not represented by the list of possible answers. Though the online survey instrument did not specifically seek data pertaining to Special Education, it recorded 19 references from 14 different participants to iOS devices being used by special education in some capacity. One participant noted that they "are seeing great success and costs savings when deploying iPads to special needs students" (Appendix O, Survey ID# 63). One participant stated that the iOS devices were provided to special education without management oversight so they "can do what they want" (Appendix N, Survey ID# 80). Another participant offered an example of the iOS device user reception and purpose, writing that the "special education department houses the iPads and is extremely happy with the context in which they are used, which is mostly with students with limited communication skills" (Appendix O, Survey ID# 14). Another specific use was identified by another participant where iPads "have been greatly useful for ADD students to stay on task via various apps" (Appendix O, SurveyID# 55).

According to the data the environment in which iOS devices in Wisconsin K-12 schools exist can be summarized thusly. The iPad alone accounted for nearly three quarters of all iOS devices, with a majority of the remaining quarter being iPod Touch devices. The iPhone represented only a marginal percentage. Staff interest, rather than student interest, appeared to be driving iOS device acquisition, which is supported by statistics for deployment type and account type. Technology used for management is frequently Apple's own hardware and/or software solutions, though some districts have opted to use third party tools. The most popular accessories were ones that physically protect the iOS devices. Nearly all participants viewed the available apps as a compelling feature over other options. Feedback from users is characterized as

generally positive. Some participants noted user enthusiasm specifically associated with the iOS devices. Difficulties that participants noted were largely associated with management issues. When considering mobile computing technology three quarters of all participants had looked at Android technology. In five districts where Android technology had been deployed for regular classroom use, the total number of iOS devices consistently outnumbered the Android devices. An analysis of these findings will be discussed in the following chapter.

Chapter Five

Conclusions and Discussion

After nearly a decade of debate about the conditions necessary for instructing 21st century skills, mobile computing is poised to fulfill those needs. A confluence of technologies have matured and coalesced to place the future within students grasp: wireless networks, advancements in media delivery, communications platforms, affordable hardware, and user friendly software tools. As time progresses this mobile computing technology will only become more practical, affordable, and commonplace. To keep pace with the changing technology landscape in which people live and learn, some Wisconsin school districts have adopted iOS devices.

Interpretation of Findings

The top iOS device deployed among the school districts surveyed was the iPad with 5,684 (73.7%) devices, followed by the iPod Touch with 1985 (25.7%) devices, and the iPhone with 41 (0.5%) devices. The online survey instrument did not ask for users to specify the hardware generation of each device. Determining iOS device generation would have required participants to have explicit knowledge of the technical minutiae of variations. Though these statistics are not generation specific, they do provide raw data as to which iOS device gestalt Wisconsin school districts prefer.

Although the base model iPad is more expensive than the iPod Touch, the larger form factor, ability to run both iPad and iPod Touch/iPhone designed apps, and available accessories may account for its popularity. The iPod Touch represented just over a quarter of all devices recorded. This device shares many of the same capabilities as the iPad, though is available in a

smaller form factor and lower cost. The small number of iPhones represented in the online survey are most likely assigned only to school district staff members, as these iOS devices often have cellular service contracts paired with them.

The overall reception to iOS devices in Wisconsin K-12 schools has been characterized as positive, mirroring that of other deployments (Canby School District, n.d.; Crompton, Goodhand, & Wells, 2011). Students and staff alike appear to have embraced the technology. Participants indicated that both students and staff are excited, engaged, enthusiastic and in some cases emphatically "love" the technology. Although some participants expressed negativity about the iOS devices, these concerns were negated by the net benefits of having them.

The number of available apps and media content produced for iOS devices was the most compelling feature for users. Participants have indicated that users are constantly requesting new apps and content. Integrated hardware features such as portability, internet connectivity, multimedia, camera, and communications capability all ranked secondary to the amount of available content. The volume of cultivated content available on iTunes may also be a contributing factor as to why Wisconsin school districts surveyed opted for iOS technology over Android.

Literature relevant to education technology tended to focus on the impact it has on the student. It was initially anticipated that students would be a significant influence driving iOS device acquisition. Based on the data from the online survey it is not just students, but also staff that were a driving force behind iOS device adoption in Wisconsin. Reports on the 21st century learner have established that many students have already incorporated mobile computing technology into their lives (P21, n.d.; Lenhart et al., 2010; Jukes, McCain, & Crocket, 2010). One possible explanation for staff driving iOS deployment may be a desire to achieve parity with

the technology that students are already using. These iOS devices have the potential to close the digital divide between students and staff. Another explanation may be that iOS technology is more accessible to staff than a traditional computer when they are required to respond to email, use web-based student management platforms, quickly fetch online data, or perform other work related functions.

One completely unanticipated finding was the use of iOS technology as a tool for Special Education students. Although the survey did not specifically ask about Special Education, participants addressed the subject across several questions. In these instances a few participants declared that they were using a "hands off" approach to management. Special Education students and staff were provided iOS devices and instructed to use them as needed. For students with Special Education considerations all iOS devices have by default built-in accessibility options such as voice over, speech recognition, zoom, font resizing, high contrast output, audio adjustments, and assistive accessory input support. These features replicate the functionality of expensive customized assistive hardware and software. As an off-the-shelf consumer device they are also much easier to replace than proprietary solutions. Another possible advantage for Special Education consideration is the ability to replace textbooks, notebooks, and other cumulatively weighty objects that may otherwise burden a student with physical limitations.

One of the more pronounced sources of difficulty for school districts that have deployed iOS devices appears to be the VPP. The VPP is designed to give administrators the ability to purchase content available on the iTunes Store in bulk and distribute it to iOS devices. In general Apple products are well-known for their ease of use and intuitive design. Feedback from the online survey and follow up interviews indicate that the VPP runs counter to this claim. A layered system of Program Managers (PM), Program Facilitators (PF), and users each requiring

unique credentials was identified as a source of frustration. While regular customers using the iTunes store are able to make purchases in any amount, those using Volume Vouchers within the VPP cannot. The minimum Volume Voucher costs $100, which can then only be used by a single PM or PF. Additional Volume Voucher options are also only available in large denominations. For school districts with limited operating budgets for their iOS deployments this inflexibility in payment options is constraining. While regular users of the iOS devices may never come into contact with the VPP, the users who do are often the school district staff that may determine a certain degree of success for any iOS device deployment. Unfortunately changes to the VPP can only be made exclusively by Apple. Until such changes are made, school district staff will have to continue using the flawed VPP.

Of the 31 school districts that stated that they had considered Android technology as a mobile computing solution, 26 opted instead to use iOS technology. The remaining five did adopt Android technology for regular classroom use, but those numbers were consistently less compared to the number of iOS devices. While the Android platform has a wider array of device configurations and varying price points, in most cases cheaper than iOS technology, the amount of platform diversity does not appear to translate into adoption in K-12 environments. While the Android platform is a strong competitor to iOS devices in the public market space, considerable development may need to occur for it to be a more attractive option for K-12 needs. Although the iPad is the dominant tablet form factor mobile computing device in Wisconsin, Android tablets are arriving on the market to challenge that incumbency (The New Media Consortium, 2012).

Recommendations

K-12 curriculum is developed from a thorough examination of the student, understanding

their developmental potential, and selecting the appropriate instructional tools necessary to achieve goals. Developing an iOS deployment plan should follow a similar path, whether it is for the student or staff. Not all iOS users will use the device in the same fashion. An iPad checked out by staff from a school library will be used in a radically different fashion than if the device were assigned to them personally. A student using a classroom assigned iPod Touch will use the device solely in the confines of that class period. If that student were assigned the same iPod Touch in a 1:1 student-to-device ratio program and allowed to use it throughout the entire school day, it would also be used quite differently. When considering the deployment of iOS devices, the needs of the user should be paramount in determining deployment methods. Just as K-12 curriculum is developed with the education needs of the individual, the following recommendations for iOS device deployment are designed with user at the fore.

In the feedback gathered from online survey participants, several noted that the iOS devices were highly personalized and not well suited to an enterprise environment. In deployment scenarios where each iOS device is assigned to a single user, such as individual staff or a 1:1 student-to-device ratio, management is fairly straightforward. Each device can be custom tailored to the individual needs of the user, by the user, based on the level of permissions granted to the account. In a single user scenario users tend to further personalize the device by changing default device settings, adding email accounts, providing login credentials for additional wireless networks, installing both free and purchased apps, downloading audio and video media, and inserting login information for a variety of online services. Although it is entirely possible to use an iOS device sans an associated Apple ID, it is not a pragmatic option for school users given the device's breadth of features, apps, and education potential.

In a multi-user environment iOS devices are not as well suited to such personalization. In

K-12 those scenarios are ones involving roaming carts, library checkout, staff checkout, and classroom usage across multiple class periods. Some native iOS apps such as email, YouTube, Twitter, and a host of third party apps bury login information within the device settings. This account information can then be retained on the device for future use, which presents a host of privacy issues. Resetting the device to factory settings after each use to insure personal data is completely removed is an untenable situation for day-to-day use.

Some of the difficulties of a multi-user environment could be mitigated by the addition of a K-12 specific profile management system in subsequent versions of iOS from Apple. Most of these features would merely be an extension of currently existing iOS device management features in Mac OS X Server and/or iOS itself. Within this hypothetical system, users would be presented with a user login screen on the iOS device requiring a school provided username and password. Upon login account information for iOS services (address book, calendar, email, third-party apps, wifi credentials) would be automatically loaded from a management server. The profile would also manage which apps and features are available to the user. Data created by the user could be accessible on any iOS device using iCloud or a local server. Fast user switching could be possible with a dedicated app or option after pressing the power button.

Until Apple implements any of these hypothetical features, K-12 technology staff will have to utilize established methods appropriate to their deployment scenario. By using established methods, technology staff can potentially mitigate some of the issues previously identified. Apple (2012a) outlines three deployment models for education: the Personal Ownership Model (POM), the Institutional Ownership Model (IOM), and the Layered Ownership Model (LOM). The core component of each of these models is the amount of device control allocated to the user and is visualized in Figure 5.1. In each model the user is granted a

certain level of permission to control certain features of the iOS device.

