BRING YOUR OWN TECHNOLOGY: THE EFFECT OF STUDENT-OWNED TECHNOLOGY ON STUDENT ENGAGEMENT

by

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This work is dedicated to those who sacrificed three years of precious time to allow me to achieve a goal I've had since age 16: My wife Paige, and my two children, Jackson and Audrey. Paige, thank you for supporting me through career changes and my constant pursuit of the next big thing. I'm done and it's your turn! Jackson, I am so proud of the young man you are becoming and know that your character, work ethic, and talents will take you wherever you want to go in life. Audrey, if the entire world were as sweet and kind as you, there would be no such thing as war, hate, or intolerance. Go change the world, sweet thing! Thank you and I love you all. Paige, the dining room table is all yours (again).

ABSTRACT

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The purpose of this ethnographic research study was to investigate the effect of a Bring Your Own Technology (BYOT) policy on student engagement in a high school setting through classroom observations, cross-sectional surveys, and a focus group of technology teacher leaders. The qualitative and quantitative data gleaned from this study indicated no significant difference in student engagement levels when student-owned technology was used for instructional purposes, but student engagement increased with teacher support and efficacy with technology, student-directed learning, and utilization of Web 2.0 applications. The findings of this study will inform future decision making by school districts considering BYOT policies, assist teachers with technology-based instructional design, and contribute to the literature on student engagement with instructional technology.

TABLE OF CONTENTS

	Chapter	Page
I.	INTRODUCTION	1
	Statement of the Problem	2
	Rationale	3
	Research Questions	12
	Description of Terms	12
	Contribution of the Study	12
	Process to Accomplish	13
II.	REVIEW OF THE LITERATURE	15
	Introduction	15
	Historical Perspective	19
	The Effect of Technology on Student Engagement	30
	The Effect of Classroom Constructs on Student Engagement with Technology	39
	Conclusions	54
III.	METHODOLOGY	56
	Introduction	56
	Research Design	58
	Participants	58
	Data Collection	60
	Analytical Methods	66

Chapter Page

IV. FINDINGS AND CONCLUSIONS 69

Findings....70

Summary of the Findings....95

Limitations 97

Implications and Recommendations....99

REFERENCES 101

APPENDICES

A. Informed Consent....113

B. Teacher Leader Pre-Assessment 116

C. Student Engagement Reflection....119

D. Teacher Engagement Reflection 121

E. At-task Observation Instrument 123

F. Faculty Survey....125

G. Student Survey....129

H. Focus Group Questions....133

LIST OF TABLES

Table		Page
1.	Technology Teacher Leaders	70
2.	Student Engagement Comparisons by Lesson Type	74
3.	Student Survey Results	78
4.	Demographics of Faculty Survey Respondents	81
5.	Teacher Beliefs and Practice	83
6.	Teacher Qualitative Responses on Resistance and Support	85
7.	Responses to Survey Items by Condition	87
8.	Ex Post Facto Cohort Data	95

CHAPTER I

INTRODUCTION

In a global environment dominated by the Internet, technology is the least integrated and the most restricted in public school classrooms (Cuban, 2001; Daggett, 2010; Thomas & McGee, 2012). A generation of "digital natives" is being educated by a generation of "digital immigrants" who are often unwilling or unable to adapt to changing classroom dynamics (Prensky, 2001, p. 4). In a world where 74% of teens are mobile Internet users, 62% of schools still prohibit cell phone use in class (Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013; Lenhart, Ling, Campbell, & Purcell, 2010). According to the National Center for Education Statistics (NCES), 97% of teachers reported the presence of at least one computer in their classroom every day, possession of or access to digital cameras, interactive whiteboards, and projectors, and an overall student-computer ratio of 5.3:1 (U.S Department of Education [NCES], 2010). In every environment but their educational setting, technology is ubiquitous for young people. According to the Pew Research Center, 78% of teens own a cell phone, 23% own a tablet computer, and 37% own smartphones, which is up 15% in only two years (Madden et al., 2013). Despite such technological ubiquity, 25% of respondents disagreed or strongly disagreed on a Likert scale response to "I am engaged in school" on the 2009 National High School Survey of Student Engagement, (Yazzie-Mintz, 2010). Given the exponential growth and availability of Web 2.0 applications, the use of student owned technology in schools has tremendous potential to increase student engagement in the

learning process. As early as 2004, Johnson encouraged the use of student-owned devices in school, an initiative now known as bring your own technology (BYOT), because this generation of students "will not be willing to leave their virtual lives at the school door" (Johnson, 2004, p. 8).

