

BRING-YOUR-OWN TECHNOLOGY AND ONE-TO-ONE  
INITIATIVES IN MISSOURI SCHOOLS IN 2012

by

James Michael Russell II

An Abstract

of a thesis submitted in partial fulfillment  
of the requirements for the degree of  
Education Specialist in Human Services Learning Resources  
in the Department of Educational Leadership and Human Development  
University of Central Missouri

May, 2012

## ABSTRACT

by

James Michael Russell II

Every day, nearly every high school student in the United States brings to school in a mobile phone exponentially more computer technology than NASA had when it sent astronauts to the moon. Many school districts force students to turn their phones off while at school, yet at the same time districts are looking to harness the learning resources available through mobile technology. This study looks at one-to-one computing in schools, including bring-your-own-technology, tablets, and laptops. The researcher surveyed and interviewed technology directors, administrators, and classroom teachers working in Missouri schools in 2012. Results show educators believe student-owned devices are a disruption to learning, but technology directors predict one-to-one technology will be in schools within three years. The researcher concludes that Missouri school districts are ready to harness the power of mobile technology only on their own terms by providing mobile devices, rather than allowing students to use their own.

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**CHAPTER 1:  
NATURE AND SCOPE OF THE STUDY**

**Introduction**

Mobile technology is transforming the way billions of adults and young adults around the world go about their lives. Smart phones and tablet computers have made access to the Internet, personal communication, and learning applications so indispensable that mobile devices are an essential part of daily living. With inventories of mobile devices on the rise and prices in decline (Bailey, Henry, McBride, & Puckett, 2011), mobile devices have found their way into the hands, pockets, and backpacks of millions of American teenagers (Lenhart, Ling, Campbell, & Purcell, 2010). Even more than their parents, teenagers use mobile devices to connect with friends, find inspiration and creative outlets, and work on school projects. Educators have found success implementing mobile devices in the classroom (Gulek & Demirtas, 2005; Hloden, 2010; Kozma, 2005; Messinger, Sparks, Goodale, & McManus, 2011; Motiwalla, 2005; Özdemir, 2010;), and despite tough financial times districts across the country are looking for ways to provide every student some form of portable computing device (Johnstone, 2003). Every day, millions of American teenagers bring exponentially more computing power to school in their smart phones than all of NASA had when it sent Apollo astronauts to the moon (Kaku, 2011; Robertson, 2009).

However, many school districts view the technology students bring with them to school as a distraction to learning rather than as an educational tool and creative spark. As a result, districts have published policies prohibiting the use of student-owned mobile technologies in school. Reasons for the prohibition include fears that students can cheat more easily, view inappropriate websites on a network outside the district's Internet filter,

and that students might spend their time texting or visiting social networking websites rather than doing legitimate schoolwork (Quillen, 2011b). Research has shown both that these prohibitive policies toward mobile devices can adversely affect the learning potential of high school students (Frey, Fisher, & Gonzalez, 2011; Koole, 2009) and that bans on cellular phones in school are largely ignored by students (Lenhart et al., 2010; Rainie, 2011; Toppo, 2009).

### **Statement of the Problem**

This study investigates the disconnect between the learning possibilities of mobile devices in school and district policies that currently ban students from using those devices in school. As more and more students gain access to mobile technology, and as that technology becomes both more advanced and less expensive, it would seem that school districts have access to advanced technology at almost no cost to the district in tough financial times. However, as is further discussed in the review of literature in chapter two, the results of the study in chapter four, and the discussion in chapter five, district leaders and teachers are reluctant to utilize the technology that students bring with them to school. Despite the easy access to Internet information and the multitude of learning applications that student-owned mobile devices offer, educators believe student-owned technology is more of a distraction to learning than a benefit. For educators looking to prepare students for the 21<sup>st</sup> century, the problem becomes how to incorporate the educational benefits of mobile devices without the distractions to learning created by student access to text messaging, social networking, voice mail, and gaming.

### **Purpose of the Study**

The purpose of the study is to investigate the state of bring-your-own technology and one-to-one initiatives in Missouri schools in 2012. The researcher conducted a review of existing literature to find a history of technology in the classroom and the rapid evolution of mobile technology both in the classroom and in the world. The researcher investigated the current state of mobile technology in education around the world, but specifically in secondary education in the United States. The study compares those findings with the perceptions of teachers, administrators, and district executive directors of technology within the state of Missouri related to mobile technology. The study seeks to find whether published policies about student-owned technologies are being followed and what the near future holds for mobile technology in Missouri classrooms.

### **Research Questions**

The primary research in the study focuses on current policies about, and actual use of, student-owned mobile technologies in school, as well as educators' views about how mobile technology might be used in classrooms in their district by 2015. In the review of the literature, the researcher sought answers to similar questions on a national scale, as well as questions about the history of technology in classrooms and the rapid growth of mobile devices in the past decade. The study poses the following questions:

- 1) How has the rapid growth of mobile technology impacted learning, and how are schools incorporating or preparing to incorporate mobile technology?
- 2) Regardless of a district's published policy, how often do students use the mobile technology at school?

- 3) Why do districts block students from using their personal mobile devices at school for learning purposes?
- 4) Are districts considering one-to-one technology by 2015, and if so, with what type of devices?

### **Limitations of the Study**

The study is limited by a number of factors. First, the research was conducted within a very limited time frame. The entire study took place between mid-January and early April, 2012. The researcher conducted the review of literature primarily in January 2012. Participants took an online survey for primary research over the course of three weeks in February 2012; then the researcher conducted primary interviews with education professionals April 7, 8, and 9, 2012. The results are therefore a snapshot of the state of mobile technology in Missouri classrooms and districts within about the first three months of 2012.

Another limitation of the study is access to information, which is directly linked to the tight schedule on which the research was conducted. The researcher was limited to print articles and books already within the researcher's library or available at or through inter-library loan from a nearby public library. Due to the time limitations, a heavier emphasis was placed on published articles in online databases or on the free web than materials in print.

A delimitation was information closely related to the research topic, but not specific enough to include. For instance, researchers have done studies about technology in education for seemingly as long as technology has been in education, but the author of this

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study chose to mention only a few of those in the briefest of terms due to the space limitations of the current study. Instead, the author included only those studies and sources that helped frame and provide context to the current research.

### **Definition of Terms**

**3G/4G:** Cellular data networks, which allow users with smart phones or tablets to access the Internet from their device.

**Apps:** Short for applications, which are software programs created by developers that are available for users to download, either for free or for a fee, to their smart phones, tablets, or, in the case of Apple's App Store, computers.

**BYOT:** Bring-Your-Own Technology, where students access information at school using a device the student owns and brings to school. Typically, these devices are Web-enabled through 3G, 4G, or Wi-Fi networks.

**Mobile technology:** A computing device that is portable. The term typically refers to Web-enabled smart phones, laptops, or tablet computers like the iPad, but can include other Internet-ready devices like the iTouch or Nintendo DS.

**One-to-one computing:** The practice of each student and teacher in a school having a computing device for his or her own use. In most cases students and teachers can take the mobile devices home with them, even when the devices are owned by the district.

**Smart phone:** a cellular phone that has the ability to access the Internet through a 3G, 4G, or Wi-Fi network.

**Tablet:** A flat, portable computer with a seven to twelve-inch touch screen. Examples of

tablets include the iPad and Kindle Fire.

Ubiquitous computing: in this context, another name for one-to-one computing, where each student and teacher in a school has a computing device for his or her own use. In most cases students and teachers can take the mobile devices home with them, even when the devices are owned by the district.

Wi-Fi network: Any wireless network in which an Internet signal is broadcast within a given radius, allowing the user to access the Internet on a stationary or mobile device within the given broadcast range. Many individuals have Wi-Fi networks available in their own homes or places of employment, and many restaurants and stores offer free Wi-Fi for customers with mobile technology.

### **Research Design**

The researcher gathered information for this study from a variety of libraries, online databases, and free websites. Books and periodicals came from school, public, and university libraries. The researcher accessed the Quest Library Catalog and ILLiad interlibrary loan service through universities in Missouri to search for printed materials not available in full text through databases, but due to time limitations did not request any print materials.

Online databases constituted a majority of the primary resources cited. The researcher heavily used university databases, but also accessed online databases from public and school libraries to supplement materials. Specific databases researched include, but are not limited to, *Academic Search Complete*, *Academic Search Elite*, *eLibrary*, *Education Journals*, *ERIC*, *Library Information*, *Science & Technology Abstracts*, *MasterFILE Premier*,

*NewsBank, Newspaper Source, Professional and Development Collection.* Beginning search terms included one-to-one technology, education, and BYOT. As the researcher gathered information and read published studies, the search terms changed to reflect the need to fill in additional information related to the present study.

When searching for original research cited in other studies, the researcher relied on Google's search engine to locate the original study or article only after a search of subscription databases failed. The researcher also used Google to find specific statistics through press releases and corporate filings located on Apple's website, as well as recent clippings from the technology press. In all instances, the researcher began with databases and proceeded to free websites only after failing to obtain necessary information from the subscription databases. The researcher looked at all free websites for quality of information, authorship, and bias, and in several instances deemed the free Web source not trustworthy enough and thus declined to include the information as part of the study.

### **Conclusion**

This study investigates the disconnect between the learning possibilities of mobile devices in school and district policies that currently ban students from using those devices in school. The review of literature in chapter two explores reasons why this disconnect exists and looks at whether, or how, mobile devices might impact learning in the future. The current study explores district policies on student owned technology, whether students and teachers follow those policies in classrooms, and what the future holds for mobile technologies in the near future in Missouri classrooms. The methodology for this study is in chapter three, the results in chapter four. Finally, chapter five discusses the



implications of the results of this study in the context of existing studies, as well as those that might follow.

**CHAPTER 2:  
REVIEW OF LITERATURE**

**Introduction**

Mobile technology is transforming the way millions of adults and young adults around the world live their lives. Smart phones and tablet computers are becoming an indispensable part of daily life because of their ability to access the Internet and provide personal communications and learning applications. With inventories of mobile devices on the rise and prices in decline (Bailey, Henry, McBride, & Puckett, 2011), mobile devices have found their way into the hands, pockets, and backpacks of millions of American teenagers (Lenhart, Ling, Campbell, & Purcell, 2010). Even more than their parents, teenagers use mobile devices to connect with friends, find inspiration and creative outlets, and work on school projects. Educators have found success implementing mobile devices in the classroom (Guleck & Demirtas, 2005; Hloden, 2010; Kozma, 2005; Messinger, Sparks, Goodle, & McManus, 2011; Motiwalla, 2005; Özdemir, 2010;), and despite tough financial times districts across the country are looking for ways to provide every student some form of portable computing device (Johnstone, 2003). Every day, millions of American teenagers bring exponentially more computing power to school in their Smart phones than all of NASA had when it sent Apollo astronauts to the moon (Kaku, 2011, Robertson, 2009).

However, many school districts view the technology students bring with them to school as a distraction to learning rather than as an educational tool and creative spark. As a result, districts have published policies prohibiting the use of student-owned mobile technologies in school. Reasons for the prohibition include fears that students can cheat more easily, view inappropriate websites on a network outside the district's Internet filter,

and that students might spend their time texting or visiting social networking websites rather than doing legitimate schoolwork (Quillen, 2011b). Research has shown both that these prohibitive policies toward mobile devices can adversely affect the learning potential of high school students (Frey, Fisher, & Gonzalez, 2011; Koole, 2009) and that bans on cellular phones in school are largely ignored by students (Lenhart et al., 2010; Rainie, 2011; Toppo, 2009). This study will investigate the disconnect between the learning possibilities of mobile devices in school and district policies that currently ban students from using those devices.

### **One to One and Education**

The idea of having a portable computing device in the hands of every student is not new. Technology innovators and educational leaders have long pondered the learning impact when each student has a portable computer at his or her disposal (Bailey et al., 2011). The movement has become known as both ubiquitous computing and one-to-one technology. The latter term will be used in this investigation. Foundations arose in the 1990s to fund technology projects in schools. Apple co-founder Steve Jobs said in 2000 that the digital tools were only just beginning to transform education (Bailey et al., 2011). Yet until the mid-2000s, studies showed most money spent on technology had little to no impact on reaching learning targets (Collins, 1991; Cuban, 1986; Cuban, Kirkpatrick, & Peck, 2001; Warschauer, Knobel, & Stone, 2004). School district leaders across the country seek ways to connect students to the explosion of relevant learning content on the Web; yet they feel a heavy burden to prepare students for the 21<sup>st</sup> century workforce (Kozma, 2008).

Experiments with one-to-one computing have found both success and failure with

laptop and classroom computers in the past 26 years. Cuban (1986), Collins (1991); Cuban, Kirkpatrick, & Peck (2001), and Warschauer, Knobel, & Stone (2004) found computers in the classroom had little or no impact on learning. Yet, as the last of these studies was being conducted and when Internet use was growing but the mobile revolution was still several years away, Johnstone (2003) found more than 1,000 districts looking to provide each student with a laptop computer. In 2002 the state of Maine issued laptops to junior high school students. A follow-up study in 2004 showed more than 70% of students and 75% of teachers thought the computers helped students learn and teachers reach learning targets more effectively ("Maine laptop," 2006). A more recent study indicated the laptop initiative helped students become better writers (Peckham, 2008).

Nearly every teen has some form of a mobile device capable of accessing the Internet such as a smart phone, iTouch, tablet, or even a handheld gaming device such as the Nintendo DS (Engel & Green, 2011; Johnson et al., 2011; Messinger et al., 2011). Because of this, some educators, technology proponents, and many students have suggested the idea of allowing students to use their own devices in school for learning purposes. This would allow financially strapped districts the opportunity to let students access technology without the district needing to buy a majority of the hardware. The movement to allow students to use their own devices in schools is known as bring-your-own device, BYOD, or bring-your-own technology, BYOT. For consistency, the latter term will be used in this study.

Discussion about establishing one-to-one technology in schools is currently centered around three primary types of computing: laptop computers, a technology used

since the 1990s and the subject of many studies; tablet computers such as the iPad, a device introduced in 2010 that has created a small industry of companies that create specialized learning applications; and the BYOT idea where students use mobile devices they already own, such as smart phones, personal iPads or similar tablets. Each has shown success in reaching learning targets in recent studies (Guleck & Demirtas, 2005; Hloden, 2010; Kozma, 2005; Messinger et al., 2011; Özdemir, 2010).

### **Mobilizing Mobile Computing**

Mobile technology has become an integral part of every day life for millions of adults and teenagers around the world. In 2003, Roschelle noted that software originally designed exclusively for stationary desktop computers was becoming more and more available on portable devices. About that time, video cameras became smaller and digital, requiring just seconds to transfer lengthy segments to the computer. Multimedia editing software was inexpensive or pre-loaded for free, and users could easily post their creations on the Web. GPS devices allowed users to easily find destinations while driving. In 2007, the iPhone combined these wireless and cellular technologies and has, along with its subsequent competitors, enabled millions to take this technological toolbox with them everywhere.

The rise of mobile technology has happened quickly. Worldwide, adoption of mobile devices is happening faster than households added a first television in the 1950s (Nielsen, 1998) or the switch from black-and-white to color television a decade later (Kamenetz, 2010). No other digital media are growing as fast as mobile devices (Gutnick, Robb, Takeuchi, & Kotler, 2011). More than half the people on Earth own a cell phone ("Sesame workshop," 2009) and manufacturers are creating more than 1.2 billion new mobile

devices annually (Johnson, Adams, & Haywood, 2011). By 2020, just eight years away as of this writing, experts predict cell phones will be the primary method of accessing the Internet ("Sesame workshop," 2009). Between late-2008 and mid-2011 mobile Internet usage among all adults grew from 37% in late 2008 to 63% in mid-2011. Some individuals have multiple mobile phones and devices. For instance, in the United States, a nation of 315.5 million people, there are 327.6 million mobile phone subscriptions (Rainie, 2011). Mobile usage is most significant among young adults (Purcell, Entner, & Henderson, 2010). Studies find nearly every teenager has a mobile device of some sort, and as many as 94% own a cellular phone (Rainie, 2011; Messinger et al., 2011). iPhones are growing in popularity over smart phone rivals among teens. In 2011, 61% of teens either owned an iPhone or planned to own one within six months (Sandven, 2011). A year earlier a similar survey found 42% owning or planning to own an iPhone (Sandven, 2010).