Figure 5.1 Apple Deployment Models for iOS Devices in Education

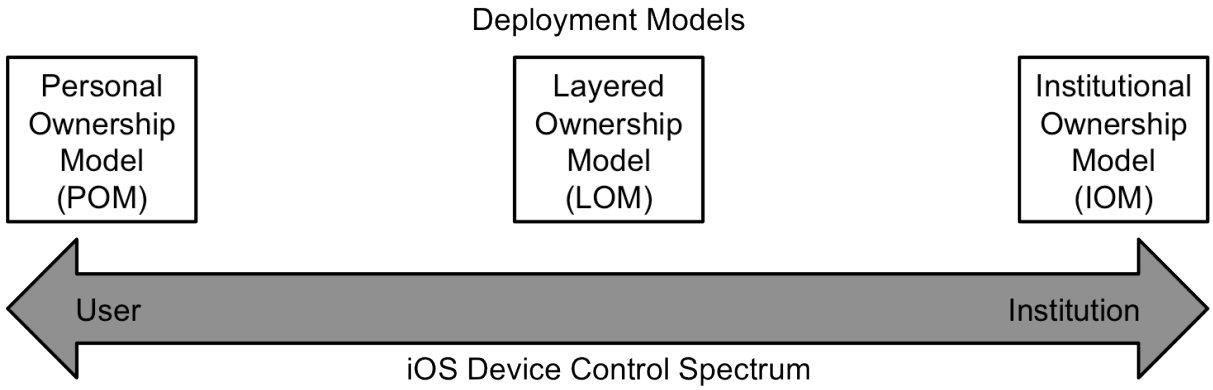

Figure 5.1. Apple iOS device deployment models placed on a spectrum indicating the amount control allocated to the user or institution. The Layered Ownership Model can move anywhere on the spectrum in between the Personal Ownership Model and Institutional Ownership Model depending on the amount of user and institutional control allotted to the device.

Each of these individual deployment models can be paired with a distribution method that best suites the use case. The online survey provided several distribution methods (see Figure 4.3) that were used in K-12. The two extremes of the deployment model spectrum, the POM and IOM, can be correlated with distribution methods that align with their characteristics. The LOM can vary in the amount of both user and institutional control and can be placed anywhere on the spectrum between POM and IOM. The following recommendations for each deployment model are based on an idealized scenario. The requirements for any real-world deployment scenario may vary.

The POM is recommended for the assigned to staff distribution method where a single user is assigned a device. In this model the amount of control the user is afforded is flexible enough to allow them to adapt to their specific needs. The user may use the device for professional needs, but still be allowed to explore options for apps and content that may be

relevant to their position. If certain apps are required to be loaded onto the device the administrator has the ability to preload them before deployment or distribute them via the VPP. Users from the online survey noted that iOS devices were highly personal, and the POM would align with this sentiment.

The IOM is recommended for a number of distribution methods where each device is placed in a multi-user scenario. Each of the assigned to classroom, assigned to department, assigned to grade, library lending, and staff checkout distribution methods are going to have specific needs depending on the users interacting with the devices. What is important in this model is that the iOS device maintains consistency when the user changes. In the IOM control of the device is solely allocated to the institution. It is not recommended that users in this model be required to provide their own personal account information with the device. A more practical solution would be to configure the device with depersonalized generic accounts. In the assigned to classroom, assigned to grade, and library lending distribution categories devices should be configured with settings and apps that are consistent with instructional needs. Assigned to department and staff checkout distribution categories should be configured to the needs of staff.

The last distribution method, a 1:1 student-to-device ratio, can be used with either the POM or IOM. It can also be used to demonstrate the flexibility of the LOM. The LOM allows for both the user to personalize the device while simultaneously giving the institution control. In this model both the user and institution can manage apps, load content, and configure the device. Determining where on the device control spectrum this model should be applied would be determined by the administrator. The LOM offers enough flexibility to also be considered for the other distribution methods.

Once an ownership model is associated with an appropriate distribution method, other

deployment considerations can be adapted to the scenario. Determining which management hardware and software will best accommodate the deployment scenario, the types of accounts to associate with each device, and which accessories are required will be evident by the needs of the users in each distribution method. Models for successful iOS device deployments can be found in Canby, Oregon (Canby School District, n.d.), Grey Culbreth Middle School in North Carolina (Crompton, Goodhand, & Wells, 2011), and the Beyond Textbooks program in Virginia (Dunleavy et al., 2011).

Final Conclusions

Some Wisconsin school districts are adopting iOS devices to provide students and staff with the tools necessary to operate in modern society. When considering the sum of data collected for this study it appears that Wisconsin school districts are still trying to determine a standard for what iOS deployment methods to utilize. Without deployment models to build upon some school districts are using a "learn as we go" approach that adapts as time goes on. On the other end of the spectrum some school districts appear to have a clearly defined role for iOS devices and the installed infrastructure to support it. In either case it is apparent that schools will continue to adopt iOS devices with or without the aid of existing models. Using established precedent would of course be preferable. Having determined which deployment methods are currently in use by Wisconsin schools, future research could focus on the efficacy of these deployment methods.

The advancement of technology will continue unabated after publication of this study. Certain concepts, methods, or iOS devices described herein may quickly be rendered obsolete as Apple continues to innovate. This research provides a snapshot of iOS device deployment

methods as they exist in Wisconsin K-12 schools. It is a foundation for which school districts nationwide can construct their own iOS device deployments.

A spreadsheet containing raw data from this report is available for download at:

http://kenfager.com/ioswik12.zip

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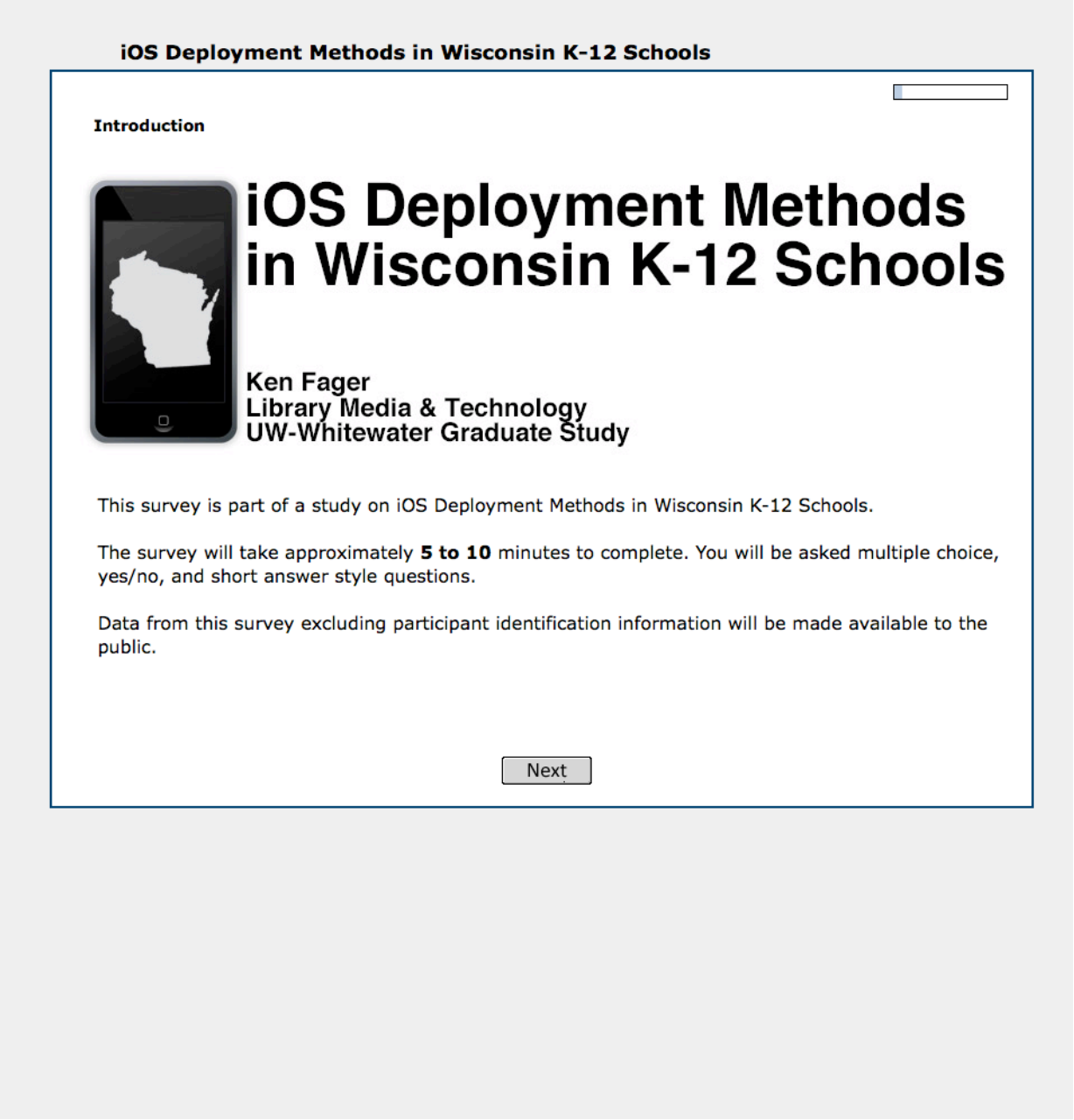
Appendix A
Screenshots of the Online Survey Instrument



iOS Deployment Methods in Wisconsin K-12 Schools

Informed Consent Terms

iOS Deployment Methods in Wisconsin K-12 Schools

INFORMED CONSENT TERMS

You must agree to the **INFORMED CONSENT TERMS** prior to taking the survey.

1. This survey is part of a research study on iOS Deployment Methods in Wisconsin K-12 Schools. The purpose of this study is to build a foundational knowledge of how various Wisconsin districts, schools, and classrooms are integrating iOS technology for students and/or staff use. The estimated time for each participant taking this survey is 5-10 minutes. Participants will answer a series of both quantitative and qualitative short answer questions.
2. This research benefits Wisconsin K-12 technology stakeholders by expanding the publicly available knowledge-base for a revolutionary computing platform.
3. Participation in this survey is entirely voluntary. There is no penalty for refusal to participate. There is no penalty if the participant does not complete the survey.
4. The surveyasp.uww.edu website is considered a private space. Data collected in this survey will only be accessible to the researcher.
5. Data collected from the survey will be stored on the surveyasp.uww.edu server(s) and the researchers personal computer(s).
6. As an online participant in this research, there is always a risk of intrusion by outside agents, i.e., hacking, and therefore the possibility of being identified.
7. Participant names, contact information, and other potential public identification data will not be published in written public reports. The researcher may identify provided school district, school, and/or classroom and subject information. The researcher reserves the right to assign pseudonyms to individuals if required.
8. The researcher may contact the participant with follow-up questions via e-mail or telecommunications. These follow-up questions will be for clarification, expansion of, and/or related to the answers provided in this survey.
9. Online communications are considered public in nature. Electronic records of communications (e-mail, phone calls, etc.) with the researcher may be subject to open records requests.
10. The participant affirms that they are at least 18 years of age.
11. The participant affirms that they are employed by a Wisconsin school district.

If you have questions about this survey, data collection methods, procedures and/or general concerns please feel free to contact the researcher.