Statement of the Problem

The purpose of this research was to determine what effect the use of student owned technological devices had on student engagement in the classroom. This study went on to ascertain which strategies, technologies, instructional designs, and web-based applications worked best to engage students with their own technology. Technology use in the classroom is limited and restricted by policy, resulting in disaffected students who want technology integrated into their educational experience. According to Skinner and Belmont (1993), student engagement is both an emotional and behavioral construct. Engaged students "select tasks at the border of their competencies, initiate action when given the opportunity, and exert intense effort and concentration in the implementation of the learning tasks" (Skinner & Belmont, 1993, p. 572). According to Yazzie-Mintz (2010), there is an emerging engagement gap mirroring the achievement gap.

According to the 2010 National Educational Technology Plan (NETP), technology is pervasive in students' lives outside of school and that energy must be channeled into the classroom experience. "Technology is at the core of virtually every aspect of our daily lives and work, and we must leverage it to provide engaging and powerful learning experiences" (NETP, 2010, p. 7). This five-year plan recommends the application of technology usage in the private and professional world to the education field. Increasing teacher technology proficiency is critical because teachers generally do

not have the technological proficiency of other professionals and this has a negative trickle-down effect on students.

Rosen (2011) discussed the "iGeneration's" consumption of media, which includes the Internet as well as movies, television, and texting. Teens aged 13-15 consumed an average of 16 cumulative hours of media per day while their older 16 -18 year old peers consume 20 hours (Rosen, 2011). For this generation of students, technology is an appendage that is an integral part of their lives.

A Kaiser Family Foundation study in 2010 found that 8-18 year olds consumed an average of seven hours and 38 minutes of media seven days per week (Rideout, Foehr, & Roberts, 2010). For the purposes of the Kaiser study, the term media included television, music, computer, video games, movies, and print media. These calculations were recreational only and not related to the student's educational work in any way. Given the massive amounts of media that young people consume, Rosen (2011) questioned why a generation of multitasking students is being educated in unitasking classroom environments.

Rationale

According to Palfrey and Gasser (2008), "the educational establishment is utterly confused about what to do about the impact of technology on learning" (p. 238). The idea of introducing and integrating technology into the classroom is not a new one. The twentieth century saw attempts to bring radio, film, television, and computing technology into the classroom to accomplish a number of academic and social goals with varying degrees of success (Goddard, 2002; Hill, 2011).

A Policy Information Report from Educational Testing Services (ETS) described technological conditions unimaginable at present. While 98% of U.S. schools had computers in 1996, only 85% of those computers had multimedia capability and only 64% of schools had Internet access (Coley, Cradler, & Engel, 1997).

Dwyer, Ringstaff, and Sandholtz (1991) evaluated the Apple Classrooms of Tomorrow (ACOT) initiative, which was created to explore the effect of technology use on teaching practice. The goals of ACOT were to promote change by integrating state of the art technology into schools. A flood of new technology did little to change teaching practice. Teacher and student collaboration increased over time and environments were modified to accommodate technology projects resulting in increased student engagement (Dwyer et al., 1991). Technology had a positive impact on student engagement, usually due to its novelty (Dwyer et al., 1991). To overcome a decline in student enthusiasm for technology, the manner in which technology is utilized must be addressed (Dwyer et al., 1991). The study found that technology increases student engagement when it is integrated into a larger pedagogical framework, allows students individual time to investigate, and permits teachers to accept their changing role in the classroom (Dwyer et al., 1991).