The rate at which mobile technology is advancing is staggering (Johnson et al., 2011). From one year to the next, technology nearly doubles itself, suggesting that the smart phone of 2012 is exponentially more advanced compared to its 2007 version (Kaku, 2011). Some of the biggest changes to mobile technology have occurred within the lifetime of students who will complete third grade in 2012. Nine years ago Apple had yet to debut its iTunes store, which by January 2012 consumers had used to download more than 15 billion songs (Herther, 2012). In 2009, Apple introduced the App store, and by February 2012 users have downloaded more than 25 billion apps. In 2010, Apple debuted the iPad. Less than two years after that, more than 1.5 million of the devices were being used in education, including more than a thousand in one-to-one school settings. In January 2012

Apple announced a new product line aimed directly at the education market, textbooks for iPads (Herther, 2012). While a lengthy discussion of textbooks and eBooks is beyond the scope of this investigation, it merely highlights the rapid evolution in technology that has occurred and foreshadows impending change that will likely affect learning and teaching. Nor is this investigation strictly about Apple products. Rather, the research indicates that Apple's innovations have reached the consumer marketplace first, and appear to have more support and market share than subsequent competitors (Sandven, 2011; Sandven 2010; "iPads," 2011). Thus, that company's products and name will appear more frequently than others in this investigation.

The amount of online media content has exploded, and as a result the amount of time students are exposed to media has grown significantly (Rideout, Foehr, & Roberts, 2010). The growth in media can be seen through generations, with the most significant growth in the most recent decades. In the 1930s, school-age children spent a total of about 10 hours per week as consumers of mass media, which in that era was radio, movies, and records (Gutnick et al., 2011). By comparison, in the first decade of the millennium, 8- to 18-year-olds consumed 10 hours and 45 minutes of media per day. Much of this time is spent multi-tasking by using multiple devices at the same time, such as listening to an iPod while using the Internet. Multi-tasking with multiple media enables a student to get the equivalent of almost eight hours of exposure in just five and a half hours (Rideout, et al. 2010). Takeuchi (2011) found 59% of parents believe digital media keep students from getting enough exercise, while just 18% of parents believe their own children are spending too much time with technology. Race and socioeconomic status play a role in media

consumption. Middle-class and white students spend less time with media than lower-income, Hispanic, or African American students (Gutnick et al., 2011).

Mobile devices have become pervasive in American culture, and many young children are growing up with encouragement to use the devices as learning tools or digital babysitters. A search of the words baby and iPad on YouTube will yield dozens of videos from parents who have uploaded videos of nine-month to two-year-old children operating an iPad, or using their fingers to try and make a print magazine interactive like an iPad's touch screen. Most of these videos were filmed, edited, and uploaded on similar portable devices. A 2011 study by the Joan Ganz Cooney Center at the Sesame Workshop found that two-thirds of all four to seven-year-olds have used an iTouch or iPhone. About half of the survey group of children came from low-income families. Sixty-four percent of the children said that the device was "easy" or "very easy" to use, and 53% did not need an adult's help. The study also found 19% of two-year-olds can operate a smart phone application, while only 9% can tie their own shoes (Chiong & Shuler, 2011). Pediatricians say the interactivity of an iPad is better developmentally compared to complacent watching of television for three- and four- year-olds (Tahnk, 2011). Older students use mobile devices to fill dead time, such as on a bus or, when allowed, in class when other work is completed (Motiwalla, 2005).

One of the newest forms of media exposure is the mobile application, or app. Apps are software designed for use on either a specific device, such as the iPad, iPhone, or an Android device, or for a wider market that will work on almost any mobile device. Mobile applications can combine key features of the device, such as GPS for pinpointing locations,



a camera for taking pictures, and the keyboard for typing all in the same application.

Because some mobile applications use features only available on some phones, some apps are only available on specific platforms. For instance, some logic games require a user to move a ball through a maze by tilting the mobile device one way or another, which uses the device's tilt-shift detector. Devices that do not have that capability cannot run that particular mobile app.

The rise of what has become known as the apps culture happened almost instantaneously. In 2010, a majority of adults had not downloaded an app to their phone. Eleven percent didn't know if their phone could handle apps. Only 13% of cell phone owners had paid to download an app (Purcell et al., 2010). By late 2011 users had downloaded more than 15 billion apps (Herther, 2012), and only a few months later that number had jumped to more than 25 billion just on the App Store (Apple, 2012d). The youngest demographic of tweens, teens, and twenty-somethings download the most apps. Before Apple introduced the iPad, there were already more than 60,000 applications available for smart phones (Caverly, Ward, & Caverly, 2009). In January 2012 there were more than 500,000 apps available on iTunes, and 300,000 on Android (Shuler et al., 2012). Chiong and Shuler (2010) found evidence that students can learn from apps. Nearly half of teachers interviewed in a national survey reported using educational software for developing skills in reading, writing, and mathematics ("What types," 2010). Given the enormous growth in app software, it is a logical step to think that if a specific learning software from a teacher's repertoire isn't available as a mobile app yet, something like it is probably available.

The creation of apps for education is a growing industry. Most of the thriving companies producing apps for education didn't exist just five years ago (Bailey et al., 2011). Since the iPhone's introduction in 2007, apps have become a multi-billion dollar industry. The Apple app store has paid out more than 2.5 billion dollars to developers, who are targeting young children with learning apps more and more. In 2009, of the most-sold apps, 47% targeted preschool and elementary aged children. By late 2011, it was 72% (Shuler, Levine, & Ree, 2012). More than 25% of parents have now downloaded apps for their children (Rideout, 2011). Web-enabled smart phones and tablets allow users to access the Internet and applications virtually anytime and anywhere. Most television shows are available through on-demand cable providers or can be streamed through mobile devices and apps using online providers such as Hulu, Netflix, or YouTube (Rideout et al., 2010).

Devices that might qualify for bring-your-own-technology in schools are not limited to cellular phones. Other devices that don't have phone service, such as Apple's iTouch, or tablets such as the iPad, Samsung Galaxy, or Motorola Xoom, can offer similar access to mobile applications, photo and video editing, and the Internet through Wi-Fi, 3G, or 4G networks. Studies show that children as young as four can operate an iTouch without assistance (Chiong & Shuler, 2010). There were at least 12 million Apple iTouch devices in the United States by mid-2009, almost a year before Apple introduced the iPad (Elmer-DeWitt, 2009). Even devices like the Nintendo DS can access the Internet through Wi-Fi, providing young children access to some Web resources (Takeuchi, 2011). Many American teenagers have more than one mobile device, such as a cellular phone, an iPod, and an e-

reader. Teenagers who own mobile devices report using the devices primarily for staying in touch with friends as well as taking and sharing photos (Rainie, 2011), but significant numbers also report using mobile devices outside of school for classroom research, to spark their creativity, and engage in collaborative problem solving (Messenger, et. al, 2011).

A common concern when discussing bring-your-own-technology initiatives is not every teenager has a Web-enabled phone, especially those from lower income families. Frey, Fisher, and Gonzalez (2010) found putting students into pairs solves the issue of not everyone having a mobile device at schools where an open policy, but not a one-to-one initiative, exists. Students from lower income homes that have a mobile device rely heavily on their phone since that might be the only means of accessing the Web in their home. Teens in the lowest household income category of under \$30,000 a year are most likely to use their mobile device to access the Internet (Rainie, 2011). The same study found that lower income households had the lowest ratio of computers in the home, at 70%, down 27% compared to the highest income category at 97%, and the highest ratio of individuals going online with a cell phone, 41%, 18% more than the highest income category, at 23% (Rainie, 2011).

Household income, age, and, to a lesser extent, race all play a factor in which students have access to what technology. Outside of school, teen Internet access is highest among teens whose parents are white, have college degrees, and household incomes above \$50,000 a year. These students have faster Internet connections, making it more likely they are engaged in online activities than peers from a different demographic. Age is also a factor. In 2009, 58% of 12-year-olds had a cellular phone, compared to 83% of 17-year-

olds. More white students own cell phones (78%) than their black (75%) and English-speaking Hispanic (68%) classmates. Teens from households with an annual income of more than \$75,000 are much more likely (87%) to have a mobile phone than their classmates from households earning less than \$30,000 a year (59%). More girls have phones than boys, but the difference is slight: 77% to 74% (Purcell, 2011). There are a significant number of different mobile device manufacturers and models, and two years before the release of the iPhone and similar smart phones, researchers found there wasn't a significant favorite among teens (Roschelle, Sharples, & Chan, 2005). But the market changed quickly. By the 2011 holiday season, the iPad, iTouch, and iPhone were the top three most sought-after gifts on tween and teen wish lists ("U.S. Kids," 2011).

### **Learning with BYOT**

Mobile devices are seen as a ready-to-be-implemented technology that will have a significant impact in K-12 education before the middle of the present decade (Johnson, et. al, 2011). Hlodan (2010) found measurable gains in student achievement using mobile devices as a learning tool. Researchers identify three motivations for using mobile devices in learning: students can access more information more quickly, it allows adaptability to upcoming changes in teaching pedagogy, and it better aligns with what businesses would like to see in student technology skill sets (Kukulaska-Hulme, 2007). Researchers split the definition of mobile learning into three areas: the mobility of the technology such as smart phones, the mobility of the learner, and the mobility of the learning, which refers to the unique context in which the learner is situated (El-Hussein & Cronje, 2010; Walker, 2007).

Mobile learning allows students to learn where they are, whether that is the

classroom or outside of school. Rather than take a class to a computer lab, teachers can create a mobile computer lab wherever it is convenient and appropriate: on the theatre stage, outdoors in the football stadium stands, even in the classroom. Outside of the school campus, the world of learning remains open. Each student individualizes learning based on his or her own contexts, and the student can lift the possibilities of learning beyond the traditional computer lab and classroom using a mobile device (Walker, 2007). A 2010 study found nearly three-fourths of high school students say they would use a mobile device in school to look up information on the Internet, more than half would take notes or record notes for later use, and almost half wanted the device for accessing online textbooks ("How would," 2010).

Nearly every student has a mobile computing device that can access the Internet (Messinger et al., 2011, Engel & Green, 2011). A vast majority of those teens use their mobile devices to access social media, such as websites and mobile apps like Facebook and Twitter that are designed to be socially interactive. Incorporating social media and mobile apps which teens are already familiar with into classroom learning can improve student attitudes toward learning. Allowing students use of mobile technology at school can create a more positive school culture and improve student motivation, creativity, and achievement (Messinger et al., 2011; "The New," 2011). When social media and technology are included in learning, student motivation and interest increases (Engel & Green, 2011, Frey et al., 2010, Kozma, 2005,). Social media aids peer-to-peer learning, where students help one another problem solve and collaborate (Rainie, 2011). Özdemir (2010) found students showed a deeper, more meaningful understanding after learning with a mobile

device paired with a multi-media rich text such as Quick Response, or QR, codes that link from a traditional textbook to supplemental online content.

At the heart of the movement to one-to-one computing is easy access to fast Internet service. As the number of Internet users has grown and possibly plateaued in the last decade with 95% of 12- to 17-year-olds having some form of Internet access, down from a 97% high the year before (Rainie, 2011), the content of the Web has grown more dynamic. Rather than simply retrieving information, users interact with websites and with other users through apps and social networking sites. Mobile capabilities provide significant opportunities to share and learn from one another, a veritable worldwide classroom with a significant portion of human knowledge at a user's fingertips, if one knows how and where to look.

Use of specific social media varies, especially by age. While 50% of all adults use social media, up to 86% of young adults use it. Sites like Facebook show a steep decline in the number of networked friends the older a user is. Students in and just graduated from high school average 318.5 friends each. Thirty-five to 46-year-old adults, or where one might expect a seasoned, veteran teacher to be, average 197.6 friends. Fifty- seven to 65-year-olds average 85.1 friends on Facebook. Comparatively few teens use the status-updating service Twitter or others like it. Only 9% of teens use Twitter, although more 14- to 17-year-old girls do, at 13% (Rainie, 2011).

### **Downside of BYOT**

While mobile devices allow students and teachers to be more flexible, a new style of teaching pedagogy is necessary to go along with device integration (Corbeil & Valedes-

Corbeil, 2007; El-Hussein & Cronje, 2010). Students believe teachers need additional training about using mobile devices for educational purposes, and teachers are reluctant to integrate the devices without added support and training. Laela Zaidi, a sophomore from Joplin High School, bemoaned the constant use of the free MacBooks that every student received the year after the deadly tornado destroyed Joplin High School. Now, she says, students are directed to websites and video tutorials rather than working with teachers on more traditional lessons. In the wake of the disaster and trying to restart school at entirely new locations, teachers had little time to plan out effective use of the new laptops. “Technology will never replace the personal touch that teachers use to motivate and inspire students everyday” (Zaidi, 2011).

Students use their mobile devices every day to communicate, create, and learn, but teachers have not successfully integrated the potential use of the devices into the curricula (Messinger et al., 2011). While the end result of the pervasiveness of mobile devices in society and its impact on learning cannot adequately be predicted, the style of teaching used before mobile devices will not work without some adaptation in a learning environment where nearly every student has mobile access (El-Hussein & Cronje, 2010). The Mooresville, North Carolina district saw a 20% jump in the number of students who scored proficient in state science, math, and reading tests after the district went through a digital conversion. However, district leaders are quick to point out that the technology was only part of that success. Changing the way teachers integrate the technology was just as important (Quillen, 2011a). In the Speak Up 2010 national survey, a majority of principals and district administrators cite lack of teacher skills as the primary factor preventing

students from using their own mobile devices at school for educational purposes (*"The new,"* 2011).

Mobile devices, especially cellular phones, have a number of perceptions to overcome in order to be viewed as worthwhile in learning environments. Some question the motives of cell phone manufacturers and wireless providers pushing to integrate technology and education. Current educational spending worldwide is estimated at \$2.5 trillion annually, making education a market rich with potential clients if a case can be made for getting mobile devices in the hands of each student (Kamenetz, 2010). From a design perspective, Özdemir (2010) found the small screens and keyboards of mobiles to be the largest disadvantage in using the devices in education. Some connect wireless, portable keyboards to their devices to make typing easier, but at a list price of \$69 each, (Apple, 2012e) a mid-size district of 10,000 students looking to add wireless keyboards in a one-to-one environment would be looking at an additional \$690,000 expense.

Even though parents most often buy phones so they can more easily stay in touch with their school-age children (Lenhart et al., 2010), parents don't perceive the added educational opportunities of the devices. Parents use the cell phones as leverage with their children by banning their teens from using cell phones more than they ban any other mobile device teens own. One study found parents view mobile phones as the least valuable device for learning, especially compared to devices like an iPad, laptop or Kindle. "These perceptions are based on parents' still evolving understanding of what their kids *should* be doing with digital media at certain ages," (Takeuchi, 2011, p. 5, italics from source). Parents also don't seem to realize the extent to which their students use phones at



school. One study found less than a quarter of parents think their students are using their phones at school, while 65% of students report using them (Toppo, 2009).

A bigger hurdle than parents' views for bring-your-own-technology integration in schools is the policies of the schools themselves. A Project Tomorrow survey found that less than 25% of K-12 administrators would likely allow student use of mobile devices for learning at school, while almost two-thirds said they were unlikely ("*The new*," 2011). The topic is so sensitive that Julie Evans, CEO of the non-profit Project Tomorrow, has reported that school administrators heckle her when she is presenting on the topic of students using mobile devices at school for learning purposes (Quillen, 2011b). Classroom teachers are less than enthusiastic about students using their mobile phones due to concerns about students being distracted (Stansbury, 2010). Asked to identify the mobile learning device in their "ultimate school," 61% of principals and 47% of teachers said laptops. Sixty-two percent of middle school and high school students envisioned using their own devices ("*The new*," 2011). Ninety-four percent of administrators believe that when teachers use their own cell phone at work it is for something unrelated to teaching (Obringer & Coffey, 2007).

District policies that ban or limit the use of cellular phones at school have been in place across the United States for more than a decade (Garza, 2003; Summa, 2002; West, 2004; Zirkel 2008). Some go as far as confiscating a student's phone, a policy which might violate parents' due process rights (Maddox, 2012). The no-phones-on-campus policies were designed for a number of learning and safety reasons, such as to stop students from being distracted from learning by making calls or sending texts in class, taking video of the

school day and posting it online, using the Internet to find answers on exams, or to text answers to friends (Johns, 2007; Stansbury, 2010; West, 2004). Michigan had a state-wide ban on students bringing cell phones to school until 2004 (West, 2004). The city council of New York City voted to override a mayoral veto in 2006 to ban phones in the million-student school system, a ruling that led to a parent-led lawsuit on behalf of students (Zirkel, 2008). Due to the fact that nearly every American teenager has a cellular phone, nearly every district in the country has either had to create a policy regarding student use of mobile phones or has had to deal with individual situations involving them. Because of students' reliance on their phones to communicate outside of school, Frey, et al. (2010) found bans on mobile devices were equivalent to asking students to turn off part of their brain.

Regardless of school policies prohibiting the use of cell phones and mobile technology at school, students still bring their devices to school and use them. The Pew Research Internet and American Life Project found 64% of teens say they attend a school where cell phones are allowed at school, but not during class. Twelve percent report attending a school that allows them to have their cell phone on at all times, and 24% are at schools that ban the devices outright. At the schools that do not allow phones at all, 65% of students who own mobile devices still take their phones to school every day. Fifty-eight percent report regularly sending text messages during class. A fourth say they have made or received a phone call while in class at the schools that ban the devices outright. Overall, 43 percent of teens who take their phones to school say they text in class at least once a day (Lenhart et al., 2010). Another study found teens sent a fourth of their total daily text

messages during school hours, on average three per class period (Toppo, 2009).