Researcher:
Ken Fager
fagerk26@uww.edu
(920) 562-0212

Faculty Advisor:
Dr. Eileen Schroeder
schroede@uww.edu
(262) 472-2837

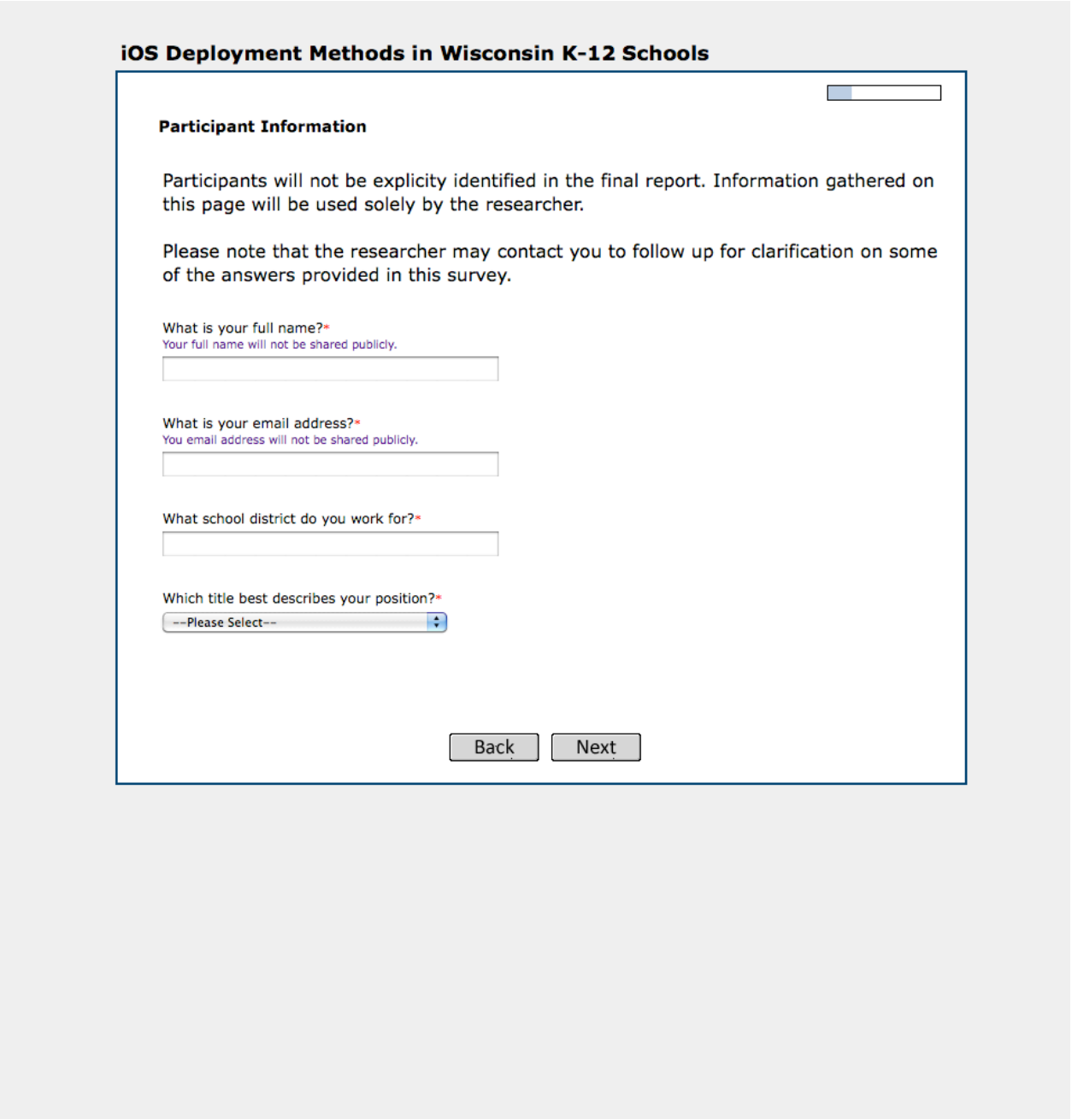
Questions about your rights and/or treatment as a participant can be directed to the Institutional Review Board Administrator.

IRB Administrator:
Denise Ehlen
Office of Research and Sponsored Programs
University of Wisconsin - Whitewater
800 West Main Street
Whitewater, WI 53190
Telephone: (262) 472-5212
Fax: (262) 472-5214
E-Mail: ehlend@uww.edu

Click the checkbox to indicate that you understand and agree to the INFORMED CONSENT TERMS.*

☐ I understand and agree to the INFORMED CONSENT TERMS.

Back Next


iOS Deployment Methods in Wisconsin K-12 Schools
Participant Information
Participants will not be explicity identified in the final report. Information gathered on this page will be used solely by the researcher.
Please note that the researcher may contact you to follow up for clarification on some of the answers provided in this survey.
What is your full name?*
Your full name will not be shared publicly.
What is your email address?*
You email address will not be shared publicly.
What school district do you work for?*
Which title best describes your position?*
--Please Select--
Back
Next

iOS Deployment Methods in Wisconsin K-12 Schools

iOS Device

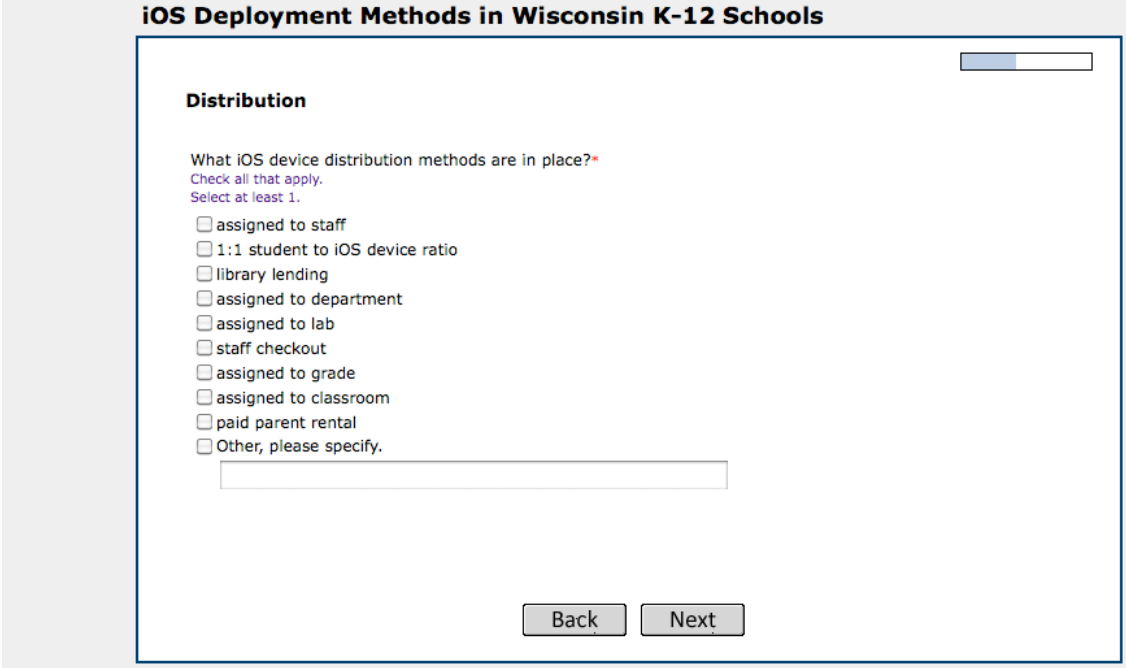
What is an "iOS device?"

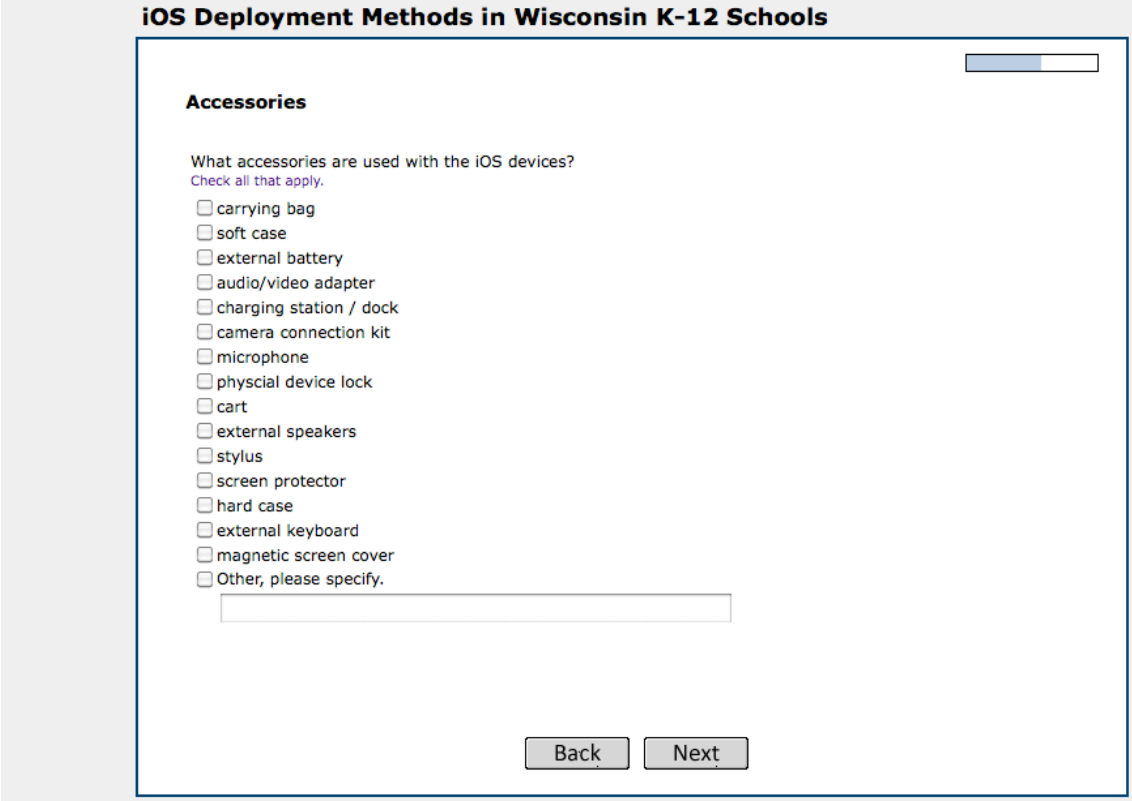
iPad **iPod touch** **iPhone**

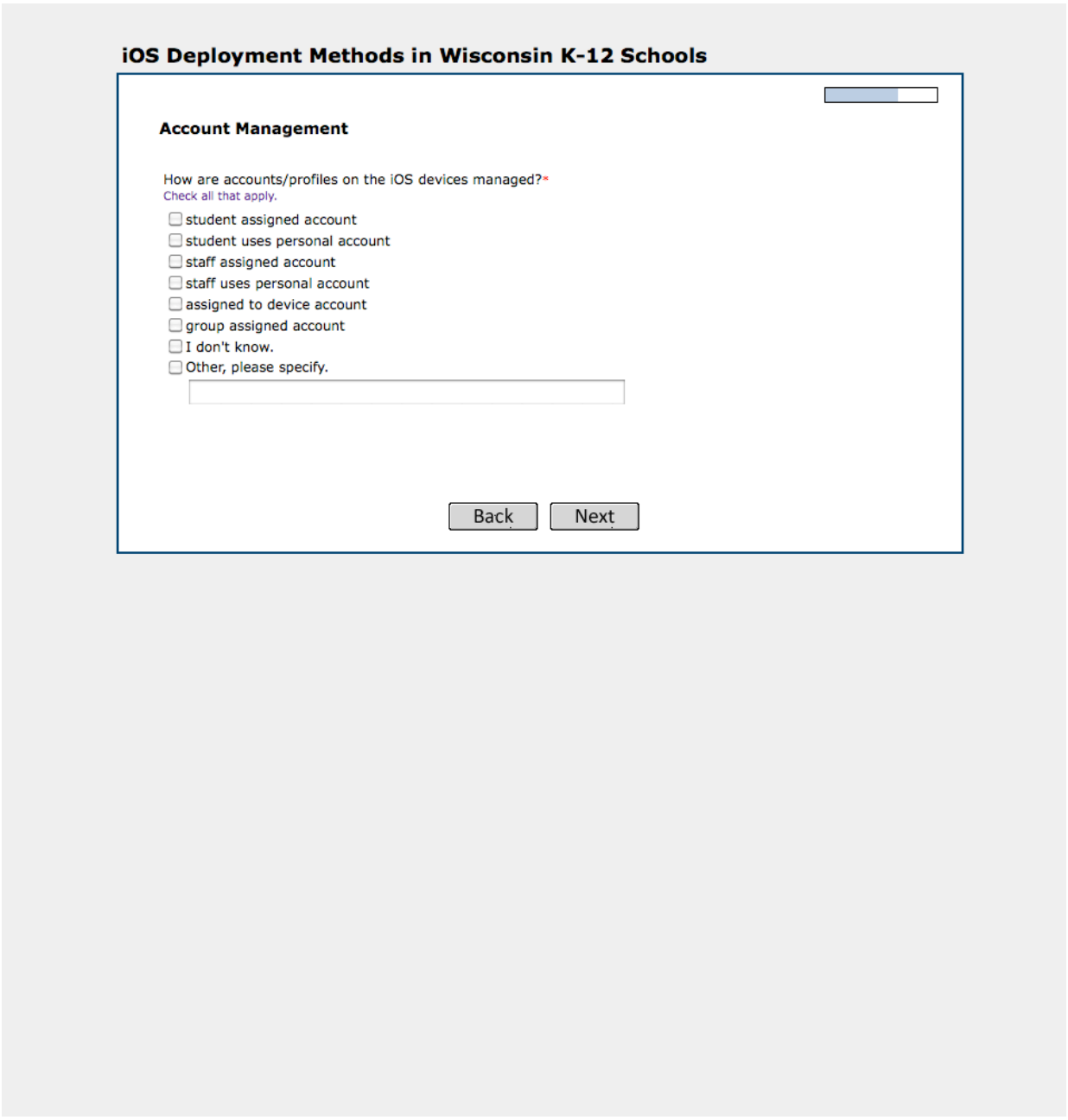
A number of questions in this survey use the generic term **iOS device**.

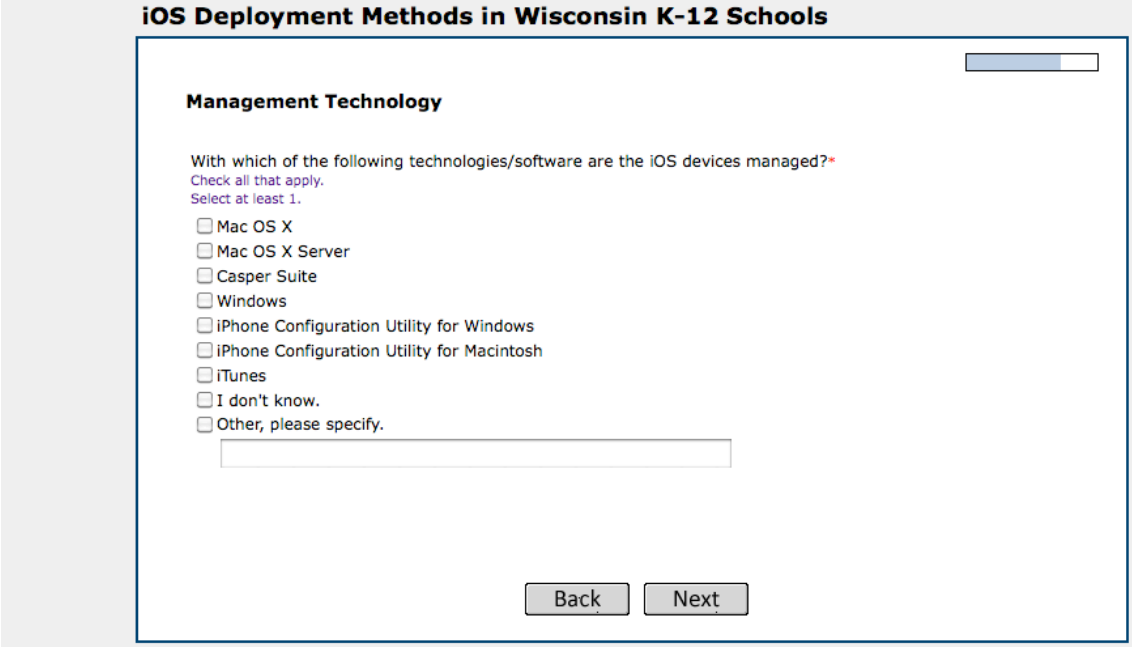
An iPad, iPod touch, and iPhone are all considered to be *iOS devices*.

Back Next


iOS Deployment Methods in Wisconsin K-12 Schools
Distribution
What iOS device distribution methods are in place?*
Check all that apply.
Select at least 1.
assigned to staff
1:1 student to iOS device ratio
library lending
assigned to department
assigned to lab
staff checkout
assigned to grade
assigned to classroom
paid parent rental
Other, please specify.
Back
Next


iOS Deployment Methods in Wisconsin K-12 Schools
Accessories
What accessories are used with the iOS devices?
Check all that apply.
carrying bag
soft case
external battery
audio/video adapter
charging station / dock
camera connection kit
microphone
physcial device lock
cart
external speakers
stylus
screen protector
hard case
external keyboard
magnetic screen cover
Other, please specify.
Back
Next


iOS Deployment Methods in Wisconsin K-12 Schools
Account Management
How are accounts/profiles on the iOS devices managed?*
Check all that apply.
student assigned account
student uses personal account
staff assigned account
staff uses personal account
assigned to device account
group assigned account
I don't know.
Other, please specify.
Back
Next


iOS Deployment Methods in Wisconsin K-12 Schools
Management Technology
With which of the following technologies/software are the iOS devices managed?*
Check all that apply.
Select at least 1.
Mac OS X
Mac OS X Server
Casper Suite
Windows
iPhone Configuration Utility for Windows
iPhone Configuration Utility for Macintosh
iTunes
I don't know.
Other, please specify.
Back
Next

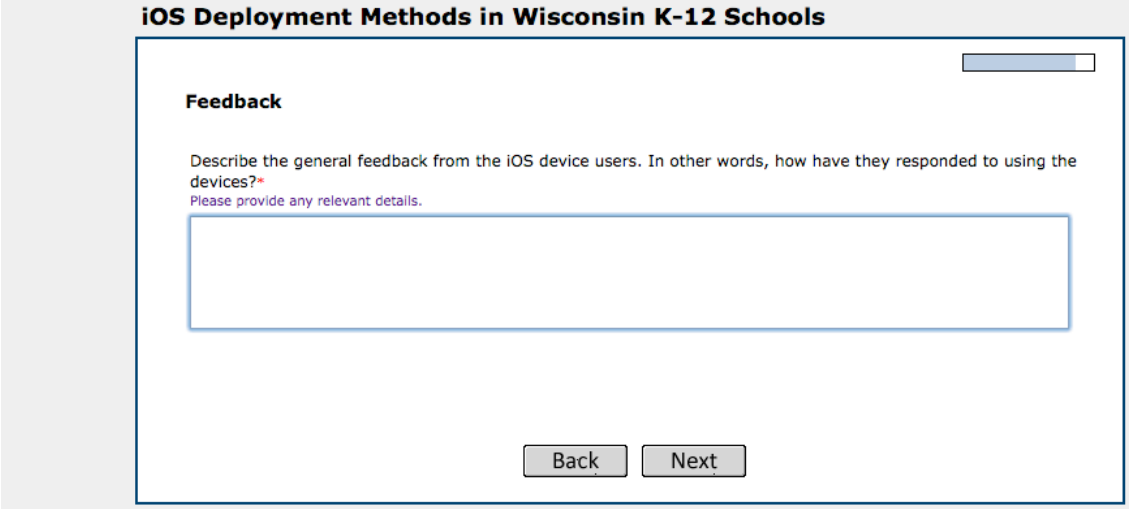
iOS Deployment Methods in Wisconsin K-12 Schools