Detractors to BYOT cite increased ability to cheat and access to inappropriate material as additional reasons for not allowing students to use their own mobile devices. A *USA Today* survey found a quarter of teens reported texting their friends answers to tests, and slightly more admitted to storing notes on their phones to use during tests. About half felt these practices were a serious offense (Toppo, 2009). Students cite access to Google or other search engines through their mobile devices as an easy method to finding test answers (Quillen, 2010b). Some worry that by using a cellular signal, students can access information on the Internet that is inappropriate and would normally be blocked by school filters. Principals and district administrators see Internet safety as a concern, but not as much as other concerns like classroom distractions, digital equity, or lack of teacher skills to integrate the technology into the curriculum ("*The new*," 2011)

Districts and individual schools that have successfully integrated one-to-one technology with students have a number of things in common, not the least of which is a very clear policy about use of mobile devices in school. While often referred to as the Acceptable Use Policy, an open policy that allows mobile devices could more adequately be termed a policy of etiquette and respect. Districts that have had the most success in implementing more open policies for mobile devices have crafted a few simple rules around the culture of each campus. Administrators punish all mobile policy rule breakers in accordance with any other behavioral issue (Quillen, 2011b). Engel and Green (2011) found policies that work best include involving parents to gain community support. In the broader acceptable use policy, it is stated exactly where, when, and how the devices can be

used. Classroom teachers also reiterate the expectations in their own classroom guidelines. The students have a clear understanding of what is expected of them when they are using the devices (Engel & Green, 2011). Frey et al. (2010) found students were more engaged where teachers were using mobile technology in class or where students were encouraged to use their own devices under a more open mobile device policy.

As the proliferation of mobile phones and the capabilities of the devices has increased, the support for students being able to use them in school has increased perhaps only slightly more rapidly than the reasons teachers and administrators find to keep them out. In 2010, a new product emerged that arguably has the potential to satisfy both sides of the mobile devices in learning battle: the tablet.

### **Tablets**

The iPad tablet was almost immediately hailed, both by its creators and education pundits, as a device that would change the way students learn and teachers teach. Demand was immediate. Apple co-founder Steve Jobs said the company sold 15 million first-generation iPads (Apple, 2012a), and news sources estimated the company would sell 40 million more iPads in 2011 (Evans, 2011). In its record-breaking fourth quarter of 2011, where Apple brought in more money and made more profit than any corporation in history, the company sold 15.43 million iPads, more in three months than it sold in the entire previous year (Apple, 2012b). The company estimates that 1.5 million iPads are in use in education settings, including more than a thousand one-to-one settings (Herther, 2012).

The tablet computer is appealing on many levels. The screen is significantly larger

than a phone, approximately the size of a standard textbook cover. This allows an easier user experience in viewing information and media. It also has a bigger keypad for typing compared to a cellular phone. At its release, Apple claimed its third generation iPad has good enough voice dictation technology that a user can speak rather than type, suggesting that with a touch screen and voice dictation, keyboards and keypads might soon be a thing of the past (Cook, 2012). There are no hinged parts to break, such as with a laptop computer screen. Tablets have a battery life of up to 10 hours, which is especially appealing to brick-and-mortar schools not designed to have outlets to power 35 computers in every classroom. Tablets have approximately the same height and width as the cover of a standard textbook, but can hold hundreds of digital textbooks at enormously less weight, which appeals to students, and at significantly less cost, which appeals to administrators.

Since a tablet can hold hundreds of textbooks, potentially negating the need for students to carry around large backpacks loaded with books for each of their six to eight classes, some have called students currently in school the last backpack generation (Elmer-DeWitt, 2011). Some schools have even eliminated student lockers because e-books and tablets have rendered them a thing of the past (Schools, 2012). More than three-fourths of current tablet owners believe the devices help students perform better in class, and 86% think tablets help students study more efficiently. Nearly three-fourths of college-bound seniors and college students that don't already have a tablet want one (Finkel & Aspey, 2011).

Another appeal of tablets for education is the ability to customize the device to each student's schedule through learning applications. Students in biology class can dissect a

frog using traditional methods of pins, knives, and tweezers, just without the chloroform and resulting dead frogs when they use an app. Art classes can tour museums from around the world and learn about specific pieces of art or artists, then emulate the techniques used with drawing and painting apps. Spanish students can use vocabulary and translation apps.

A decade ago districts were looking toward giving every student a laptop (Johnstone, 2003). Districts are now looking beyond the laptop toward devices that are even more portable. The educational advantages of portable devices have been shown repeatedly since 2005. Studies found that when teachers or districts allow students access to technology and social media, students are more interested and motivated (Engel & Green, 2011; Frey et al., 2010; Kozma, 2005; Messinger et al., 2011). Portable computers, including laptops, lead to more frequent and better quality collaborations between students and teachers (Amirian, 2004; Bhave, 2002).

While there are currently tablets other than the iPad, many education technology directors view the terms tablet and iPad as interchangeable. A Piper Jaffray study found that 100% of district-level technology directors who were considering implementing tablets in their districts were considering only iPads and no other models. In fact, the technology directors predict by 2016 iPads will outnumber computers in schools ("iPads," 2011). In November 2011 Georgia's education commissioner announced negotiations with Apple to give each of the state's middle schoolers an iPad in a cost-savings move to replace outdated textbooks. The deal would include an iPad for each student, teacher training, Wi-Fi in schools, as well as tablet versions of textbooks ("iPads," 2011). In January 2012, Apple announced its entry into the textbook market and has added design tools that would help

individual teachers and publishers create interactive textbooks (Apple, 2012c).

Unlike printed textbooks, the tablet versions are much more interactive and can be updated. While negotiating the iPad deal, the Georgia state commissioner of education lamented some of the state's textbooks were so old they didn't have anything about September 11, 2001 ("iPads," 2011). New worldwide standards for electronic publishing, agreed to in Germany in October 2011, give textbook publishers the option of updating textbooks even after they're on a tablet. The new ePub 3 standard allows publishers to create electronic textbooks with comprehension checks, quizzes, videos, and pictures or graphics that students can spin and zoom in and out of, offering three-dimensional views of everything from molecules to mountains ("ePub," 2011). Students understand as much from an e-book as from a regular printed book, and a majority of students prefer the ease of use of an eBook versus the print version of the same title (Milone, 2011).

The price point of mobile technology makes the devices more appealing to districts in difficult financial times, especially when public scrutiny on school spending is intense. In a bring-your-own-technology scenario, districts would have little expense other than providing devices for students who don't already have their own, and a need to increase available bandwidth (Loertscher, 2011). A national study found 62% of parents with a child in a rural, urban, or Title I school all agreed they would buy a device for their student if the school district allowed them for educational purposes (Stansbury, 2010).

Worldwide, K-12 schools spend three percent of education dollars on technology. In the United States, that number is 1.6%. Similar American industries like health care and professional services spend up to four times that amount on technology (Bailey et al.,

2011). Despite tough financial times, some districts are continuing to advance technology by opening their school networks to student-owned devices, such as at Osseo school district in Minneapolis, or Kearns High School in Salt Lake, which provided iPads to every student beginning in the 2010-2011 school year (Loertscher, 2011). In California, the Riverside Unified School District allows students to use their own mobile technology. The district provides a device with digital access to students who don't have their own. The program is predicted to save the district 30% just in textbook costs (Bailey et al., 2011). Among the technology directors from the Piper Jaffrey study, only 20% said the primary stumbling block to implementing iPads right away was the cost of the devices for every student. Sixty-four percent said device management and concerns about who would track and work on the devices was the biggest hurdle ("iPads", 2011).

Device management for a school of two thousand students could require one or more full time staff. Every teacher who has inventoried textbooks at the start and end of a school year can imagine the requirements of keeping track of, and maintaining the upkeep of, a mobile computing device for every student in the building. In addition to a shift in the method of teaching with mobile devices, there would be a requisite change in the method of organizing a school building. While there might not be a continued need for computer labs in a library, there would be a new need for spaces for students to charge their mobile devices throughout the day. Classrooms built with eight or ten outlets would potentially need thirty or more. Schools would need a system for what would happen if students left a charger or mobile device at home.

Studies on the impact of computers and technology in the classroom through the



early 2000s show mixed results and little overall impact on learning targets (Collins, 1991; Cuban, 1986). Cuban, Kirkpatrick, and Peck (2001) and Warschauer, Knobel, and Stone (2004) found that despite large amounts of money spent on technology, teachers in schools that did not have one-to-one implementation rarely used computers in the classroom with students, and teachers often had a negative attitude toward the technology. More recent studies have shown a stronger connection between mobile computing and improved learning (Messinger et al., 2011; Hloden, 2010; Kozma, 2005; Özdemir, 2010). The computing power of mobile devices doubles almost every year, resulting in an exponential shift in technology over the course of a decade (Kaku, 2011). As more teachers become better versed with technology on their own mobile devices, their attitudes and comfort level about implementing technology in the classroom have improved. Yet research suggests additional training for teachers and a shift in traditional teaching theory is necessary to harness the potential of mobile devices in school.

Since the technology is relatively new, there are limited studies specific to the impact of iPads in the classroom. Other studies on the impact of portable learning can reasonably be extrapolated to tablets. One-to-one initiatives have been shown to be effective with other portable devices in the classroom, including laptops (Gulek & Demirtas, 2005; Maninger & Holden, 2009; Peckham, 2008; Roschelle, Sharples, & Chan, 2005; Russell, Bebell, & Higgins, 2004). Maninger and Holden (2009) studied student and teacher uses of tablet computers in a one-to-one middle school environment and found higher than expected technological collaborations between students as well as teacher-student collaborations. A study of a one-to-one laptop initiative in Maine found that middle school

students improved their writing skills with the portable computers (Peckham, 2008). In North Carolina, the Mooresville school district went digital and saw a jump of 20% in students scoring proficient on all of the state's core-subject math, science, and reading exams. Leaders there are quick to point out that mobile technology was not a magic bullet; rather, it was merely part of a bigger plan to revamp teaching and learning in the district into something more current (Quillen, 2011a).

### **Review of Literature Conclusion**

In recent years studies suggest that as children grow up and learn with computers, mobile computing is impacting learning in a more positive way than ever. Kids learn from apps. Researchers found mobile devices increasing learning and student motivation, and in some instances like Mooresville, North Carolina, studies show students earning higher standardized test scores when using mobile devices. There is increasing evidence in the literature that mobile devices work for education. However, overwhelming empirical data do not yet exist in the literature to suggest an urgent need for all schools to adopt one-to-one computing with mobile devices. That is not to say that researchers will not find it as the devices continue to be implemented in schools and researchers continue to study their impact. In 1969, Sesame Street forged a new path by creating educational programming for young, underserved children on television. In 2012, as districts consider ways to harness the power of one-to-one computing, "it is important that we do not discount technologies that have not yet made significant educational impact as not having the potential to do so" (Shuler, 2012, p. 7).

## **CHAPTER 3: METHODOLOGY**

### **Research Plan**

This study will investigate the disconnect between the learning possibilities of mobile devices in school and district policies that currently ban students from using those devices. The researcher designed an online survey to gather input from teachers, administrators, and technology directors throughout the state of Missouri. The survey, in Appendix A, asked participants whether their school has a published policy regarding student use of mobile devices at school; what was the biggest stumbling block to students using them; whether the devices offer more of a distraction or benefit to learning; whether the district currently has or is investigating one-to-one technology; and which mobile technology the respondent would recommend if his or her district were to adopt one-to-one technology in the next two years. Additionally, the researcher conducted one-on-one interviews with five education professionals in the state of Missouri.

### **Setting**

There are two settings for this study. The primary setting for data collection is an online survey. Participants took the survey at their convenience between February 14 and February 29, 2012. To participate, respondents needed a computing device and an Internet connection in addition to the invitation e-mail with the link to the survey.

A second setting was the phone or in-person interviews. The researcher conducted one-on-one surveys either in person or over the phone with select education professionals. The researcher chose not to use e-mail because of its limitations for clarification and

immediate follow-up questions. One-on-one interviews were conducted April 7, 8, and 9, 2012.

### **Participants**

Participants in this study were education professionals working at a K-12 school district in the state of Missouri in the winter and spring of 2012. The survey targeted three distinct subsections of education professionals. The first group was certified teachers, primarily classroom teachers, but also certified teachers who work with students on a regular basis such as library media specialists. The second identified group was administrators. For this group, the survey targeted building principals, but also included assistant principals. The final group targeted was executive directors of technology within districts. Not all districts require the individual in this position to hold a Missouri teaching certificate, and the survey does not ask nor require the director of technology respondent to identify whether he or she is certified. The researcher expected a larger number of teachers to respond than building principals, and more principals than directors of technology, which would be a representative sample because in any given district there are more teachers than principals, and more principals than district directors of technology.

The University of Central Missouri's Institutional Review Board, or IRB, granted two human subjects approvals for this study. The IRB first approved an expedited human subjects study request for the anonymous online survey on February 2, 2012. The approval letter is in Appendix E. The IRB approved a second human subjects study request and the informed consent form for the personal interviews on April 5, 2012. That approval is in Appendix F.

There is no breakdown of demographics beyond the self-reported position of teacher, administrator, or technology director within the study. The survey did not measure demographic information such as sex, age, years of experience, ethnicity, or level of education. However, it can be assumed that each respondent has at least a bachelor's degree as part of either a teacher education program or other course of study to qualify for a Missouri teaching certificate. As can be seen in the full text of the survey in Appendix A, the first two questions ask respondents to identify themselves as a teacher, administrator, or technology director; and if the respondent is a teacher what grades he or she teaches.

The researcher selected participants for in-person and phone interviews based on two factors. The first is personal relationships with the individuals, all of whom are education professionals in the state of Missouri. The second criterion for selection was that the individuals asked to participate were representative of the three groups who took the online survey: teacher, administrator, or executive director of technology. To make the responses from the personal interviews similar to the number of participants of the online survey, the researcher asked four teachers and one principal to participate in personal interviews. None of the five work at the same school. Due to time limitations and scheduling conflicts, no executive directors of technology were personally interviewed. The invitation e-mail to recruit participants for personal interviews is in Appendix C, the general list of questions is in Appendix D. Each of the five interview subjects agreed to have his or her name used in the results and discussion of this thesis. However, the researcher decided to use pseudonyms to make the respondents, and their schools, confidential because of the content of some of the answers. Table 1 provides information

about the five respondents, their pseudonyms, and relationship to the researcher. The names of the high schools are also pseudonyms and do not represent schools in Missouri that might have the same name.

### **Educator and High School Pseudonyms in the Study**

Pseudonym	Role	High School Pseudonym	Subject Area Taught	Years as classroom teacher	Relationship
Christy	Teacher	Northwest	English	7	Friend of researcher
Eleanor	Teacher	Central	English	18	Friend of researcher
Jacob	Teacher	Southeast	English	17	Friend of researcher
Matthew	Principal	Southwest	N/A	N/A	Friend of researcher
Sara	Teacher	Northeast	Science	5	Acquaintance; Friend of Christy

Table 1

### **Materials and Design**

Participants received an e-mail either directly from the researcher or forwarded from another education professional in the state of Missouri. The text of the invitation e-mail is in Appendix B. Participants opted in based on their willingness to take the survey and their eligibility to participate. The researcher asked that only teachers, administrators, or directors of technology in Missouri school districts participate.

The six-question online survey related to the effectiveness of district policies on student-owned mobile devices as well as attitudes toward mobile devices in school for learning purposes. The researcher used personal contacts from organizations such as the Greater Kansas City Principal's Roundtable, the Missouri Society for Technology in

Education (MSTE), the Missouri National Education Association (MNEA), the Missouri State Teachers Association (MSTE), the Missouri Association of School Librarians (MASL), as well as contacts at Missouri public school districts such as Lee's Summit, Blue Springs, Liberty, Raytown, North Kansas City, Center, Hickman Mills, Grandview, and Fort Osage. While individual members of these organizations were contacted, only one group, the Greater Kansas City Principal's Roundtable, received one invitation per member. This was done only after permission was sought and the group agreed to receive the invitation e-mails. In addition, the researcher asked the invited participants to forward the invitation e-mail to other professional educators in Missouri who met the selection criteria. However, given the number of responses received, the evidence suggests that if the invitation was forwarded it was only to specific individuals rather than larger groups. The number of responses received is consistent with the original number of invitations sent by the author, rather than a snowball survey where one person forwards the invitation to others, who then forward it on to more people.