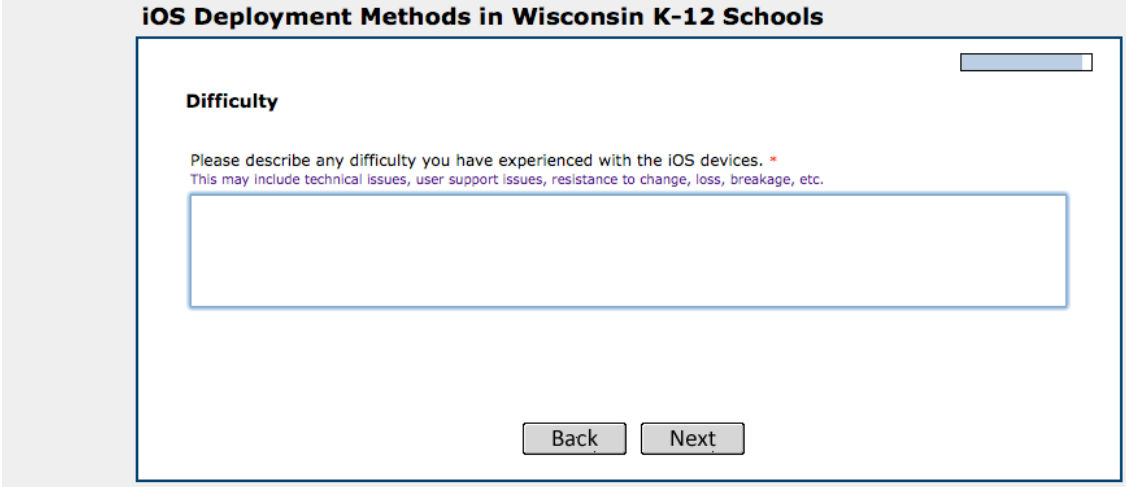
Features

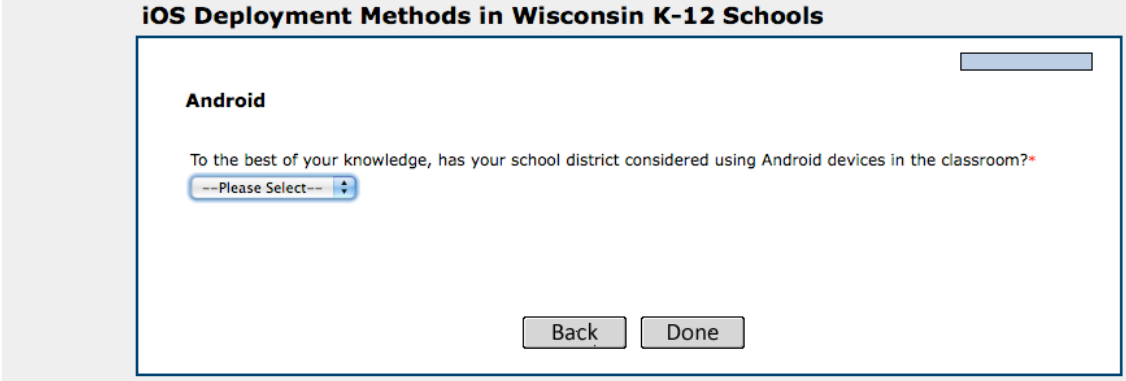
In your opinion, what features are the most compelling for the iOS device users?*
Select at least 1.

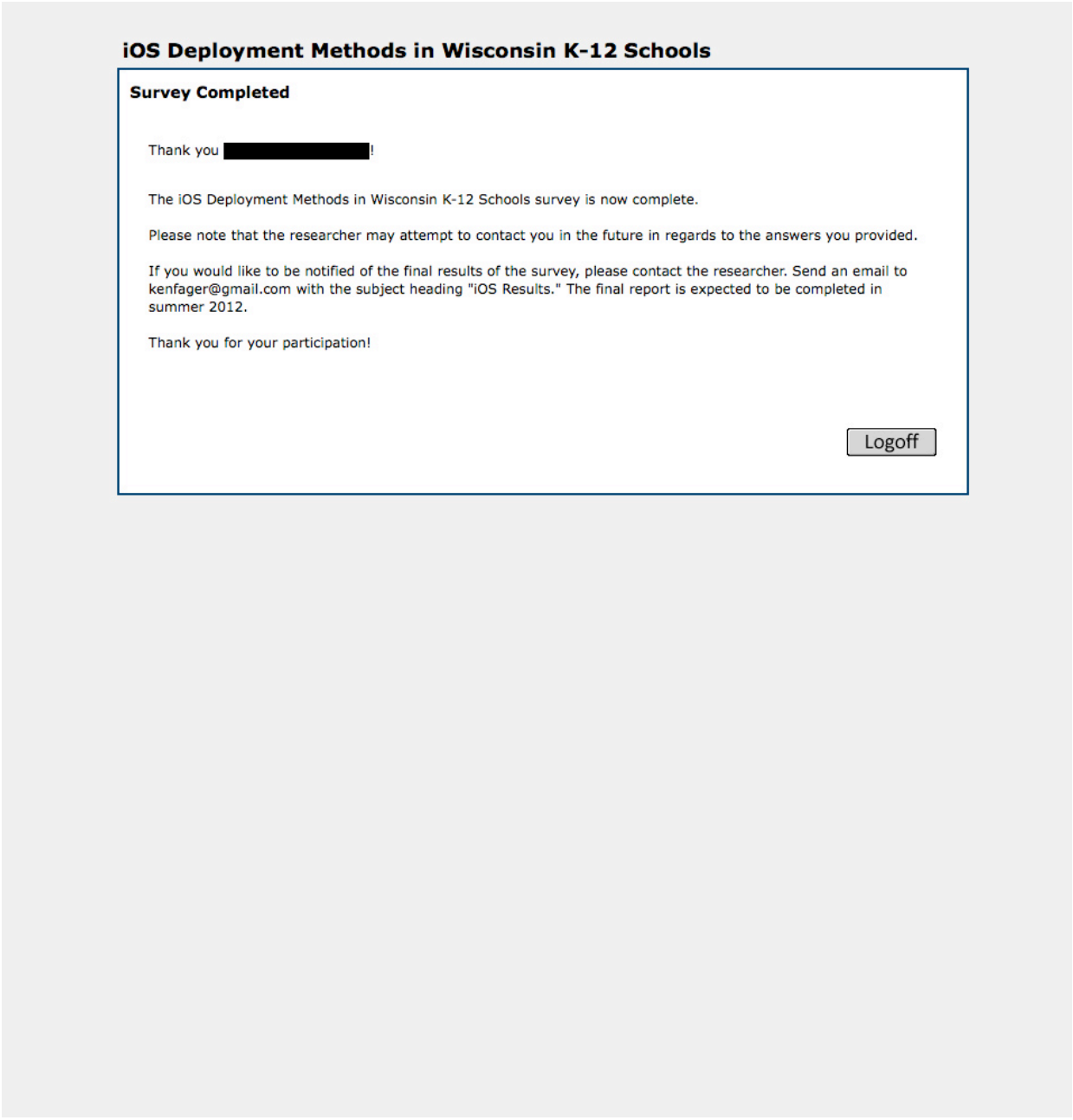
- [ ] communications capability
- [ ] available eBooks / literary content
- [ ] touchscreen
- [ ] camera capability
- [ ] available apps / software
- [ ] multimedia capability
- [ ] internet connectivity
- [ ] portability
- [ ] Other, please specify.

Back Next


iOS Deployment Methods in Wisconsin K-12 Schools
Feedback
Describe the general feedback from the iOS device users. In other words, how have they responded to using the devices?*
Please provide any relevant details.
Back
Next


iOS Deployment Methods in Wisconsin K-12 Schools
Difficulty
Please describe any difficulty you have experienced with the iOS devices. *
This may include technical issues, user support issues, resistance to change, loss, breakage, etc.
Back
Next


iOS Deployment Methods in Wisconsin K-12 Schools
Android
To the best of your knowledge, has your school district considered using Android devices in the classroom?*
--Please Select--
Back
Done



iOS Deployment Methods in Wisconsin K-12 Schools

Survey Completed

Thank you [redacted]!

The iOS Deployment Methods in Wisconsin K-12 Schools survey is now complete.

Please note that the researcher may attempt to contact you in the future in regards to the answers you provided.

If you would like to be notified of the final results of the survey, please contact the researcher. Send an email to kenfager@gmail.com with the subject heading "iOS Results." The final report is expected to be completed in summer 2012.

Thank you for your participation!

Logoff

Appendix B
Online Survey Recruitment E-mail Sample

Subject: iOS Deployment Methods in Wisconsin K-12 Schools Survey

E-mail body:

Hello,

My name is Ken Fager and I am a UW-Whitewater Library & Information Technology graduate student. I am currently conducting research on iOS Deployment Methods in Wisconsin K-12 Schools.

The iPad and iPod touch are gaining a strong foothold in schools nationwide, and Wisconsin is no exception. This robust new technology presents unique challenges to district and school level staff. There is little precedent research on what methods to use to support this technology.

As part of my graduate research, I have created an online survey regarding iOS Deployment Methods in Wisconsin K-12 Schools. The survey will only take 5 to 10 minutes of your time to complete. Your personal information will not be shared publicly.

http://surveyasp.uww.edu/TakeSurvey.aspx?SurveyID=94LI8p25

If you have any questions about this study please feel free to contact me.

Thank you for your participation,

Ken Fager
Grad Student
UW-Whitewater
Library & Information Technology
fagerk26@uww.edu
kenfager@gmail.com

Appendix C
Online Survey Informed Consent Terms

iOS Deployment Methods in Wisconsin K-12 Schools
INFORMED CONSENT TERMS

You must agree to the INFORMED CONSENT TERMS prior to taking the survey.

6. This survey is part of a research study on iOS Deployment Methods in Wisconsin K-12 Schools. The purpose of this study is to build a foundational knowledge of how various Wisconsin districts, schools, and classrooms are integrating iOS technology for students and/or staff use. The estimated time for each participant taking this survey is 10-15 minutes. Participants will answer a series of both quantitative and qualitative short answer questions.
7. This research benefits Wisconsin K-12 technology stakeholders by expanding the publicly available knowledge-base for a revolutionary computing platform.
8. Participation in this survey is entirely voluntary. There is no penalty for refusal to participate. There is no penalty if the participant does not complete the survey.
9. The surveyasp.uww.edu website is considered a private space. Data collected in this survey will only be accessible to the researcher.
10. Data collected from the survey will be stored on the surveyasp.uww.edu server(s) and the researchers personal computer(s).
11. As an online participant in this research, there is always a risk of intrusion by outside agents, i.e., hacking, and therefore the possibility of being identified.
12. Participant names, contact information, and other potential public identification data will not be published in written public reports. The researcher may identify provided school district, school, and/or classroom and subject information. The researcher reserves the right to assign pseudonyms to individuals if required.
13. The researcher may contact the participant with follow-up questions via e-mail or telecommunications. These follow-up questions will be for clarification, expansion of, and/or related to the answers provided in this survey.
14. Online communications are considered public in nature. Electronic records of communications (e-mail, phone calls, etc.) with the researcher may be subject to open records requests.
15. The participant affirms that they are at least 18 years of age.
16. The participant affirms that they are employed by a Wisconsin school district.

If you have questions about this survey, data collection methods, procedures and/or general concerns please feel free to contact the researcher.

Researcher:
Ken Fager
fagerk26@uww.edu
(920) 562-0212

Faculty Advisor:

Dr. Eileen Schroeder
schroede@uww.edu
(262) 472-2837

Questions about your rights and/or treatment as a participant can be directed to the Institutional Review Board Administrator.

IRB Administrator:
Denise Ehlen
Office of Research and Sponsored Programs
University of Wisconsin - Whitewater
800 West Main Street
Whitewater, WI 53190
Telephone: (262) 472-5212
Fax: (262) 472-5214
E-Mail: ehlend@uww.edu

Appendix D
Online Survey Questions

Question #	Question Contents
1	What is your full name?
2	What is your email address?
3	What school district do you work for?
4a	Which title best describes your position?
4b	What school building(s) do you work at?
5a	How many of each iOS device does your district own?
5b	How many of each iOS device does your building have?
5c	How many of each iOS device are available for you and your students to use?
6	What iOS device distribution methods are in place?
7	Which of the following factor(s) drove the acquisition of iOS devices in your district?
8	What accessories are used with the iOS devices?
9	How are accounts/profiles on the iOS devices managed?
10	With which of the following technologies/software are the iOS devices managed?
11	In your opinion, what features are the most compelling for the iOS device users?
12	Describe the general feedback from the iOS device users. In other words, how have they responded to using the devices?
13	Please describe any difficulty you have experienced with the iOS devices.
14a	To the best of your knowledge, has your school district considered using Android devices in the classroom?
14b	Has your school district actually deployed them [Android devices] for regular use in classrooms? If so, how many?

Appendix E
Online Survey Job Categories

Level:	Job Title:
District	District Administrative Staff
District	District Technology Administrator
District	District Technology Support / Technician
School	School Administrative Staff
School	School Technology Administrator
School	School Technology Support / Technician
School	School Teacher
School	Librarian
School	Aide
School	Other

Appendix F
Participating School Districts Listed Alphabetically

1. Baraboo
2. Bowler
3. Burlington
4. Cedarburg
5. CESA 5
6. Chilton
7. Eau Claire
8. Edgerton
9. Elkhorn
10. Friess Lake
11. Gale-Ettrick-Trempealeau
12. Grafton
13. Green Bay
14. Hartford Union
15. Hillsboro
16. Kiel
17. Lake Geneva
18. Mauston
19. Mellen
20. Mishicot / Sevastopol
21. New Richmond
22. Oshkosh
23. Owen-Withee
24. Peshtigo
25. Pulaski
26. Riverdale
27. Rubicon
28. Seneca
29. Sheboygan
30. Somerset
31. Spring Valley
32. St. Francis
33. Sun Prairie
34. Twin Lakes
35. Verona
36. Washington-Caldwell
37. Waterford
38. Waukesha
39. Wausau
40. Weyauwega
41. Winneconne

Appendix G
Question 4a Data

4a) Which title best describes your position?

Survey ID#	Participant Job Description
3	District Technology Administrator
6	District Technology Administrator
7	District Technology Administrator
9	District Technology Administrator
11	District Technology Support / Technician
14	School Teacher
17	School Technology Support / Technician
19	District Technology Administrator
20	School Teacher
21	District Technology Administrator
23	District Technology Administrator
25	District Technology Support / Technician
26	District Technology Administrator
30	District Technology Administrator
34	District Technology Administrator
37	District Technology Administrator
38	School Administrative Staff
40	District Technology Administrator
41	District Technology Administrator
43	District Technology Administrator
44	Librarian
45	District Technology Support / Technician

46	District Technology Administrator
47	District Administrative Staff
49	District Technology Administrator
50	District Technology Support / Technician
51	Librarian
55	District Technology Administrator
58	District Technology Support / Technician
59	District Technology Support / Technician
60	District Technology Support / Technician
61	School Technology Administrator
63	District Technology Administrator
64	District Technology Administrator
65	District Technology Administrator
67	School Technology Administrator
69	District Technology Administrator
71	Librarian
72	District Technology Support / Technician
77	District Technology Administrator
80	District Technology Administrator
81	District Technology Administrator
84	District Technology Support / Technician
86	District Technology Administrator

Appendix H
Question 5a, 5b, and 5c Combined Data

5a) How many of each iOS device does your district own?
5b) How many of each iOS device does your building have?
5c) How many of each iOS device are available for you and your students to use?

Survey ID#	iPad	iPod Touch	iPhone	Total iOS Devices
3	7	0	0	7
6	24	36	0	60
7	10	30	0	40
9	9	1	0	10
11	900	500	0	1400
14	5	2	0	7
17	54	8	0	62
19	200	20	0	220
20	10	0	0	10
21	15	0	0	15
23	15	0	0	15
25	40	8	0	48
26	40	20	0	60
30	75	20	0	95
34	2	0	0	2
37	0	5	0	5
38	20	30	0	50
40	15	0	0	15
41	300	100	0	400
43	32	20	0	52
44	1	0	0	1

45	20	30	0	50
46	1700	300	30	2030
47	35	0	1	36
49	140	115	0	255
50	300	100	0	400
55	22	20	0	42
58	25	50	0	75
59	30	25	0	55
60	90	40	0	130
61	32	25	0	57
63	75	10	0	85
64	16	0	0	16
65	60	0	0	60
67	100	0	0	100
69	40	20	0	60
71	135	15	5	155
77	60	0	0	60
80	30	5	0	35
81	500	400	5	905
86	500	30	0	530

Appendix I
Question 6 Data

6) What iOS device distribution methods are in place?

Option	Total
1:1 student to iOS device ratio	3
library lending	13
assigned to classroom	20
assigned to department	13
assigned to staff	33
assigned to grade	4
assigned to lab	5
staff checkout	17
other	11

Survey ID#	Other Answer
19	Assigned to specific students - but not 1:1 in full
38	I-Pod Touch cart
40	Also used for SED students.
41	mobile labs for checkout
47	Cart Checkout
51	used in library media center
60	assigned to special needs students
65	2 carts of 25 each, the carts are checked out by classroom teachers
71	We are in a pilot, so select staff have been given devices, all administrators
80	Assigned through Special Education
81	assigned to student for IEP

Appendix J
Question 7 Data

7) Which of the following factor(s) drove the acquisition of iOS devices in your district?

Option	Total
school board interest	7
pilot program	20
grant funding	12
public input	1
parent interest	6
student interest	12
staff interest	33
private funding	1
standards compliance	3
fundraising effort	5
other	11

Survey ID#	Other Answer
6	help prepare our staff to work in districts
7	Test
19	IEP / Goals Driven
38	ITLS Standards
41	Features and functionality
46	great for content delivery and content creation
49	available educational content
51	need for computer access
61	Administration Interest
69	VPP to purchase apps on a enterprise level vs individual

80	Purchased by Special Ed, outside of Technology Plan

Appendix K
Question 8 Data

8) What accessories are used with the iOS devices?

Option	Total
charging station / dock	15
screen protector	21
camera connection kit	7
microphone	5
soft case	20
hard case	21
magnetic screen cover	16
audio/video adapter	18
carrying bag	4
external battery	0
physical device lock	1
external speakers	6
other	4

Survey ID#	Other Answer
3	none
37	none
46	AppleTV
71	we only have a few external keyboards, and camera connections, but smart covers and VGA adapter for all

Appendix L
Question 9 Data

9) How are accounts/profiles on the iOS devices managed?

Option	Total
student assigned account	4
student uses personal account	3
staff assigned account	21
staff uses personal account	12
assigned to device account	12
group assigned account	17
I don't know	2
other	9

Survey ID#	Other Answer:
23	Trying to determine best practice.
25	Using Apple VPP account by department and building
37	not managed
40	iPhone Configuration Utility
46	school based iTunes accounts
71	We have accounts for each of our buildings. Admin uses their personal accounts
72	student device is a District account, teacher is a personal account
77	Staff accept when district purchases app then district account is used to install app
80	Spec Ed staff managed under personal account but assigned to student; iTunes giftcards for purchases

Appendix M
Question 10 Data

10) With which of the following technologies/software are the iOS devices managed?

Option	Total
Mac OS X	15
Mac OS X Server	9
Casper Suite	5
Windows	12
iPhone Configuration Utility for Windows	8
iPhone Configuration Utility for Macintosh	10
iTunes	29
I don't know	2
other	9

Survey ID#	Other Answer
9	nothing reallly
23	Maas360
37	Not Managed
50	MMS
58	none
63	Absolute MDM
69	Just purchased a Mac Mini with MDM to manage devices
80	No enterprise management, yet. But looking at it.
84	MaaS360

Appendix N
Question 11 Data

11) In your opinion, what features are the most compelling for the iOS device users?

Option	Total
touchscreen	25
internet connectivity	21
communications capability	6
multimedia capability	14
portability	27
available apps / software	38
camera capability	6
available eBooks / literary content	10
other	8

Survey ID#	Other Answer
3	Games and Entertainment
17	early elementary and RTI apps
19	Relatively low-cost
44	interactive, immediate feedback
49	ease of use
61	Instant On. Ease of Use
80	Can't be currently managed by IT, therefore Spec Ed has more freedom to "do what they want" without oversight. Rave about Special Ed "apps."
86	battery life

Appendix O
Question 12 Data

12) Describe the general feedback from the iOS device users. In other words, how have they responded to using the devices?

Survey ID#	Response
3	Users say iPads are a supplement to a PC, but cannot replace a PC for doing school related projects. Textbook companies do not have plans to have apps for science, social studies, science, etc... Textbook companies rely on web based tools.
6	Love the devices but when asked how it is changing instruction, our staff can't describe. In other words, I believe it is just the "sexy" new device that still is a gadget when it comes to instruction.
7	In the ES and Special Ed departments. The devices are loved. At the MS and HS, we have given up using ios devices and instead are using laptops.
9	THEY LOVE THEM ALL. Going 1:1 with iPads in grades 6-8 starting in September 2012.
11	When teachers let the kids lead the way there is a great deal of success. When teachers try to ram it into their current structures, there is very little impact on learning.
14	Special Education department houses the ipads and is extremely happy with the context in which they are used, which is mostly with students with limited communication skills. They are assigned to particular students.
17	They iPad's are very useful for very specific apps however they are unable to connect to our internal network storage servers.
19	Many people have anecdotally indicated student engagement, and personal likes and dislikes.
20	Some of the students like them, but they seem to like the small lap tops that we have available for them to use.
21	Our iPads are strictly used in a self-contained cognitive disabilities program. The teacher leading our cognitive disabilities program has been very happy with the ease of management with the Bretford sync cart that was also purchased.
23	Too earlier yet for us to have gotten any feedback, sorry.
25	There is a small learning curve, but this is for the staff that have not used an iOS device prior. Students have no issues using an iOS device. Staff have collaborated and compiled a list of uses/apps among themselves. They are asking for more.

26	They are pleased with the apps available for students with specific learning needs.
30	They love the devices. They hate the process to get the devices synced up. They hate even more Apple's volume purchase program process. Doubt if we will buy more unless Apple changes that process.
34	So far the response is good. They like the ability to customize the apps to their student's needs.
37	Devices work great. iTunes corrupts/takes over systems its loaded on. iTunes fills up profiles. Management can be circumvented by factory reset.
38	Good feedback from staff and students.
40	We just started using the devices in our SED department, so I am limited on feedback. Staff seem to like them since they are "new and cool" devices. I do see a reason for them in SED, but as far as normal education I don't. I see them as more of a distraction then a tool.
41	The are in demand! Teachers at sites who check out carts don't want to give them up, and I also hear that staff keep "borrowing" them off carts. Sp. Ed. staff are reporting very positive results with students.
43	Teachers report that students are motivated to use the iOS device, it is convenient to use due to it's size, and students are actively engaged when using the device.
44	I have one teacher who uses the devise regularly for various apps.
45	Ipod touch cart is very popular
46	The response has been very positive. We have a 1:1 high school and students are excited and engaged with the devices. Teachers are using them more and more - it is helping to improve an already positive collaborative culture in the schools. Elementary students are the most reponsive and excited to use the devices.
47	Both students and staff have provided positive feedback
49	Our staff has responded very favorably to using these devices in the classroom. They have been an excellent additional resources in our 21st century tool chest.
50	Nothing but requests for more apps and more devices. They cant get enough of them.
51	Students like using this technology.
55	iPads are generally used in the Special Ed dept. and have been greatly useful for ADD students to stay on task via various apps. Also iPods are used in 4th grade for audio books. Our librarian use iPads for digital books as well.