The researcher selected the education professionals for personal interviews based on a prior relationship with the individuals, their education experience, and their current position as a teacher, principal, or technology director. The researcher conducted one interview on the phone; the researcher conducted the remaining interviews in person. Appendix C has the text of the initial personalized e-mail invitation to participate in the one-on-one interviews. Appendix D has a general list of questions from which the researcher worked during the interviews. Not every question was asked to every educator

due to time limitations of each interview or because previous answers had already covered the topic.

### **Procedure and Analysis**

The invitation e-mail invited prospective participants to click a link within the e-mail that sent them to the online survey located at SurveyMonkey.com. Participants responded to the six-question multiple-response online survey between February 14 and February 29, 2012. A total of four separate but identical surveys were available during this time frame. Each survey could hold a total of 100 respondents. The researcher compiled the results from each of the four surveys into one results pool for analysis. The text of the invitation e-mail is in Appendix B.

Participants received no compensation or other incentive for answering the online survey questions. Those who chose to take the survey did so on their own computing device with Internet access. Respondents took the survey at their convenience, which might have been at their school, home, or any other place where they had both a computer and online access. The survey took two to three, and no longer than five minutes to complete and posed no greater risks than those encountered in daily performance of routine physical or psychological examinations or tests. The survey contained two demographic questions and six content questions. All responses were anonymous.

While the goal of the survey was to get a representative sample of educators within the state of Missouri, the only qualification for participants was that they be a teacher, an administrator, or a technology director within the state. The data will provide a look at the views of middle or high school teachers, administrators, or technology directors based on



self-reported responses. Elementary teachers were eligible to take the survey, but because the original e-mail invitations were sent to secondary teachers and principals, none were expected. The survey did not ask the size of the school district at which the respondent worked, so a statistical comparison of educators at rural vs. urban schools, a K-12 school vs. an elementary, middle, or high school, or a class 3 school vs. class 5 schools is not possible within the data collected. Neither is it possible to identify the number of respondents from the same district, nor whether a large number of respondents from any of the categories were from the same district.

Because the researcher is based in western Missouri in a suburb of Kansas City, most known professional contacts in the teaching community are from this area. Most of the personal contacts are high school teachers, since the researcher is also a high school teacher and athletic coach. To get a broader representation of the state, the researcher sent invitation e-mails to other high school contacts throughout the state, including rural schools in southern, northern, and Mid-Missouri, as well as a few contacts in urban and suburban schools in the St. Louis area. It was hoped that a representative sample of participants from around the state responded. However, the sample did not provide evidence to support or negate this hope based on data received as responses were anonymous.

The researcher estimated that 150 teachers, 30 administrators, and 15 directors of technology would choose to participate. However, given the possibility that a large percentage of those initially e-mailed would respond, or the possibility of the e-mail being forwarded to additional professionals, the researcher used Survey Monkey online surveys

that could accommodate up to 400 total respondents. The researcher used four separate online surveys, each containing precisely the same questions in the same order. Each survey accommodated a maximum of 100 respondents. The only difference between the surveys was the link used to access the surveys. Links to all four surveys were available to all participants, as can be seen in Appendix B.

The six content questions collected data related to policies, practices, and opinions concerning students using mobile technology in schools. Each of these six questions had a check -box that required respondents to choose the most appropriate response. The complete survey is in Appendix A. Exempting the two demographic questions, one question had three available responses, another had four available responses, and the remaining questions had five available choices. None of the questions required answers, so if a participant did not wish to provide a response, the survey could still be submitted. The questions are designed to provide some form of an acceptable answer for each question, including unknown answers such as 'other reason.'

Additionally, the researcher conducted individual interviews with five Missouri education professionals on April 7, 8, and 9, 2012. The researcher conducted four of the interviews in-person, and one on the phone. Each of the five education professionals agreed to have her or his name, school, years of experience, and position in the school, such as English teacher, used within the narrative. The initial invitation e-mail for these individuals is in Appendix C. The researcher did not ask if the interview subjects also participated in the anonymous survey. While the researcher asked interview questions related to the

results of the anonymous survey, none of the interviewee's answers were included in the data from the anonymous survey, which was closed prior to conducting the interviews.

For data analysis, the researcher compiled raw data from each of the four identical online surveys into an Excel spreadsheet for tabulation. Before exporting from SurveyMonkey.com, the researcher cross-referenced the data with how the participant answered the demographic question, "Are you a teacher, principal, or executive director of technology?" By sorting the information this way, it was possible to compare and contrast the answers of all teachers, all principals, and all directors of technology. Additionally, the researcher analyzed the data based on all respondents.

## **CHAPTER 4: RESULTS**

Ninety-three education professionals in the state of Missouri chose to participate in the anonymous online survey. In addition, four classroom teachers and one principal agreed to participate in additional one-on-one interviews following the close of the anonymous online survey. The researcher created a pseudonym for both the educators and the schools at which they work.

The first anonymous online survey question asked participants to identify themselves as a teacher, principal, or executive director of technology. Of the 93 respondents, 69 identified themselves as classroom teachers, 20 reported working as a principal or assistant principal, and four said they were executive directors of technology for an entire district. These results are consistent with the ratio the researcher expected, since there are far more teachers than principals in any given school or district, and more principals and assistant principals than there are executive directors of technology in any district.

The second survey question asked teachers to identify what grade levels they teach in Missouri. Principals and directors of technology were exempt from the question, and 100% of those identifying themselves as either a principal or director skipped the question. The remaining 69 participants all identified themselves as teachers. The question offered a range of choices for each grade from Kindergarten through twelfth grade. All the respondents reported teaching at a secondary school, and 99%, 63 of 64, teach ninth

through twelfth grades. Since teachers in secondary often teach more than one grade level, respondents could choose more than one grade level for their response. Thus, the 69 teachers created responses for 223 total grade levels from 6-12, or an average of 3.2 grade levels taught per teacher. Figure 1 shows that more of the teachers work with older students. Eighty-seven percent teach seniors, 83% teach juniors, 75% teach sophomores and 74% have freshmen in class. There is one response for each of sixth, seventh, and eighth grades. Based on cross-tabulation of survey results, it is possible to identify that the same teacher reported working with 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> grades. The researcher asked no other demographic questions. It is not possible to identify survey participants as being from an urban, suburban, or rural school.

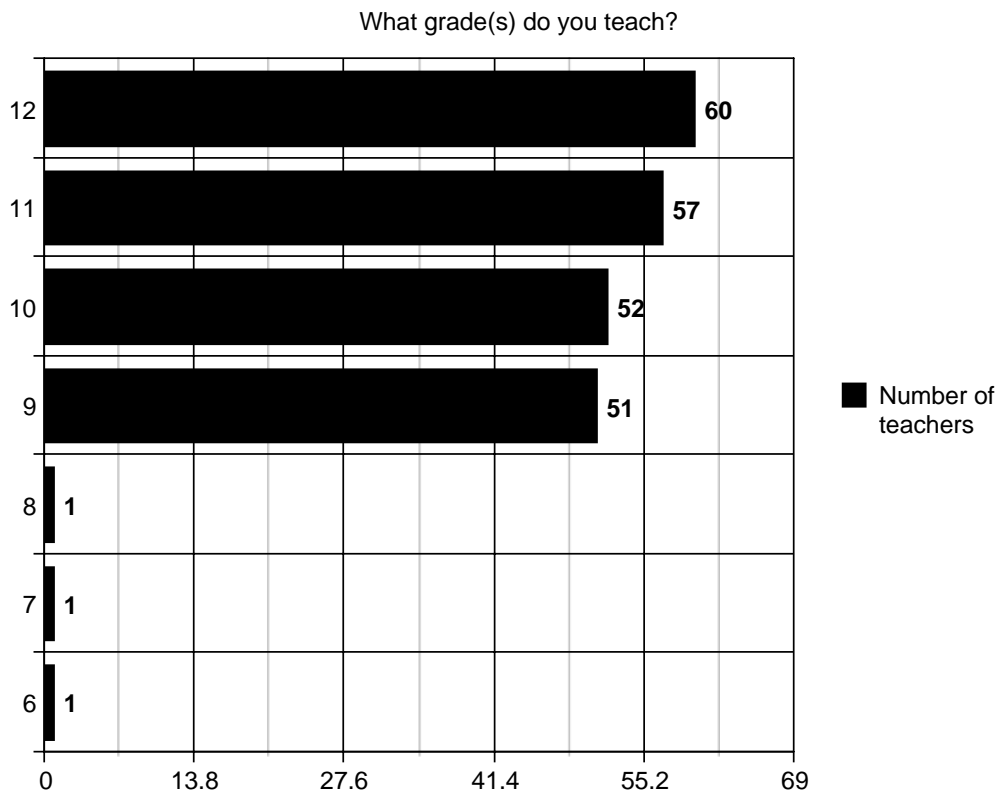
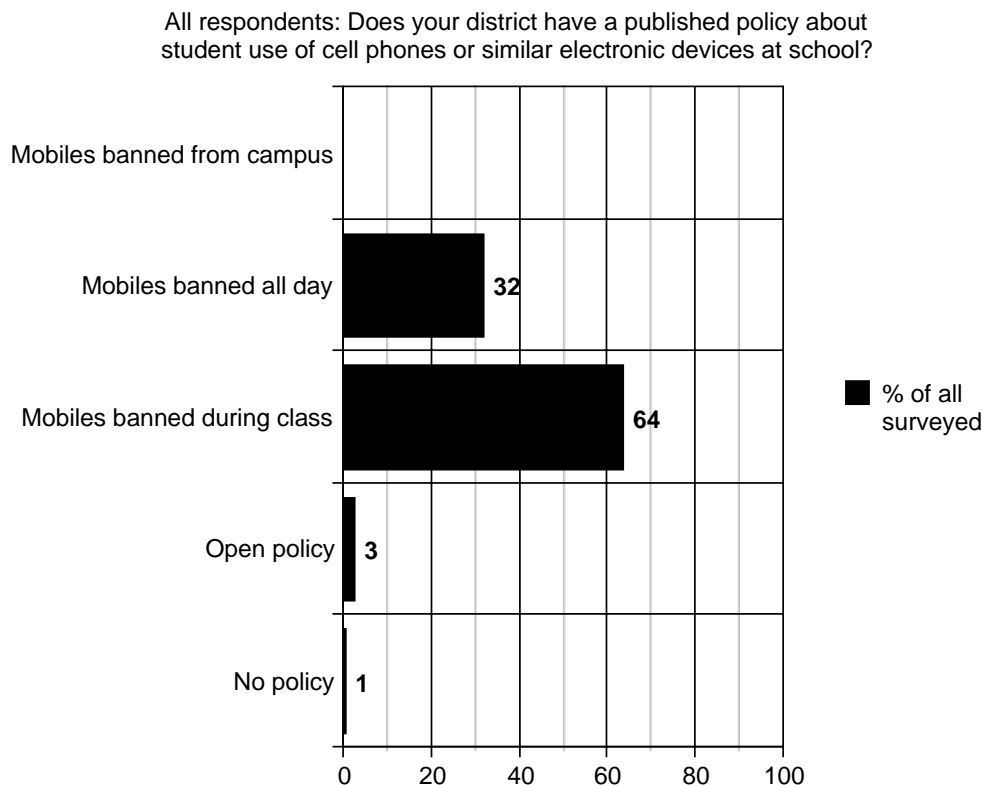


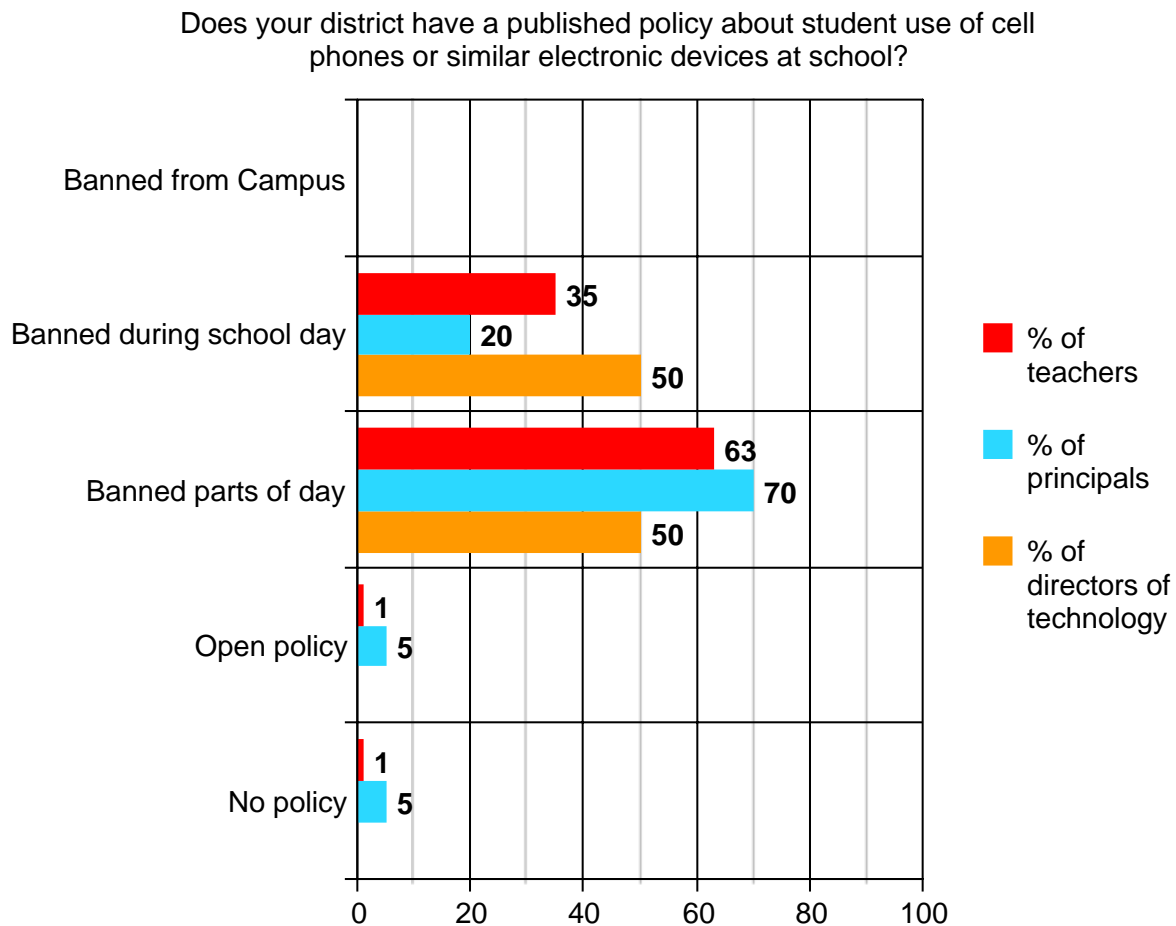
Figure 1. Total responses to the question, “What grades do you teach?”

Nearly every respondent works in a district where mobile phones are banned from classrooms, but none work in a district where mobile devices are completely banned from campus. Question three asked, “Does your district have a published policy about student use of cell phones or similar electronic devices at school?” Figure 2 shows 96% of all those surveyed report working in a district where mobile devices are banned either all the day, meaning a bell to bell ban with no usage between classes or at lunch, or banned part of the day, meaning students can use their mobiles on campus between classes and at lunch, but not in the classroom.



*Figure 2.* Percentage of all responses to the question about what kind of policy the respondent’s district has on student use of cell phones.

Figure 3 breaks the data down by the respondent's reported position of teacher, principal, or technology director. 100% of technology directors, 98% of teachers, and 90% of principals said cell phones were either banned during the school day or during parts of the school day.



*Figure 3.* Percentage of teachers, principals, and directors of technology responses regarding cell phone policies at school.

A majority of educators report working in a district where phones are only banned during class: 63% of teachers, 70% of principals, and half the technology directors. Fewer teachers reported working in a district where phones are banned during the school day,

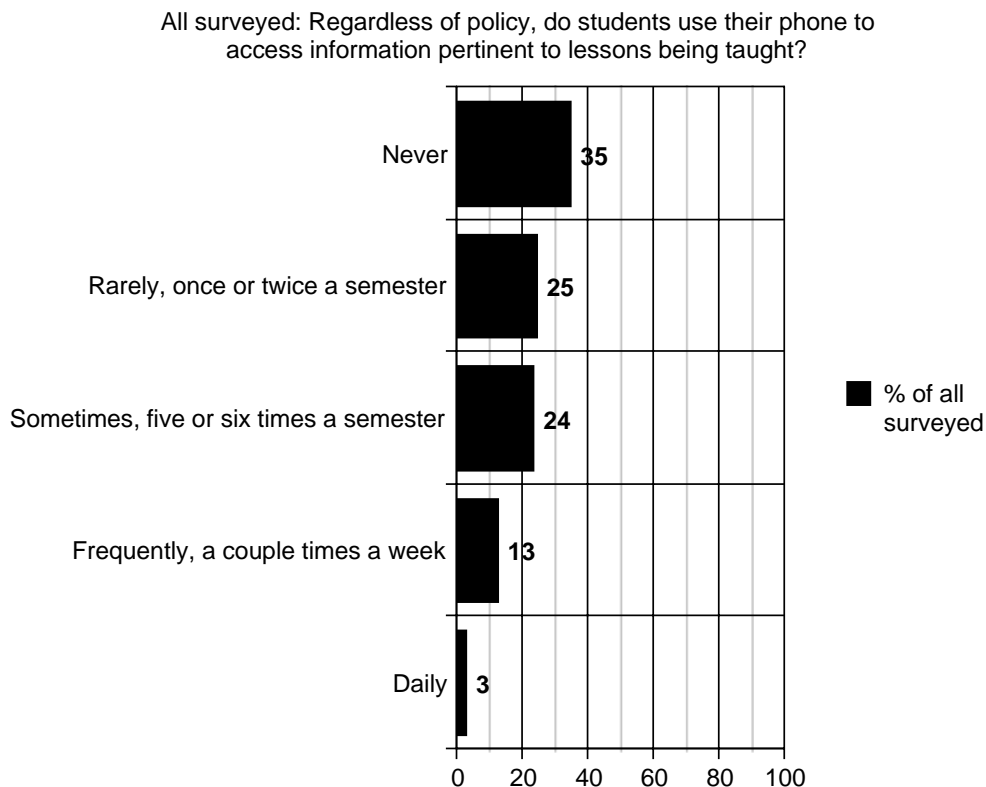
meaning students are allowed to bring them to school but are required to put their phones away before classes begin each morning and leave them away until school is dismissed in the afternoon. Half of the technology directors report working in a district with all-day bans, as do 35% of teachers and 20% of principals. One percent of teachers and 5% of principals reported working in a district with no policy, and the same numbers reported working in districts with an open policy where students are not barred from using their mobile devices in class or on campus.

Educator interviews revealed some schools within the same district have different policies on student use of cell phones. Christy (names of both individuals and schools are pseudonyms), a fifth-year English teacher at Northwest High School in suburban Kansas City, and Sara, a fifth-year science teacher at neighboring Northeast High School in the same suburban district, say their schools have different approaches to student mobile phones. Christy said the policy at her school is a bus-to-bus ban, where phones are allowed on campus only well before and well after classes. Teachers who see a student with a cell phone are supposed to confiscate the phone and turn it into the office. "It gets difficult because it really becomes a power struggle," Christy said (Christy personal interview, April 7, 2012). A few miles away, Northeast's staff decided to stop fighting the battle of the mobile phones. Sara said the staff decided it was too difficult to enforce a mobile phone ban in the hallways, so students now are banned only from using the devices in class (Sara, personal interview, April 7, 2012).

Figure 4 shows responses for survey question four, which asked, "Regardless of district policy, do students in your classroom (or, if applicable, building/district) currently



use their phone to access information pertinent to lessons being taught?” Sixty percent of educators surveyed said students use their phones in class to seek information about lessons being taught just two times or fewer a semester.



*Figure 4.* Percentage of all surveyed to the question, “Regardless of policy, do students use their phone to access information pertinent to lessons being taught?”

Southeast High School leaves the decision about whether to ban mobile phones in class up to the teachers, according to 18-year veteran English teacher Jacob. “I’m not sure how many teachers fight that battle. I don’t,” Jacob said. “I allow it and I’ve found that generally all I need to do is ask for courtesy, and I get it.” Jacob teaches primarily college-bound classes, but said, “In the regular classes it’s a little trickier to get their noses out of the video games and texting” (Jacob, personal interview, April 8, 2012). Eleanor is an

English teacher in her 16<sup>th</sup> year at Central High School, a school where students are only allowed to use their mobile devices at lunch but not between or in classes. Eleanor estimates about half of the 120 teachers at the school enforce the ban. “If it rings in class or they get a text chime, my kids know if they make a big deal out of it they get a green slip. If they ignore it and keep working, we move on. I’m just trying to teach them etiquette in the real world” (Eleanor, personal interview, April 8, 2012).

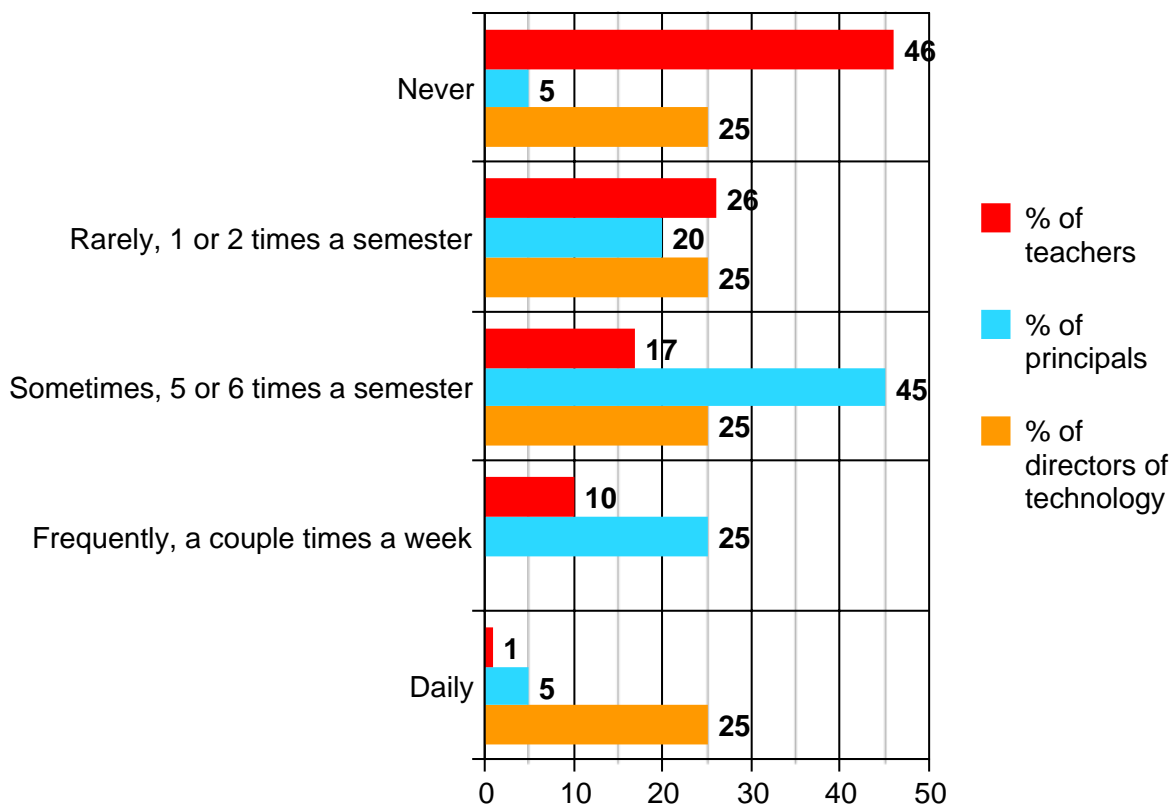
Allowing students to access the Internet through their mobile devices can help stimulate discussion and help teachers better explain something that comes up unexpectedly during a discussion. “When I don’t know the answer to something and we’re doing a rhetorical analysis of an essay, and something comes up like, ‘When was that civil war in Peru?’ someone can look it up and have the answer in seconds,” Jacob said. “It really moves the discussion along” (Jacob, personal interview, April 8, 2012). Eleanor said about students using their mobile devices in class, “If they want to research and they ask permission, I always say yes.” Eleanor works with International Baccalaureate students with vocabulary in context, getting not just meanings but nuances of words. “I’ve got a set of 10 classroom dictionaries but not enough for each kid. If they can get service and can look something up on a dictionary app, it’s often faster.” Like Jacob, Eleanor likes the fact mobile devices can help fill in for things she doesn’t know. “Occasionally they’ll ask me something I don’t know about a historical reference, and they’ll look it up and enrich the discussion” (Eleanor, personal interview, April 8, 2012).

In the anonymous survey, classroom teachers appear to be the most vigilant about not allowing students to use mobile devices. As seen in Figure 5, 46% of teachers say

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students never use their phones for research in the classroom. Five percent of principals and 25% of technology directors believe students never use the devices in class. One percent of teachers and five percent of principals, but a fourth of the technology directors, believe daily mobile usage is occurring in the classroom.

Regardless of your district policy, do students in your classroom (or, if applicable, building/district) currently use their phone to access information pertinent to lessons being taught?



*Figure 5.* Percentage of teachers, principals, and directors of technology responding to the survey question about student use of cell phones during class for learning purposes.

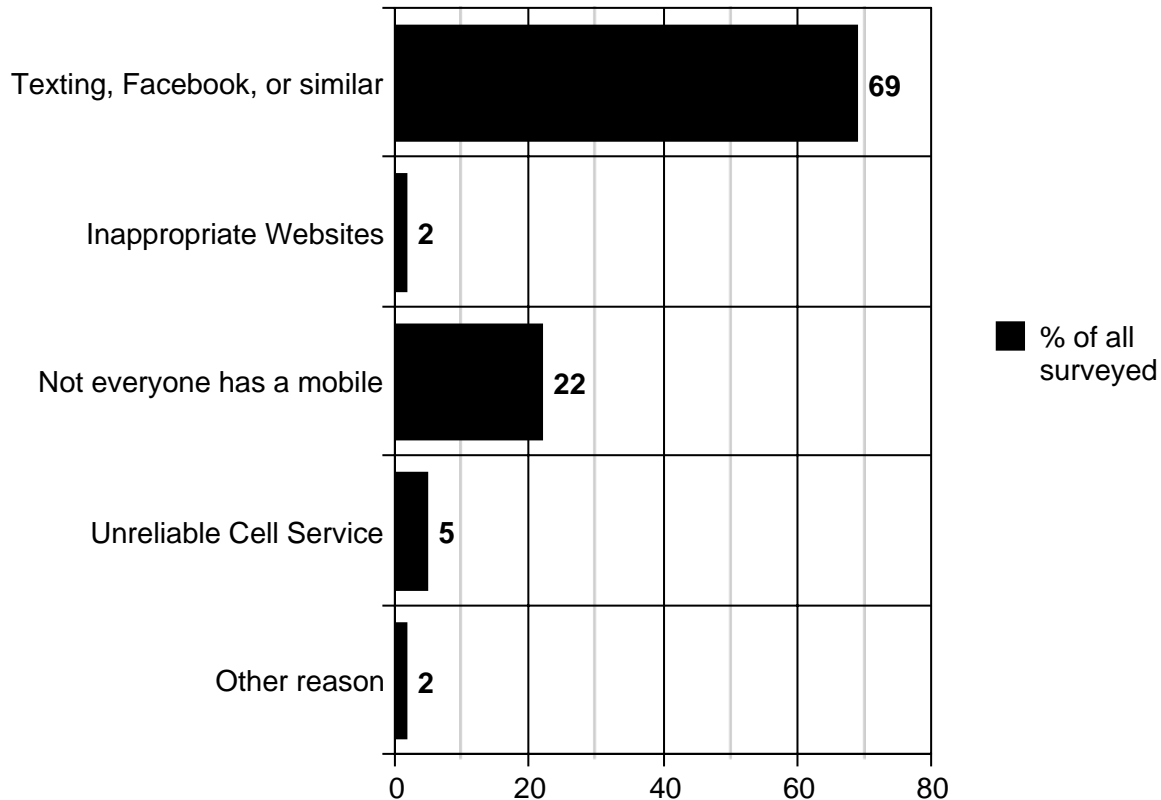
Despite the fact that nearly all respondents said they worked in a school where cell phones are banned from the classroom, a majority of respondents, 65% overall, said that students use the devices in class at least once a semester, and 16% report students using

their mobiles in class several times a week or daily. Breaking the results down by category, 42% of teachers, 65% of principals and 50% of technology directors believe students use their phone in class for learning purposes between one and six times a semester.

Christy is at a school with a strict bus-to-bus ban and only occasionally allows students to use their mobile devices to access information pertinent to English class discussions. "I'm a rule follower," she said. "They have to ask" in order to use it in class. For Christy, the rules are another opportunity for the students to show their responsibility. "Are these kids or young adults? How much do I let them fail? (Christy, personal interview, April 7, 2012). Sara, from Northeast High School, said, "Teachers have the discretion to allow students to take (a mobile phone) out and use it for an activity," such as for a poll that helps the instructor gauge student's understanding. "Sometimes if they ask, I'll let them use it for something class related. But they have to ask," Sara said (Sara, personal interview, April 7, 2012). "If they start using a phone without asking, I get suspicious," Christy said (Christy, personal interview, April 7, 2012).

Worries that students will be doing something other than their assigned work with their mobile devices is the main reason that educators see as a stumbling block to allowing students use of their own devices at school. Figure 6 shows the percentages of all responses to this question, with 69% of Missouri educators surveyed reporting the biggest stumbling block is students using their devices to text or access social media sites like Facebook.

Survey overview: What is the biggest stumbling block to students using their Web-enabled cell phones at school to access class-specific information on a regular basis?



*Figure 6.* Percentage of all respondents to the question about stumbling blocks to allowing student-owned cell phones at school to access class specific information on the Internet.

While texting can be a distraction, there can be benefits as well. Eleanor, who is also a debate and forensics coach, encourages students to text in class in order to get in touch with parents. “Texting can be a good communication tool. Students use it to contact parents to see if they’re free for a tournament event before they sign up,” she said (Eleanor, personal interview, April 8, 2012). Jacob, whose Southeast High School is in its third year of a one-to-one laptop program and who allows students to use their phones in class, doesn’t see a problem. “My teaching style is not a lot of lecture. I do a lot of turning the room into a

workshop and I move around,” which enables Jacob to see what students are working on (Jacob, personal interview, April 8, 2012). Eleanor also mentioned being in a position to see what students were working on by constantly walking the room checking in with students. “I think you’re going to have a problem if your mode of teaching is sitting behind your desk watching kids. If you don’t have good classroom management, you’ll continue to have bad classroom management with technology. It will just reflect the problems that already exist” (Eleanor, personal interview, April 8, 2012).

Figure 7 shows survey responses to the question sorted by respondent.