58	We just put out the pilot of iPads this year and so far we have gotten mixed reviews. Some of our teachers really like them and some don't like the limitations of the iPad.
59	Creates excitement and a desire to learn.
60	All users except one have praised the devices. The have made a significant impact on the special needs students.
61	Wish they were easier to manage. Wish they could be connected to school servers (MS Office files)for file and printer sharing. Seem to be holding up on the wear and tear (with a decent case).
63	Users like the devices, but time will tell if it "just because it is new and shiny." However, we are seeing great success and costs savings when deploying iPads to special needs students.
64	Our special education staff have just entered the world of iPads, staff are excited about all of the app possibilities for their students.
65	Our staff and students love the iPads. The program has been very well received and the tools are well used for our first year.
67	Well received. Students and staff appear to appreciate and use them on a daily basis.
69	They love it, great student interaction\interest. Apps have reached some students in a way other learning strategies could not.
71	We are a PC shop, so we have had problems with getting iWorks documents off. The devices are locked down, so staff can not add apps. We don't have a printing solution. We are not a Google App school, so saving docs, etc is challenging. Cloud based storage is currently block for the most part in our Distric so this complicates things. Staff really like the portability of the device. Like creativity options. Elem staff use a lot of apps. Great for Special Service students
72	All our principals have an iPad and now we are moving them in to classrooms. I think people think they are "fun," but we're waiting to see how effectively they really will be used in a classroom.
77	Most are highly satisfied. iPad 1 users are hopeful that they will be able to upgrade to iPad 2 or 3
80	Generally positive, but for the wrong (IMHO) reasons. We have a locked down AD environment, and iOS currently allows users less oversight & tracking since our security suite doesn't support iOS. Special Ed is pushing to rapidly expand, which has upended our Tech Plan and investment, and with Admin approval is forcing IT to adapt & change to filter & track devices.
81	Overall, they have been successful. The effectiveness of these devices lies in the professional development for staff and curriculum need.

84	our special ed staff who are the pilot program love the variety of apps available. their feedback has been very positive.
86	Feedback has been exceptionally positive. The user interface (touch) has been quickly adopted and the biggest problem is how to handle the devices at the enterprise level. If this can be resolved I see no reason not to deploy these devices as widely as possible.

Appendix P
Question 13 Data

13) Please describe any difficulty you have experienced with the iOS devices.

Survey ID#	Response
3	WiFi Connectivity is a major problem for use of any of the Internet based apps on the iPad. Some places it is completely useless.
6	It is a retail device that still has a long way to go in enterprise management. Yes you can buy third party application such as Casper etc. however budgetarily it is difficult. At least with iOS5 we have a chance to never sync it again.
7	Managemnet is difficult. Using Apples method to distribute software legally is impossible. It is absolutely ridiculous to require 4 different log ins to buy one app. I will admit that once the app is purchased installation is easy, but the purchasing problem is stupid.
9	no issues
11	Breakage when they are allowed to be taken home w/ no soft case.
14	The devices have only been used last school year and this year. We had an IT person who was unable to get the iOS devices connected to the wireless system on a secured network. However, we have a new IT person and the wireless has been reconfigured and we have very few problems this year.
17	The ability to connect to their files that are stores on the network. The magnetic case was not a good solution.
19	Management is a fairly significant challenge. In addition, many end-user questions about how a certain app works are not answerable by my team. There are simply too many apps and very little predictability.
20	Not having a flash player so some of the programs that require that you can not use the i-pad for.
21	Since we do not have a large-scale deployment, implementation issues have been minimal. A single teacher is managing a lab of 15 iPads on her own, with little technical support beyond the initial lab/sync setup.
23	IOS devices are not designed to be used easily with multiple users. Can't cutomize the device for each user. The way in which the device accesses wireless networks means it is not practical in a shared device situation to allow each individual user to log on and then off. Student/human nature being what it is means they'll forget to log off the wireless network and the next student will wind up using the previous student's network credentials.

25	We are requiring cases and extended warranty. This is our least problematic platform in our environment. The only troubleshooting we have had to do is turn the iOS device off and back on again.
26	People have no skills regarding the use of the devices.
30	They are a nightmare to get setup and synced.
34	Managing the Apps.
37	iTunes corrupts/takes over systems its loaded on. iTunes fills up profiles. Management can be circumvented by factory reset.
38	Theft, loss, repairs
40	As IT I notice they are not a device that is very easy to control/lockdown. I wish Apple would care more about management of these devices with schools on a small IT budget. Even educational pricing from Apple isn't that impressive.
41	It took some time to figure out the best way to activate, manage and deploy them. Casper is a good tool, and I am glad we have it. One challenge concerns how to best manage accounts. Finding the right level of management is tricky. We are using the volume purchase program, which is very nice and offers discounts. We will review this at the end of the year to determine if we like the way we are managing them, and if we want to make some revisions.
43	The volume purchase program is quite a bit of hoop jumping to get an app deployed. We have a concern about being able to retain the apps that we purchase.
44	It is used by only 2 people really, both proficient users so there are not many issues.
45	Transitioning thru filtering components as they lack windows type credentials.
46	We have over 1700 iPads so the major iOS updates - like 4.3 to 5 - were difficult. We also provide an alternative web browser for our high school students so that it is filtered at home. This browser does not offer the same end user experience as Safari for the iPads.
47	Keeping all devices synced with apps in proper folders. Sharing of iPads and accounts within apps.
49	Very difficult to manage these devices without a central server. The IOS deployment is very "consumer" based and not very enterprise friendly.. We have made it work in our environment, but it takes way too much effort to distribute these devices along with their associated apps.
50	Main issue at this time is trying to determine who can load apps and what apps may be loaded.

51	We are still learning the best way to purchase and download apps. Seems like too many steps to download free apps and volume purchased apps.
55	No problems so far.
58	So far we have not seen any difficulties with the iOS devices.
59	Difficult to manage when more than one user uses the same device.
60	We have experienced very few issues with the devices. Initially we had some issues with apps and our proxy server, but we have since removed the proxy server. Sometimes with have problems with Apple Push Notifications, but these seem to be related to our network as opposed to a problem with the device.
61	Nothing except the management and explaining to staff that they are not a "computer" that can attach to the network (for file and printer sharing)
63	managability is very difficult.
64	Nothing yet
65	There is a slight difficulty with the overall management of the devices. We are still learning what works best for us and waiting to try out Apples MDM solution when we get our Lion server up and running.
67	Imaging.
69	Management on an enterprise level
71	Some were listed in the previous section. saving, printing, editing an itme after starting. We learned as we went, and many errors on the deployment side. Easily updating apps, We do have a MDM.
72	It being an "i" device. It's an i device!! It is not meant to be passed our. We decided our staff devices would be linked to a personal itunes account because we didn't want to fight it being that personal, i device. Student iPads will sync with our Green Bay app store, and we're yet to see how that goes.
77	Managing from a standpoint of leaving the device open enough for the teacher to explore free apps while locking them down so that purchases made via the Apple Voucher Program are easily installed. Right now we need to touch the device in order to install district purchased apps. Also, we do not have WiFi everywhere.
80	I'm not a fan. These are OK for personal use, but fair to poor in Enterprise environment. We

	can't remotely manage, most still on iOS 4.x. Cost is extremely high for equivalent hardware, although Win and Android tablets have so far been no better. Staff tends to be "off-task" frequently. Devices are so far more disruptive than helpful in classroom as the novelty of the device tends to outweigh how they are being used.
81	Google Apps integration-- as many districts are moving foward with Google Apps for Education, the use of these apps is not a great experience for the end user
84	managing the devices on a large scale will be challenging. without a 1:1 approach managing the accounts and having multiple users on a single device will be a huge issue. ordering VPP apps has proven to be cumbersome.
86	Enterprise management and app/ibooks purchases. Trying to tie the purchases to the device vs. the user which is not part of the current system.

Appendix Q
Question 14a Data

14a) To the best of your knowledge, has your school district considered using Android devices in the classroom?

Option	Total
yes	33
no	9
I don't know	2

Appendix R
Question 14b Data

14b) Has your school district actually deployed them [Android devices] for regular use in classrooms? If so, how many?

Survey ID#	Response
3	We have this as a pilot for next month
6	no
7	5 kindle fires
9	none deployed
14	no
17	No, but they can connect to our network.
19	No, we have not deployed any yet.
20	We will be allowing students in grades 9 - 12 to bring technology devices to school.
21	No
23	No
25	No, just investigated.
26	yes-10
30	No
34	no
37	no
40	no
43	No
46	We have purchased and tested about 20 Android devices.
47	no
49	No. Too difficult to manage these devices also.
50	no Android devices deployed at this time. No real plans to do so in the near future.
58	no

63	No
64	No, not yet. We are trying many devices before making a final decision.
67	No
69	yes, 15
71	We are just tesing some now. We have 3 chrome books and 3 Kindle fires
77	20 Android tablets will be deployed next fall in High School Mathematics
80	No. Several test devices. No Enterprise management, yet.
81	30
86	no

Appendix S
Follow Up Interview Request Email Sample

Subject: iOS Deployment Methods in Wisconsin K12 Schools Follow Up

Hello [participant name],

Thank you for participating in the iOS Deployment Methods in Wisconsin K12 Schools Survey in early March to April this year.

I would like to follow up with you about some of the answers you gave. The follow up questions are anticipated to take between 5-10 minutes of your time. Any additional information offered beyond that is appreciated, but not required.

More specifically I would like to discuss [follow up interview question topics here].

Please respond whether you would prefer to answer the follow up questions via telephone or email. I will try to accommodate you if we are to have a scheduled telephone discussion.

If you have any questions please feel free to contact me.

Thank you,
Ken Fager
kenfager@gmail.com
(920) 562-0212

Appendix T
Email Option: Informed Consent Terms and Questions Sample

Subject: iOS Deployment Methods in Wisconsin K12 Schools - Follow Up Questions

Hello [participant name],

Thank you for agreeing to answer some of my follow up questions. Before I can ask them, I am required to get your informed consent. The follow up questions will be below in red.

iOS Deployment Methods in Wisconsin K-12 Schools
FOLLOW UP INTERVIEW
INFORMED CONSENT TERMS

You must agree to the FOLLOW UP INTERVIEW INFORMED CONSENT TERMS prior to answering questions.