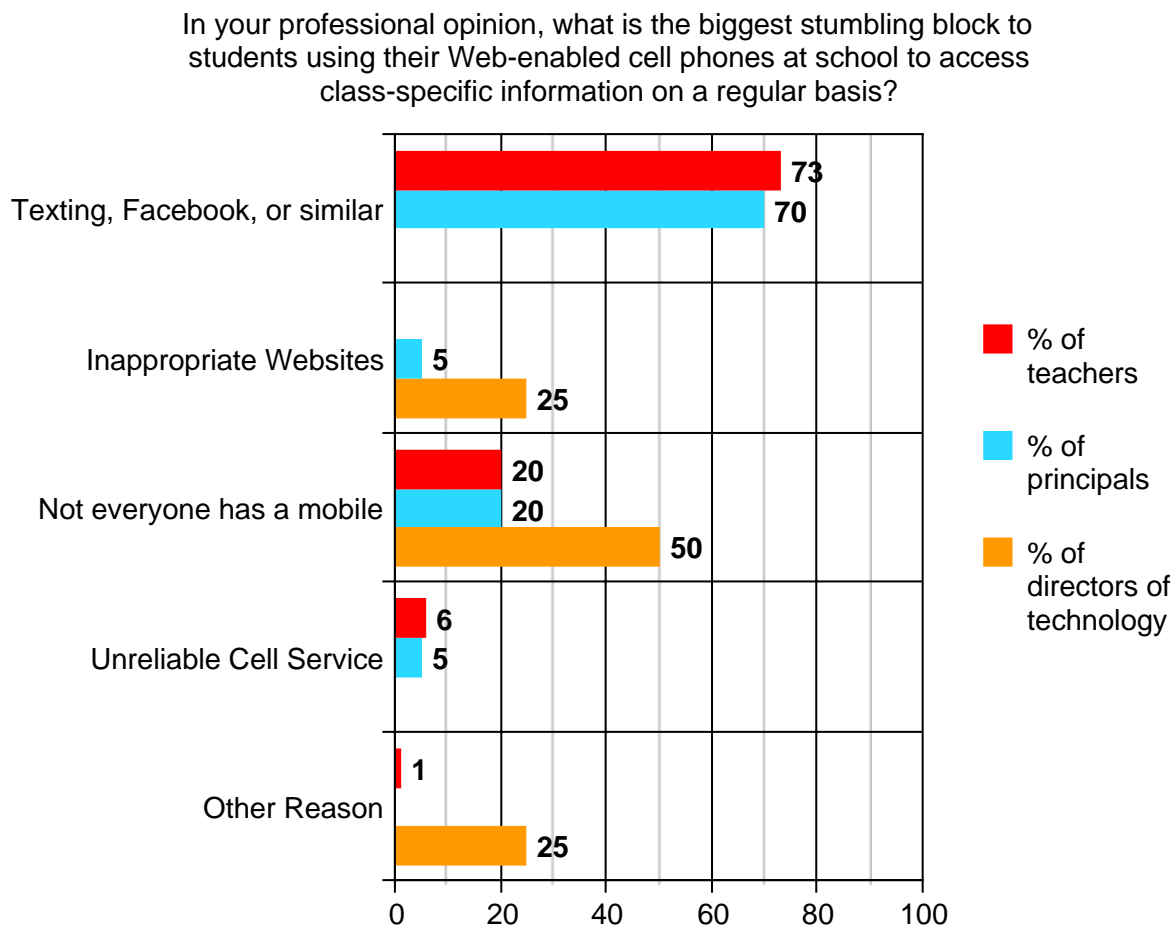


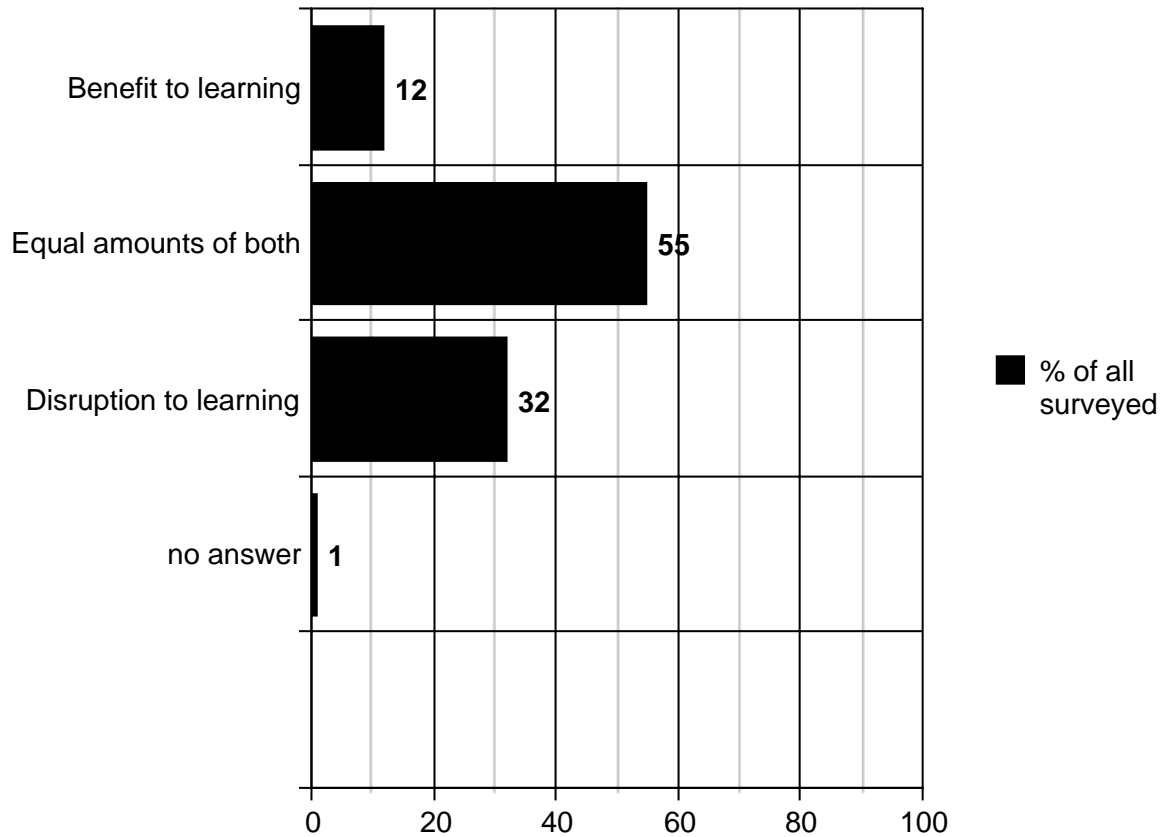
Figure 7. Percentage of teachers, administrators, and directors of technology to the survey question about stumbling blocks to BYOT.

None of the technology directors listed texting or social media access as a concern, but 73% of teachers and 70% of principals did. A fourth of the technology directors worried that students would access inappropriate websites not blocked by the district filter, and 5% of principals shared this concern about inappropriate content. None of the classroom teachers did. Another stumbling block is that not every student has a mobile phone. Half of the technology directors and 20% of both principals and teachers see this as the biggest stumbling block. Another factor that doesn't seem to be as much of a concern is not having adequate cellular reception in the classroom. Only 6% of teachers and 5% of principals reported this as a concern. At Central High School, Eleanor's classroom has no windows and is in the middle of the building. "I have very spotty service, so it's a miracle they can get (mobile devices) to work," she said. One teacher and one technology director listed "other" as a stumbling block. Because no open text box existed in the survey, it is not possible to know what the other reasons were.

Question six asks educators to ponder the good and the bad, and if possible, decide if BYOT is more of a benefit or disruption to learning. As shown in Figure 8, 12% of respondents said it was a benefit, 32% felt it was a disruption, and 55% felt it was equal amounts of both. One percent of those surveyed skipped the question.

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Does BYOT pose more of a benefit or a disruption to learning in your classroom (or if applicable, building/district)?



*Figure 8.* Responses by percentage of all who took the survey to the question about whether BYOT is a benefit or disruption to the classroom.

Figure 9 shows that 100% of the technology directors, 70% of principals, and 48% of teachers feel that student use of mobile phones in class is equal amounts benefit and distraction. As a group, teachers who picked a side feel mobile devices are more of a disruption, 39%, than a benefit, 13%. One principal did not answer the question, but those that did and who chose a side were almost evenly split among the benefit, 10%, and distraction, 15%.



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Does bring-your-own technology pose more of a benefit or a disruption to learning in your specific classroom (or, if applicable, building/district)?

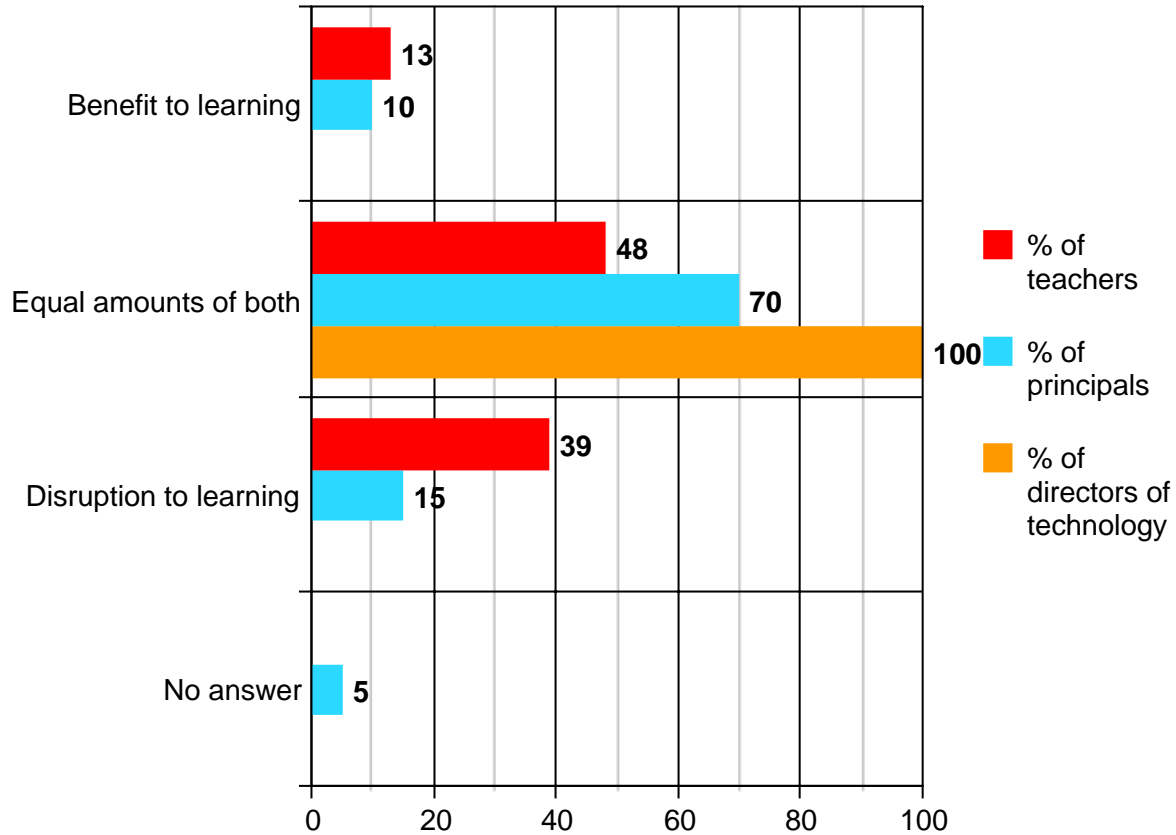
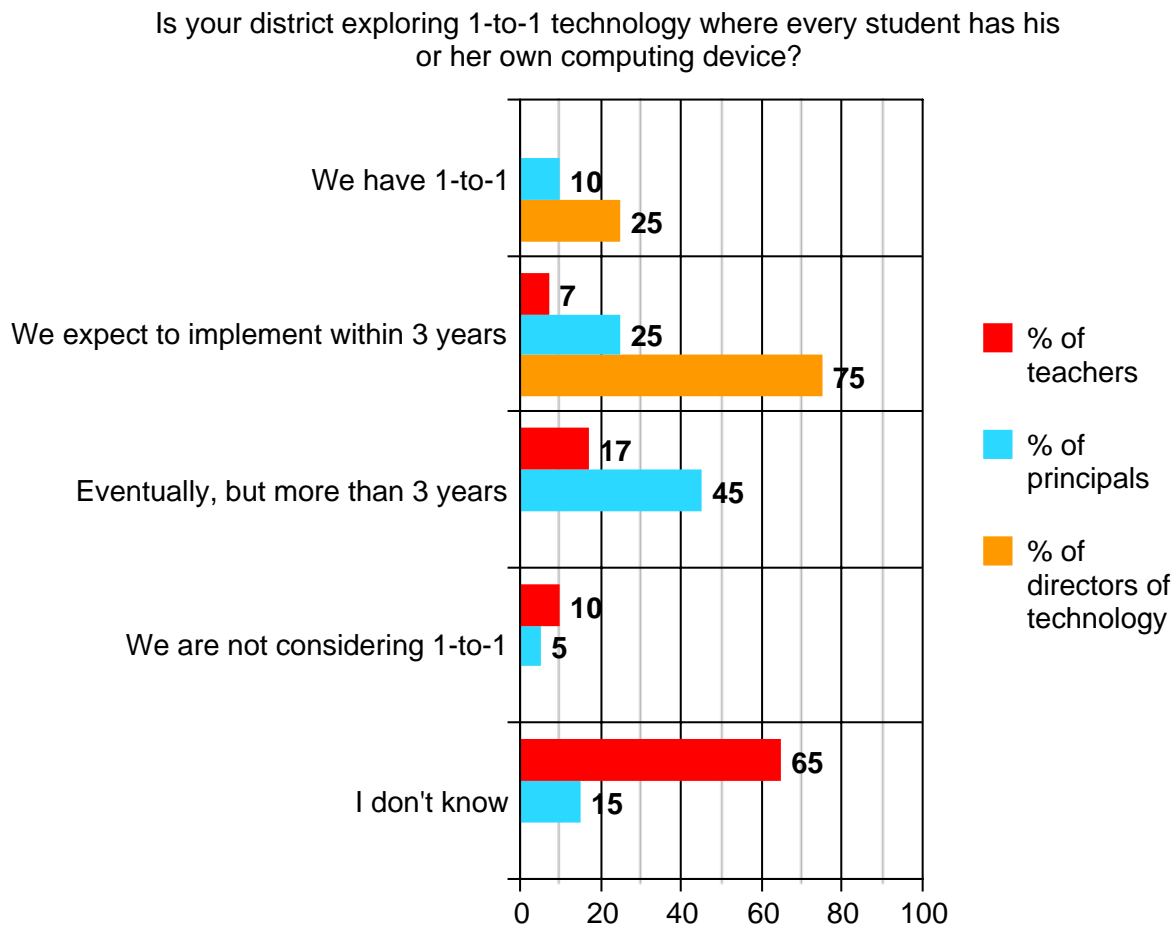


Figure 9. Responses of teachers, principals, and directors of technology to the question about BYOT being a benefit or distraction to learning, by percentage of all surveyed.

The survey question about what’s ahead for mobile technology in schools yielded the greatest gap in survey results. Question seven asks, “Is your district exploring 1-to-1 technology, where every student has his or her own computing device?” Figure 10 shows the gap between the technology decision makers in a district and the classroom teachers: 100% of technology directors say 1-to-1 is in place or coming within three years, but 93% of teachers report having either no idea what their district was planning or they believe one-to-one won’t happen in the next three years. Principals’ responses are more spread

out, with 65% either unsure of district plans or thinking the district won't have one-to-one within three years, and 35% reporting their districts already have or will have one-to-one within three years.



*Figure 10.* Responses from teachers, principals, and directors of technology to the survey question asking if their district is exploring one-to-one, by percentage of all surveyed.

It appears that while plans to implement one-to-one technology might be in the works at the district level, the details of those plans have not yet filtered through the building administrators to the teaching staff. The prospect of one-to-one in the classroom brought mixed emotions from educators in the interviews. Christy pondered how her students might use the devices. Next year she is taking on the role of debate coach, and she

mentioned that some students from other schools use iPads in debate rounds. "We've already got computers available in the debate classroom," Christy said, unsure whether one-to-one would be a good fit at her school (Christy, personal interview, April 7, 2012). Sara, who teaches advanced high school science classes, saw the benefits of iPads. "For anatomy it'd be great for students with online content," Sara said, mentioning the ability of websites and apps with graphics that can expand, spin, enlarge, and show layers of muscle systems within the body (Sara, personal interview, April 7, 2012). Neither Sara nor Christy thought their district was considering one-to-one, but Sara said her school is giving away iPads to help boost attendance the last few months of school. Students who miss less than a certain number of days have their name entered to win one iPad per month in the last three months of the 2012 school year.

Jacob has worked the last three years with a one-to-one initiative at Southeast High School and said there has been some good and bad with the experience, but generally, the good has outweighed the bad. The district distributed mini-laptops manufactured by Hewlett Packard to students three years ago. "It's been a constant battle to keep them up and running. The batteries are going, kids fight over outlets in the room. By and large they work, but to a kid, every student will tell you the laptops aren't very good." Jacob said next year the district is replacing the Hewlett Packard mini-laptops with Apple laptops (Jacob, personal interview, April 8, 2012).

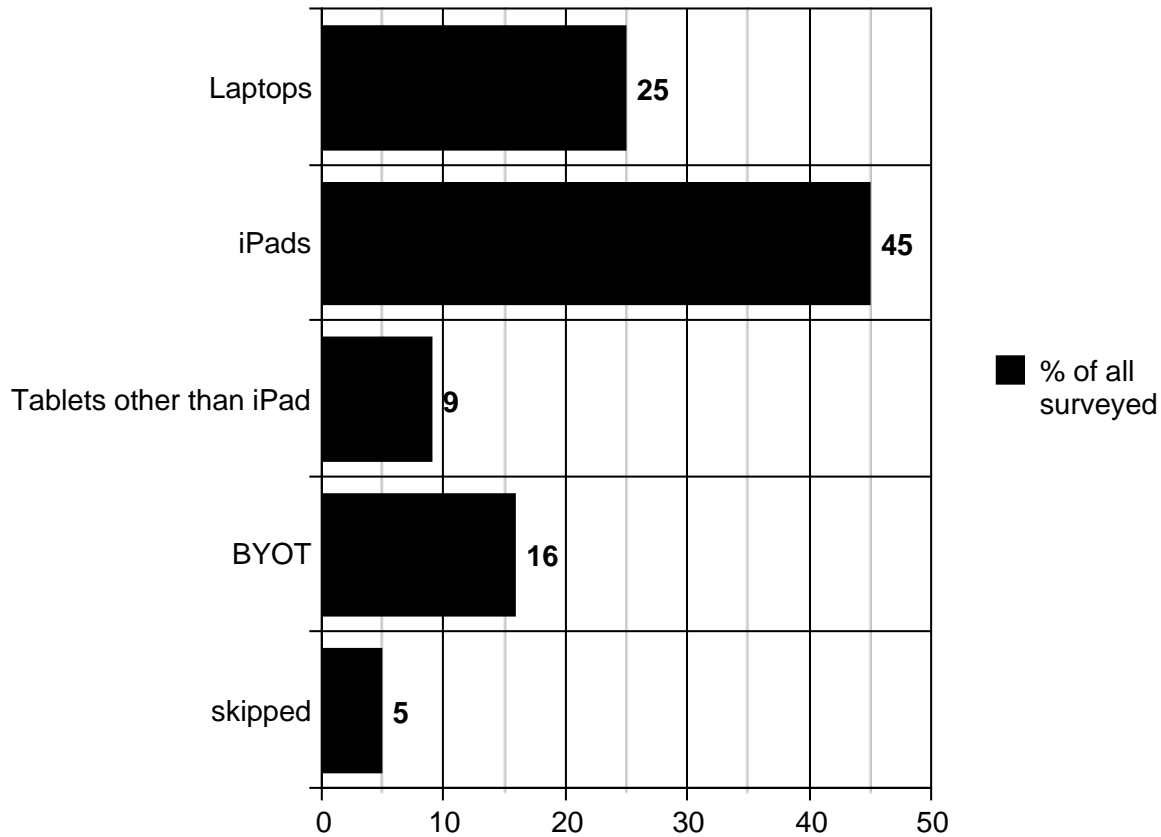
Matthew, principal at Southwest High School, said the older campus will require some planning to accommodate one-to-one, an initiative that is being studied in the large suburban district. "With our building being a massive retro-fit, I think the infrastructure

here will have to be re-examined and beefed up,” Matthew said. More important than the number of outlets and charging stations is creating a process for the devices. “If a kid is expected to have the computer and shows up without it, what happens? If a kid loses it, what happens?” (Matthew, personal interview, April 9, 2012). At Central High School, Eleanor welcomes the idea of one-to-one devices. “The best case scenario is the district provides every kid some kind of tablet, like an iPad. But if the student preferred his or her own technology, I would hope the district would be flexible and allow that” (Eleanor, personal interview, April 8, 2012). Matthew said his iPhone has been the easiest device to use out of the last four or five computers he’s had. “My preference would be that the kids have an iPad (because of) the portability, its ability to work across different platforms, the fact students can have something else on their desk besides the iPad, and the cost” (Matthew, personal interview, April 9, 2012).

If the technology directors are right in predicting one-to-one technology will happen very soon, what will the devices be? Question eight asked educators, “Which of the following would you recommend if your district were to adopt 1-to-1 devices in the next two years?” Figure 11 shows that iPads are the preferred method of implementing one-to-one technology by almost a two-to-one margin over laptops.

## BRING-YOUR-OWN TECHNOLOGY ONE-TO-ONE INITIATIVES IN MISSOURI 60

Which of the following would you recommend if your district were to adopt 1-to-1 in the next two years?

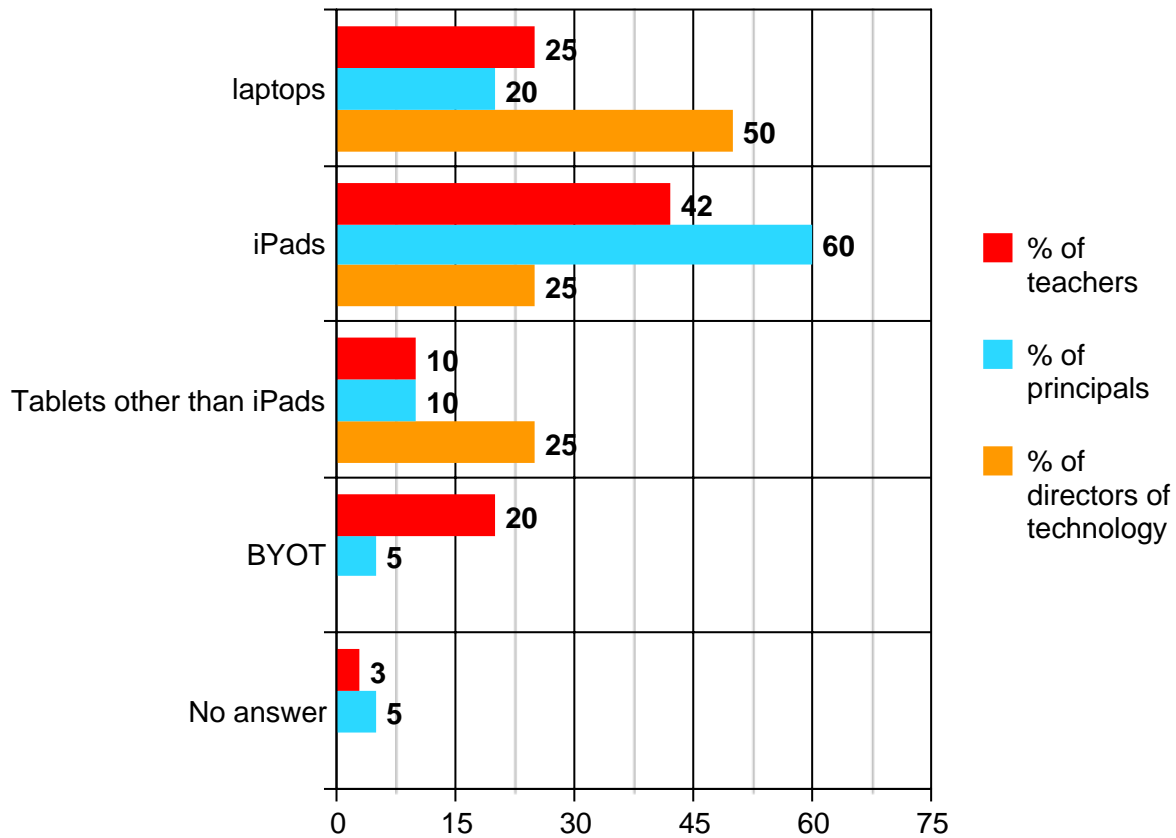


*Figure 11.* All survey responses or non-responses to the survey question about recommended devices for implementing one-to-one in the next two years, by percentage.

Figure 12 shows how the difference in preferences for teachers, administrators, and technology directors. Technology directors are evenly split between laptops and tablets at 50% each. Of those preferring tablets, half prefer iPads. Three times as many principals and almost twice as many teachers prefer iPads over laptops. Twenty percent of teachers support BYOT for their students, perhaps a surprising statistic given teacher responses earlier in the survey about students never using their phones in class to access information, students accessing social media rather than working in class, and mobile phones being seen

as a disruption to learning. Five percent of principals and 3% of teachers skipped this final question.

Which of the following 1-to-1 devices would you recommend if your district were to adopt 1-to-1 in the next two years?



*Figure 12.* Preferred devices for one-to-one implementation from teachers, principals, and directors of technology, by percentage of all surveyed.

The anonymous online survey did not ask educators about their own comfort level with using technology, but a number of them brought it up in the interviews. Matthew said the most important element in moving to one-to-one devices is training teachers to integrate the devices into the classroom and curricula. “Good teaching drives critical thinking, good teaching drives creativity and does more than have students regurgitate

information. Instead of making (one-to-one) about technology, make it about learning and critical thinking.” (Matthew, personal interview, April 9, 2012).

Jacob, whose district began one-to-one with laptops three years ago, said the technology hasn’t drastically changed the way he teaches English. For instance, when working on research, “The laptops just changed the location. Instead of spending three to four weeks in the library, I now spend a week where the books are and move back to the classroom.” With the laptops, Jacob no longer needs the computer labs, and students can do the same work in the familiar environment of his classroom. For Matthew, teaching with or without technology always comes back to good teaching and student engagement. “There are things you can do on a tablet or laptop that can be just as mundane as what you do on a worksheet” (Matthew, personal interview, April 9, 2012).

Eleanor said that every time she has made a leap with technology there have always been students willing and able to help her troubleshoot any problems. “I would readily acknowledge my need for professional development. I don’t consider myself tech savvy or very current in technology,” Eleanor said. “But I don’t like the idea of remaining 15 to 20 years behind the technology the students will be using in the workplace and in their lives. We as educators have an obligation to learn it and welcome it” (Eleanor, personal interview, April 8, 2012).

## **CHAPTER 5: DISCUSSION**

### **Introduction**

Mobile technology has transformed the lives of millions of people around the world. Mobile devices have very quickly become an integral part of day-to-day life for everything from communication and entertainment to research and learning activities. One-to-one initiatives have been shown to be effective with laptops (Gulek & Demirtas, 2005; Maninger & Holden, 2009; Peckham, 2008; Roschelle, Sharples, & Chan, 2005; Russell, Bebell, & Higgins, 2004). This study sought to investigate educator views on BYOT and one-to-one initiatives in Missouri schools in 2012. In the discussion, data from each of the survey questions as well as the educator interviews will be analyzed and compared to findings from similar recent studies.

### **Demographics**

The first two questions of the survey asked demographic information. Ninety-three educators participated in the survey, fewer than the 150 the researcher had anticipated. The lower numbers are likely the result of a number of factors, most of which involve time. The anonymous survey was only available to teachers for a short time due to the brevity of the entire study. The researcher only sent one invitation e-mail. The researcher was hesitant to send a reminder e-mail since the IRB human subjects application and approval did not include specific language for a follow-up invitation. Educators who didn't link to the survey when reading the e-mail were probably less likely to come back and click the link



later without a follow-up invitation. Educators the researcher knows personally commented that they didn't feel they had the three to five minutes to fill out the survey due to the pressure of grading and lesson planning in the few spare minutes they had each day. Future studies might achieve more participants with a longer available survey window and reminder e-mail invitations, or a larger pool of initial invitations.

As predicted, the anonymous survey respondents resembled the staff population within a district, as more teachers than principals participated, and more principals than executive directors of technology participated. This held true for the educator interviews as well, although the interview subjects were selected to reflect this demographic representation.

### **District Policies**

Nearly every student has some sort of mobile device capable of accessing the Internet, and some students have more than one device (Engel & Green, 2011, Lenhart et al., 2010, Messinger et al., 2011). In many instances the technology in students' mobile devices is more advanced than the desktop computers of half a decade ago, and in some cases student-owned technology is more advanced than the computers students must use in school (Kaku, 2011). Yet data from this study show 96% of professional educators in Missouri reported working in a school where student-owned mobile devices are banned from use in classes.

District policies that ban or limit the use of cellular phones at school have been in place across the United States for more than a decade (Garza, 2003; Summa, 2002; West, 2004; Zirkel 2008). In the last decade, those bans have eased somewhat. Michigan had a

statewide ban on students bringing cell phones to school until 2004 (West, 2004). In a 2010 report, Lenhart et al., found 88% of students attended a school where mobile devices were banned in class or completely from campus, and 24% of those attended schools where mobile devices were banned from campus. In Missouri in 2012, not a single educator reported working for a district where student-owned mobile technologies were banned on campus. In fact, 68% of all educators in the survey report working in a district where students can use their mobile devices everywhere in school except in classrooms, only slightly higher than the 64% of students who reported attending school where mobile phones were banned only in class (Lenhart et. al, 2010). The major change in that time frame is that mobile devices are not banned outright, at least not in the Missouri schools in this study.

### **Student Use of Mobile Devices**

Teachers in Missouri believe students are generally following the no-mobiles-in-class ban, as 89% of teachers report students use the devices to access information about a lesson in the classroom six or fewer times a semester. Forty-six percent of teachers say students never use the devices to find information pertaining to a lesson being taught. In interviews, teachers say students looking to search for information on the Internet on their mobile device tend to ask the teacher's permission to do so, essentially stepping around the district's ban and then using their device openly within the teacher's sight. This survey did not ask educators how often they thought students texted in class or broke the in-class mobile phone ban without permission, although the Pew Internet and American Life survey found that students reported texting in class much more frequently than teachers thought

they were (Lenhart et. al, 2010).

In recent years, researchers have found success in implementing mobile devices in the classroom (Guleck & Demirtas, 2005; Hloden, 2010; Kozma, 2005; Maninger & Holden, 2009; Messinger, et. al, 2011; Motiwalla, 2005; Özdemir, 2010; Peckham, 2008; Roschelle, et. al, 2005; Russell, et. al, 2004;). Despite tough financial times, districts are looking for ways to get portable computers into the hands of students (Johnstone, 2003) to prepare them with 21st century skills (Kozma, 2008). Allowing students the use of mobile technology at school and relating it to the social media they so often use outside of school can create a more positive school culture and improve student motivation, creativity, and achievement (Engel & Green, Frey et al., 2010, Kozma, 2005, 2011, Messinger et al., 2011; "The New," 2011, Rainie, 2011). Since the technology is relatively new, there are limited studies specific to the impact of iPads or BYOT in the classroom. Other studies on the impact of portable learning can reasonably be extrapolated to other mobile computing devices.

Studies have found teens use their devices outside of school for class-related research, creative inspiration, and engaging in collaborative problem solving (Messenger, 2011) . With 89% of students in Missouri already using their devices at least once a semester while attending a school that bans the devices during class or all day, it is reasonable to imagine that students would use their devices for learning purposes with significantly greater frequency if the classroom bans were lifted and teachers planned specific lessons involving the technology.

### **Stumbling Blocks to BYOT**

School districts are hesitant to allow students to use their own devices despite the tremendous computing power in a mobile device that now comes to school with nearly every student (Kaku, 2011; Lenhart et. al, 2010). At the top of the list of concerns, teachers contend students might text or use social networking websites at school. While no executive director of technology reported this as a concern, 73% of teachers and 70% of principals cited texting and social media as the primary stumbling block to allowing student use of their own mobile technology in school. Surveys of teens back this up: 43% of teens report texting in class daily, and 64% of all teens with cell phones have texted at least once in class (Lenhart et. al, 2010). Studies find teens largely ignore bans on mobile devices in school (Lenhart et al., 2010; Quillen, 2011b; Rainie, 2011; Toppo, 2009).

Less than a third of those surveyed thought something other than texting and social media distractions would keep students from using their own devices at school. One concern is about not getting adequate cellular reception to use the mobile devices without tapping the school's Wi-Fi network. This could include schools in rural areas that do not get strong enough cellular signals anywhere near the school, or any school that has adequate cellular coverage outside of school but the building somehow inhibits the signal inside the structure. Five percent of all respondents listed cellular reception as a primary concern. One teacher brought this up in the interview, saying mobile reception was so bad in her suburban classroom that students often cannot access the Internet even when they have the teacher's permission to use their device in class.

Less of a concern, at 2% of all respondents, was that students would access

inappropriate websites, suggesting that educators believe students can resist finding content that will get them in trouble at school, but students cannot resist the temptation to text or visit social media while in class. Second only to the 69% of educators being concerned about texting is the 22% of all those surveyed worrying about students who do not have a mobile device. Research shows nearly every student has at least one device capable of accessing the Internet, and that students from lower-income homes often rely more heavily on their mobile device for Internet than students from wealthier households (Rainie, 2011). However, data suggesting that every student has a mobile device (Engel & Green, 2011; Johnson et al., 2011; Messinger et al., 2011) does not guarantee that each and every student in a given district will, in fact, have one. For instance, Matthew, the suburban high school principal outside of Kansas City interviewed for this study, made an educated guess that 85% of the students at his school had mobile phones capable of accessing the Internet. He cited concerns about the students who did not have any sort of device. Even though only a handful of students might lack a useable mobile device in any given school, districts that go to one-to-one devices and do not provide every student a device will need to be prepared to offer some assistance if every student is expected to bring his or her own. Suburban principal Matthew doesn't mind teachers allowing students to use their phones for a structured activity in class, despite a strict school-wide ban during the day. "The only part that bothers me is the divide you might see in kids that have the good phones and kids that don't. Some of the phones are so much better than what other kids have." (Matthew, personal interview, April 9, 2012).

Despite the data showing educator's concerns about students using Facebook or

texting in class, the teachers interviewed for the study were not greatly concerned about students being off-task with the devices in their classroom. Several teachers interviewed said classroom management with or without technology is the same: if you do not have it to begin with, you have no hope of managing a class once you put mobile technology into every student's hands. Setting expectations for student behavior with technology is no different than setting expectations without technology, and rule breaking is treated the same as any other behavioral issue like disrespect, skipping class, or cheating.

### **Benefit or Distraction?**

Educators in Missouri see both the benefit and the downside of student-owned mobile devices as a classroom learning tool. When asked if they saw mobile devices as a benefit or distraction to learning, 55% said the technology was both a distraction and a benefit. Within this response, 100% of technology directors, 70% of principals, and 48% of teachers saw both the positive and the negative. Of those who chose a side, three times as many teachers saw the distraction over the benefit. Much has been written about both the positive and the negative aspects of students using their mobile device in class, and the data here provide no proof that mobile technology is all good or all bad for learning.

### **One-to-One Exploration**

Ninety-three percent of the teachers surveyed, and 65% of the principals, either don't know if their district is considering one-to-one or they don't expect it in the next three years. However, all of the technology directors say it's either coming within three years or already here. Because the survey is anonymous, there is no way to show if the teachers, principals, and technology directors who participated in the survey are from the

same or different districts. Given the geographic distribution of invitation e-mails for the survey, especially those specifically to technology directors, it is very likely that most of the directors, principals, and teachers are from the same district. However, this can neither be proved nor disproved with the available data.