1. This survey is part of a research study on iOS Deployment Methods in Wisconsin K-12 Schools. The purpose of this study is to build a foundational knowledge of how various Wisconsin districts, schools, and classrooms are integrating iOS technology for students and/or staff use. The estimated time for each participant taking this survey is 10-15 minutes. Participants will answer a series of both quantitative and qualitative short answer questions.
2. This research benefits Wisconsin K-12 technology stakeholders by expanding the publicly available knowledge-base for a revolutionary computing platform.
3. Participation in this interview is entirely voluntary. There is no penalty for refusal to participate. There is no penalty if the participant does not complete the survey.
4. Data collected from the survey will be stored on the researchers personal computer(s).
5. Participant names, contact information, and other potential public identification data will not be published in written public reports. The researcher may identify provided school district, school, and/or classroom and subject information. The researcher reserves the right to assign pseudonyms to individuals if required.
6. Online communications are considered public in nature. Electronic records of communications (e-mail, phone calls, etc.) with the researcher may be subject to open records requests.
7. The participant affirms that they are at least 18 years of age.
8. The participant affirms that they are employed by a Wisconsin school district.

If you have questions about this survey, data collection methods, procedures and/or general concerns please feel free to contact the researcher.

Researcher:
Ken Fager
fagerk26@uww.edu
(920) 562-0212

Faculty Advisor:
Dr. Eileen Schroeder

schroede@uww.edu
(262) 472-2837

Questions about your rights and/or treatment as a participant can be directed to the Institutional Review Board Administrator.

IRB Administrator:
Denise Ehlen
Office of Research and Sponsored Programs
University of Wisconsin - Whitewater
800 West Main Street
Whitewater, WI 53190
Telephone: (262) 472-5212
Fax: (262) 472-5214
E-Mail: ehlend@uww.edu

1.) Do you understand and agree to the FOLLOW UP INTERVIEW INFORMED CONSENT TERMS? (A “yes” or “no” answer will suffice.)
2.) [follow up question]
3.) [follow up question]
4.) [follow up question]

Thank you for your participation. If you are interested in receiving the final iOS Deployment Methods in Wisconsin K-12 Schools report in August/September please indicate that in your response.

Thanks again,

Ken Fager
kenfager@gmail.com
fagerk26@uww.edu
(920) 562-0212

Appendix U
Follow Up Interview: E-mail Response

1.) Do you understand and agree to the FOLLOW UP INTERVIEW INFORMED CONSENT TERMS? (A "yes" or "no" answer will suffice.)

Yes

2.) You mention that both students and staff have used the iPads and have had a positive reaction to them. How much in demand are your carts? Where and for what purpose are they being used the most?

We have one cart for our K-3 classes and one for 4-5 classes. Our K-3 cart is much more in demand this first year because I have a first grade teacher who uses them all the time for start of the day activities, math, the daily 5, and anything else that comes up where their use is appropriate. My twins are in the kindergarten class so that has also helped me work with our kindergarten teacher in integrating them into her class.

The 4-5 cart is definitely used, but I do not think there is much overlap/demand for it. Our 4-5 classes use them for research, note taking, writing, creating movies, taking AR tests.

3.) You state that you are still learning how best to manage the devices while waiting for an Apple MDM solution. What are some of the management lessons you have learned so far?

Each cart/group of iPads is ID'd to one MacBook with an iTunes account specific to those iPads. I have learned that even though it takes longer, it is best to download the needed app on the Macbook and then sync it out to the iPads. Since we only have 25 on a cart it is easy to just go to each one and load the app, but then when you do sync and the app is not in the iTunes library on the MacBook, it asked to sync purchases made on the iPad - but it does not tell you what the purchases are, so if a staff member (yes I gave out the iTunes password to a select few) download an app to try, and they don't like it, but forget to delete it - that app ends up in the iTunes library and then on all iPads on the cart. So I try to stick to loading apps the longer way - syncing can take a while.

4.) Where is an area that Apple can improve for supporting iOS devices in education?

1. Pricing. I know we get a 50% discount through the VPP, but I can buy an app once and load it on my 4 devices at home. It is a challenge for schools to find funding for the apps needed for classroom use.
2. Management. However, I have not had a chance to try out the Apple Configurator app yet or the MDM solution that is on a Lion server (we still have Snow Leopard).

Appendix V
Phone Interview: Informed Consent Terms Email

Subject: iOS Deployment Methods in Wisconsin K12 Schools - Follow Up Questions

Hello [participant name],

Thank you for agreeing to answer some of my follow up questions. Before I can ask them, I am required to get your informed consent. You will be asked if you agree to these terms before the interview proceeds.

iOS Deployment Methods in Wisconsin K-12 Schools
FOLLOW UP INTERVIEW
INFORMED CONSENT TERMS

You must agree to the FOLLOW UP INTERVIEW INFORMED CONSENT TERMS prior to answering questions.

1. This survey is part of a research study on iOS Deployment Methods in Wisconsin K-12 Schools. The purpose of this study is to build a foundational knowledge of how various Wisconsin districts, schools, and classrooms are integrating iOS technology for students and/or staff use. The estimated time for each participant taking this survey is 10-15 minutes. Participants will answer a series of both quantitative and qualitative short answer questions.
2. This research benefits Wisconsin K-12 technology stakeholders by expanding the publicly available knowledge-base for a revolutionary computing platform.
3. Participation in this interview is entirely voluntary. There is no penalty for refusal to participate. There is no penalty if the participant does not complete the survey.
4. Data collected from the survey will be stored on the researcher's personal computer(s).
5. Participant names, contact information, and other potential public identification data will not be published in written public reports. The researcher may identify provided school district, school, and/or classroom and subject information. The researcher reserves the right to assign pseudonyms to individuals if required.
6. Online communications are considered public in nature. Electronic records of communications (e-mail, phone calls, etc.) with the researcher may be subject to open records requests.
7. The participant affirms that they are at least 18 years of age.
8. The participant affirms that they are employed by a Wisconsin school district.

If you have questions about this survey, data collection methods, procedures and/or general concerns please feel free to contact the researcher. Contact information for the researcher, faculty advisor, or UW-Whitewater Institutional Review Board Advisor is available to you upon request. Questions about your rights and/or treatment as a participant can be directed to the Institutional Review Board Administrator.

OPTIONAL CONTACT INFORMATION:

Researcher:
Ken Fager
fagerk26@uww.edu
(920) 562-0212

Faculty Advisor:
Dr. Eileen Schroeder
schroede@uww.edu
(262) 472-2837

IRB Administrator:
Denise Ehlen
Office of Research and Sponsored Programs
University of Wisconsin - Whitewater
800 West Main Street
Whitewater, WI 53190
Telephone: (262) 472-5212
Fax: (262) 472-5214
E-Mail: ehlend@uww.edu

Appendix W
Follow Up Interview: Phone Interview Summary

1.) Does the participant agree to the Follow Up Interview Informed Consent Terms and Conditions?

Yes.

2.) You state that user "love" the devices. Can you clarify what you mean by that statement?

The administration and staff really love the email features. They think that checking Gmail or other school accounts are better on the iPad than the online interface. Staff also love the apps and the fact that they don't have to wait for students to login to use them. The apps are instant-on.

3.) You also state that users hate syncing the devices. What is the source of difficulty for getting them synced?

I've been doing this for 25 years and have used several device imaging applications. The Apple manual is a 42 page document with hyperlinks to other documents. If I were to print it out it would be between 150-200 pages. If I'm opening a manual, I'm not very happy. Apple's third management application Configurator is not very good. It is an improvement, though still not very good. It is getter there, I would say it's at about 70% of what I need. There is a company called Lightspeed which has recognized an iOS device management opportunity. I've just received the beta for it. I'll probably consider using a third party application as we go forward because Apple's solutions are just not usable.

4.) What is it about the Volume Purchasing Program that is difficult?

Number of iTunes accounts. 1 for me, 1 each for program f+m, individual iTunes for cart, 5 cart. Tied so closely to iTunes. iTunes is a pain in the neck.

The worst thing about the VPP is the number of iTunes accounts required to use it. There is one for me, one for each program facilitator, one for each program manager, an individual account for each cart. The accounts are all so closely tied to iTunes, and even as a management tool iTunes is a pain in the neck.

5.) What can Apple do to better support K-12 deployments?

In a school environment we don't want kids checking e-mail. We don't want to have to configure those accounts and we need total control. Yet we cannot operate the iOS device without an associated e-mail account. We also cannot turn e-mail off.

What I would really like is the ability to take one image from a device and duplicate it, settings and all. There are certain things, like remote desktop, that I have to physically go to each device and configure manually.

If I dug in my heels I could get these things working, but the iPads are just one of 200 projects on my plate. We have a tech club, and the kids are much better at iTunes than I am. If I could get one of them to figure out how best to set up these things I would.

One other thing is that the iPad and iPod Touch are very personal devices. In a corporate environment it works, but in K-12 it doesn't work that way, especially with shared devices. It's a strength and a weakness.

Appendix X
Follow Up Interview: Phone Interview Summary

1.) Does the participant agree to the Follow Up Interview Informed Consent Terms and Conditions?

Yes.

2.) Where are the advantages of using iOS devices with special education?

The iOS devices are being used with students who have verbal communication issues and are not able to express themselves through writing. Apps that enable special education students to speak and record vocal communications are essential. Staff are experiencing incredible success after they are given a demonstration of the iOS device features. If Android devices had similar apps they would be considered for special education use.

3.) Can you elaborate on some of the iOS device management difficulties you identified in the online survey?

Apple's Terms of Service is all but impossible to decipher. Each app is associated with a specific iTunes ID, and keeping track of what app goes with which device is frustrating. It would be nice to be able to load the app on another device with another iTunes ID when the previous device has been cleared off.

The district is forced to use the Volume Purchasing Plan (VPP) for all app purchases. The process for provisioning apps is overly complicated. In order to purchase an app and load it onto a device requires multiple logins. IT must log in to buy enterprise card, log in to buy download key to send URL to teacher, log in to email account copy URL to teacher, teacher has to login to email to get URL, teacher has to use iTunes account. The cards only come in $100 or $500 denominations. For a small school district with a $300 budget that does not present many options. What happens if there is $50 balance? Can that be transferred?

4.) How can Apple improve their K-12 enterprise support?

Allow administrators to login with a unified ID. When apps are purchased automatically send them to the devices. When the staff member leaves allow the district to get the app back and be allowed to provision it to another device.

5.) In general what have you learned from this iOS device deployment?

Give iPad to person as individual device. User has to buy everything they want to run. Only given to staff at this point.