A reasonable explanation for the disparity in the data is that while the technology leaders in a district might be weighing options and preparing implementation plans for one-to-one, the directors might not be ready to share incomplete plans with everyone in the district. Thus, a technology director would be more likely to report one-to-one is on the horizon, while the teaching staff in those districts might not be as informed and report they do not expect it. However, with any change as large as implementing one-to-one in schools, there is likely a smaller planning group composed of the director of technology, other district leaders, school principals, and a few classroom teachers helping to create the district plan for implementation. This might account for 7% of teachers and 25% of administrators who believe that one-to-one is coming within three years.

The data suggest one-to-one technology is imminent for at least a portion of Missouri schools. One-hundred percent of technology directors responding to the survey said one-to-one was going to happen within three years or was already in place in their district. The limitation of this data is that the sample size was four technology directors out of all of the districts in the state of Missouri, making the margin of error outside of reasonable limits for saying the result is representative of all Missouri school districts. However, the data provide several interesting considerations. First of all, the data suggest that the benefits of providing every student a mobile computer are enough that districts

are willing to not only consider the possibility of one-to-one, but are planning to make a move in some form very soon. None of the technology directors surveyed supports BYOT as a first choice, which further suggests that if these directors are saying they are moving to one-to-one within three years but not with BYOT, their districts are willing to financially commit to buying some type of devices for students.

A common thread in primary interviews for the study was the need for specific training and professional development for all teachers and staff when shifting to a one-to-one environment. Existing research shows that a new style of teaching pedagogy is necessary to go along with device integration (Corbeil & Valedes-Corbeil, 2007; El-Hussein & Cronje, 2010) and that the style of teaching used before mobile devices won't work without some adaptation in a learning environment where nearly every student has mobile access (El-Hussein & Cronje, 2010). Laela Zaidi, the sophomore at tornado-ravaged Joplin High School, said because teachers had no time to prepare lessons with their new laptops, teachers just sent students to websites and had them watch video tutorials (Zaidi, 2011).

Technology alone is not a magic solution to enhance student learning. Matthew, the principal of a large suburban high school, said, "There are things you can do on a tablet or laptop that can be just as mundane as what you do on a worksheet" (Matthew, personal interview, April 9, 2012). A shift in teaching pedagogy and technology training will help shift the focus from the technology to engaging lessons that have at their heart critical reasoning and thinking. In North Carolina, the Mooresville school district went digital and saw a jump of 20% in students scoring proficient on the state's core subject exams in math, science, and reading. However, technology was only part of the equation. District leaders



and teachers worked together to revamp teaching methods and learning goals while implementing the new laptop technology (Quillen: Building, 2011).

### **One-to-One Device Preference**

As districts continue to feel the challenges of shrinking budgets and increasing pressure to teach students 21<sup>st</sup> century skills, the option of allowing student-owned mobile devices might continue to gain some appeal as an option for districts that can't afford to provide its student population with one-to-one mobile devices. However, the fear that students will misuse their own devices in class seems to overshadow the benefits to be gained in a student-owned device. Twenty percent of the teachers, and 16% of all the educators surveyed, said they preferred BYOT as their top option for one-to-one technology. A Project Tomorrow survey found that fewer than 25% of K-12 administrators would likely allow student use of mobile devices for learning at school, while almost two-thirds said they were unlikely (*"The new,"* 2011). In Missouri in 2012, 95% of administrators and 100% of technology directors would pick a one-to-one solution other than BYOT. By nearly a two-to-one margin, Missouri educators say iPads are the choice for one-to-one.

Looking at the data, it is easy to think that BYOT stands little chance of being adopted in Missouri schools. Even though a district would arguably save money by not investing in hardware that students already own, districts adopting BYOT still face the challenge of training teachers with best practices in utilizing the technologies in an effective manner, providing devices for the students who don't already own one, and likely increasing bandwidth on the school's wireless networks.

By providing students with an iPad or laptop, districts can have more control over the content on the devices. Specifically, the devices would likely access the Internet through the school's wireless network, where Facebook or other social networking sites can be filtered. Districts can avoid the texting concerns by not loading SMS texting apps on the devices. Based on the data, it appears districts are more willing to spend the money to provide students with mobile devices in a controlled environment than save money by allowing BYOT devices the students own but over which the districts have no control. A significant majority of educators, 84%, say they prefer a one-to-one scenario where the district provides either a laptop or tablet to students rather than allowing students use of their own technology.

### **Future Studies**

Future studies might consider the impact of professional development on the success of a one-to-one implementation, as well as the larger impact of a one-to-one program with tablets or BYOT on student learning and achievement. A more targeted study of the self-efficacy of teachers related to technology might show a difference in comfort levels between veteran teachers and those just entering the classroom. Teacher interviews from this study showed little difference in attitude about technology between those with five years of experience and those with nearly twenty years. However, this was not a targeted area of study and a more comprehensive investigation might find more revealing results.

### **Conclusion**

This study investigated Missouri educator views on bring-your-own technology and one-to-one initiatives. While teachers and administrators have concerns about students being distracted by using their own mobile devices for things not related to classroom activities, the data show that at least some teachers are open to the idea of BYOT in the near future. However, the data show significantly stronger support from teachers, principals, and technology directors for district-provided technology such as iPads for students, which would allow districts and teachers better control over the learning environment. Additionally, the data suggest that Missouri school districts are willing to support one-to-one technology on their own terms by providing some type of device to each student in the very near future.

In technology's staggering pace of evolution and change, it currently takes just over a year to double computing power. Theoretically, an iPad put into service with an incoming freshman will be just one-eighth as powerful as a new device when that student graduates. While the technology will change rapidly and new technological marvels will undoubtedly arise within the next decade, nothing can replace the effective skills of a classroom teacher guiding student learning. Existing research and primary interviews in this study both support the need for extensive teacher training to shift the existing teaching style to accommodate a new style of teaching and learning as one-to-one initiatives are implemented.

Ultimately, the focus is not on the technology, but on the craft of teaching. Technology is a tool that increases student interest and motivation, which can lead to

increased learning and achievement if teachers harness the power of technology for learning in a beneficial way. Studies show that laptops have helped increase learning in a one-to-one environment, and it's a relatively safe leap to expect those results from the newer tablets and mobile devices currently available. As teachers develop new skills and shift the pedagogy to focus on critical thinking and reasoning with one-to-one computing as a resource, they will better prepare students for their future in the 21<sup>st</sup>, and for many students now entering school, the 22<sup>nd</sup> century.

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APPENDIX A  
Anonymous Online Survey

BYOT AND 1-TO-1 INITIATIVES IN MISSOURI SCHOOLS IN 2012

This research survey is about bring-your-own technologies, such as student-owned Web-enabled cell phones, and one-to-one technology, where each student has a portable computing device of either his or her own or provided by the school. The researcher is gathering data as part of an EdS thesis. Your responses are anonymous and no name, school, or district will be tied to any responses.

Are you a technology director, administrator, or teacher?  
-If you are a teacher, what grade(s) do you teach?

1) Does your district have a published policy about student use of cell phones or similar electronic devices at school?

Yes, they are banned from campus

Yes, Banned during school day

Yes, Banned parts of school day (such as students can use them at lunch)

Yes, open policy

No, there is no published policy

2) Regardless of your district policy, do students in your classroom (or, if applicable, building/district) currently use their phone to access information pertinent to lessons being taught?

Never

Rarely, once or twice a semester

Sometimes, five or six times a semester

Frequently, at least a couple times a week

Daily

3) In your professional opinion, what is the biggest stumbling block to students using their Web-enabled cell phones at school to access class-specific information on a regular basis?

-Students would use phones for other purposes, such as texting friends or using social networking sites such as Facebook

-Students would access inappropriate websites not blocked by a school filter

-Not all students possess a Web-enabled cellular phone

-There is not consistent or strong enough cellular reception at the school/district to be reliable

-Other reason

BRING-YOUR-OWN TECHNOLOGY ONE-TO-ONE INITIATIVES IN MISSOURI 90

4) Does bring-your-own technology pose more of a benefit or a disruption to learning in your specific classroom (or, if applicable, building/district)?  
Benefit to learning            Equal amounts of both            Disruption to learning

5) Is your district exploring 1-to-1 technology?

-We have 1-to-1

-We expect to implement within 3 years

-We are exploring options but are more than 3 years from implementation

-We are not considering 1-to-1

-I don't know

6) Which of the following 1-to-1 devices would you recommend if your district were to adopt 1-to-1 in the next two years?

Laptops

iPads

Tablets other than iPads

Bring-your-own Technology (iTouch, Web enabled cell phones and similar student owned devices)

Thank you for taking the time to participate in this survey.

APPENDIX B  
E-mail Invitation to Participate

Greetings, fellow teachers, administrators, or technology directors in Missouri.

My name is James Michael Russell II. I am a high school teacher and graduate student, and I am writing to ask your participation in a brief survey.

I am conducting a research study through the University of Central Missouri's graduate school that is designed to find out school district policies on students using their own technologies (such as cell phones) for educational purposes at school, whether these devices can potentially assist classroom learning, and if districts are considering bring-your-own technology in a framework of one-to-one student to technology implementation.

The survey consists of six total questions that will take no longer than five minutes to complete. It is completely anonymous. The survey will ask your position in the school district. Please note that while survey results will be analyzed by position (teacher, administrator, technology director) it is not possible to analyze results by a specific district or building since that information is not collected and responses are anonymous.

The risks associated with participating in this study are similar to the risks of everyday life. There are no specific benefits you for taking the survey, other than the researcher's sincere thanks. The larger benefit is, as a result of this survey, there might be a broader understanding of bring-your-own technology and one-to-one initiatives at schools within the state of Missouri.

If you are a teacher, administrator, or technology director at a Missouri school and would like to participate, please proceed to the brief online survey at one of the following links. Each link has the same survey, but only holds 100 responses. If the one survey is full, please try a different link. Your consent is implied by clicking the link and taking the survey.

<http://www.surveymonkey.com/s/BG7Q2xx>  
<http://www.surveymonkey.com/s/BPMQDxx>  
<http://www.surveymonkey.com/s/BPFW9xx>  
<http://www.surveymonkey.com/s/B68KTjxx>

Thank you for your time, and I wish you continued success.

James Michael Russell II  
xxxxxxx@ucmo.edu

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APPENDIX C

Personal Invitation e-mail for Interviews

Hi, (name of potential participant).

I'm finishing my EdS research and need to interview a handful of education professionals about technology in the classroom. As you probably know, for part of the research, I conducted an anonymous survey about the policies and practices of districts and teachers related to student-owned technology in Missouri districts.

My hope is that I can interview you by phone or in person for approximately five to ten minutes to get your professional opinions and personal experiences with mobile technology in school. I'm only interviewing five or six people, and I've chosen you because (specifics to each individual).

I'll type your responses as we talk, and use them in my thesis that I'm finishing this spring. Your responses can be anonymous if you choose. We can talk about that if you choose to participate.

I'm on a fairly tight deadline, so if you can spare a few minutes please e-mail me back and let me know if you can participate. If not, I completely understand how busy this time of year is. If you can participate, let me know a time that I can call in the next few days.

Thanks,  
Michael Russell

APPENDIX D  
General Interview Questions

1. Could you please spell your name so I have it correctly in the notes?
2. In the consent form, there is a question about using your name as part of the study. Just to clarify, may I use your full name and identifying information in the narrative?
3. What school and district do you work at, and what is your position?
4. How long have you been in that position, and how long have you been in education?
5. Does your school have one to one? (If no, skip to #14)
6. How long have you had one to one?
7. What devices do students have?
8. In your opinion, is one-to-one successful at your school?
9. How has one-to-one changed your teaching style?
10. What sort of training did the district provide before implementing one-to-one?
11. Are there any changes coming for the one-to-one program at your school?
12. What do students say about having an individual computing device?
13. Did the district have to make any physical accommodations to the buildings or classrooms before one-to-one was implemented?
14. Do you think one-to-one would work in your classroom?
15. How proficient with technology do you believe you are?
16. How well do you think you could implement one-to-one into your teaching methods?
17. What is the current policy of mobile phones at your school?
18. If your district were to go to one-to-one, what type of device would you prefer?
19. Regardless of building policy, how often do students in your classroom use their phones?
20. How important is it for students to use mobile technology at school?
21. In your opinion, does technology help students learn?

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APPENDIX E  
Human Subjects Approval: February



Human Subjects Protection Program  
Ward Edwards 1800  
Warrensburg, MO 64093  
Office 660-543-4621  
FAX 660-543-4778  
www.ucmo.edu

2/2/2012

James Russell



Dear James Russell,

Your research project, 'Bring Your Own Technology and One-to-One Initiatives in Missouri Schools in 2012', was approved by the Human Subjects Review Committee on 2/2/2012.

Please note that you are required to notify the committee in writing of any changes in your research project and that you may not implement changes without prior approval of the committee. You must also notify the committee in writing of any change in the nature or the status of the risks of participating in this research project.

Should any adverse events occur in the course of your research (such as harm to a research participant), you must notify the committee in writing immediately. In the case of any adverse event, you are required to stop the research immediately unless stopping the research would cause more harm to the participants than continuing with it.

At the conclusion of your project, you will need to submit a completed Project Status Form to this office. You must also submit the Project Status Form if you wish to continue your research project beyond its initial expiration date.

If you have any questions, please feel free to contact me at the number above.

Sincerely,

A handwritten signature in cursive script that reads "Janice Putnam Ph.D. RN".

Janice Putnam Ph.D., RN  
Associate Dean of The Graduate School  
putnam@ucmo.edu

BRING-YOUR-OWN TECHNOLOGY ONE-TO-ONE INITIATIVES IN MISSOURI 95

APPENDIX F  
Human Subjects Approval: April



Human Subjects Protection Program  
Ward Edwards 1800  
Warrensburg, MO 64093  
Office 660-543-4621  
FAX 660-543-4778  
www.ucmo.edu

4/5/2012

James Russell

[REDACTED]  
[REDACTED]@ucmo.edu  
[REDACTED]

Dear James Russell,

Your research project, 'Professional Interviews for BRING YOUR OWN TECHNOLOGY AND ONE-TO-ONE INITIATIVES IN MISSOURI SCHOOLS IN 2012', was approved by the Human Subjects Review Committee on 4/5/2012. This approval is valid through 4/5/2013. Your informed consent is also approved until 4/5/2013.

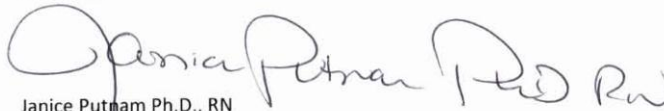
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If you have any questions, please feel free to contact me at the number above.

Sincerely,



Janice Putnam Ph.D., RN  
Associate Dean of The Graduate School  
putnam@ucmo.edu



**TRANSMITTAL FORM**

Student Name: James Michael Russell II

Graduate Degree Program: Education Specialist Human Services Learning Resources

Thesis Completion Date: April 10, 2012

Thesis Title: BRING-YOUR-OWN TECHNOLOGY AND ONE-TO-ONE INITIATIVES IN MISSOURI SCHOOLS IN 2012

\_\_\_\_\_  
Print Name of Committee Chair

\_\_\_\_\_  
Chair Signature

\_\_\_\_\_  
Print Name of Committee Member

\_\_\_\_\_  
Committee Signature

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Print Name of Committee Member

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Committee Signature

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Print Name of Committee Member

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Committee Signature

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Print Name of Committee Member

\_\_\_\_\_  
Committee Signature

DEPARTMENTAL APPROVAL:

\_\_\_\_\_  
Signature of Department Chair

**PUBLICATION AGREEMENT**

Author Name: James Michael Russell II

Street Address: 302 Kensington Square

City and State (or Province) Greenwood, Missouri

Postal or Zip Code, Country 64034

Title of Work: BRING-YOUR-OWN TECHNOLOGY AND ONE-TO-ONE INITIATIVES IN

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BY: \_\_\_\_\_

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Date: \_\_\_\_\_

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**APPLICATION FOR AN EXTERNAL THESIS COMMITTEE MEMBER**

Student Name \_\_\_\_\_

Graduate Program \_\_\_\_\_

Thesis Title \_\_\_\_\_

Projected Date of Completion \_\_\_\_\_

\_\_\_\_\_  
Name of Committee Chair Department

\_\_\_\_\_  
Name of Central Committee Member Department

\_\_\_\_\_  
Name of External Committee Member Affiliation

**Please attach the following:**

- 1. A paragraph explaining the need for the external committee member.**
- 2. The external committee member's curriculum vitae (CV).**

\_\_\_\_\_  
Student Signature Date

\_\_\_\_\_  
Department Chair Signature Date

\_\_\_\_\_

BRING-YOUR-OWN TECHNOLOGY ONE-TO-ONE INITIATIVES IN MISSOURI 100

College Dean Signature

Date

---

Dean of Graduate Studies Signature

---

Date