Cuban (2001) described the vision of classroom computing as a disappointment even given the ubiquity of computers in American schools. Cuban (2001) attributes this failure to a weak definition of computer literacy and little attention to the practice of teaching and learning with computers. Only by increasing access, restructuring schools and educational organizations, and engaging and supporting teachers will the desired technological transformation take place (Cuban, 2001).

Warschauer (2011) described the pattern first noted by Larry Cuban involving stages of early enthusiasm, pilot projects under ideal conditions, administrative pressure without teacher inclusion, teacher resistance and blame, and eventual failure. Warschauer (2011) stated that Cuban was wrong because computer use has already far superseded radio, television, and film in the classroom. Warschauer (2011) said the key is not to engage students, but teachers in order to integrate technology fully in the classroom. Warschauer (2011) described a BYOT initiative known as the Partnership for Powerful Learning in Forest Hills School District in Cincinnati, Ohio. This model resulted from the failure to fully fund a one-to-one laptop program. Prior to its implementation, all teachers participated in a full year of professional development on educational technology. Students were also required to complete a three-hour orientation if they planned to bring a device to school. Given such a proactive approach, over 95% of teachers supported the initiative prior to its launch (Warschauer, 2011).

Christensen (2002) conducted a study that demonstrated a reciprocal relationship between teacher and student attitudes regarding the use of technology in the classroom. Teacher attitudes improved with training and education on instructional technology and led to increased student computer importance. Christensen (2002) noted, "There is little doubt that the way teachers view technology affects the attitudes of their students" (p. 429).

Daggett (2010) stated students are already bringing and using their technology at school so educators should teach them to use it for mutual academic goals and to build relevant experiential learning environments. In order to do so, instruction must be shifted

from didactic to constructive learning in order to produce students that are college and career ready for a global technological world (Daggett, 2010).

A study of 30 technologically proficient teachers conducted by Bauer and Kenton (2005) revealed that even the most technologically confident educators struggle to integrate technology effectively. Forty-seven percent of these teachers reported difficulty with hardware, 30% with time to prepare, 23% with student skill levels, and 17% with teacher skill, even though they self-reported high degrees of confidence (Bauer & Kenton, 2005). Over 80% of these educators reported that they used instructional technology less than 50% of the time in class (Bauer & Kenton, 2005).

Spires, Lee, Turner, and Johnson (2008) conducted a study demonstrating a link between middle school use of technology and academic engagement. The results of this survey and focus group study indicated that students want learning environments that model the outside world and the opportunity to use technology in the classroom (Spires et al., 2008). In this study, all ethnic groups of students reported that using computers was their favorite activity in school and ranked completing worksheets and teacher explanations the least interesting (Spires et al., 2008). In this vein, Hannafin, Hill, and Land (1997), noted that the volume of information being produced necessitates a change from directed teaching styles to open-ended learning environments rich with technology-based critical thinking and problem-solving activities.

Warschauer (2006) reported 73% of students and 77% of teachers conveyed higher levels of student interest when laptops were utilized in the classroom. According to Palfrey and Gasser (2008), a number of strategies engage students with technology, including collaborative teams and the use of digital gaming.

The influx of technology into the classroom provides nearly limitless potential to increase student engagement in the learning process while promoting student growth. However, obstacles do exist that may limit student-owned devices capacity for success. While well intentioned, simply providing access to computing devices is not sufficient to increase student engagement in the learning environment. Numerous other conditions must be addressed to effectively integrate technology and engage students. Student access to educational technology and a positive perception of the value of such technology are important conditions in integrating technology successfully.

Hill (2011) questioned why mobile devices are used responsibly and effectively in the workplace but not in schools. The smart phone is rapidly closing the digital divide and keeps students engaged even after the school day ends (Hill, 2011). However, there is little research at this point whether smart phone use in the classroom is succeeding (Hill, 2011). Hill (2011) notes that the integration of computers in the classroom has run from computer labs, computers in the classrooms, laptop carts, every student laptop initiatives, and now to the mobile device. Despite the common perception of a digital divide, low socio-economic status teens own smartphones at nearly the same rate as their high socio-economic status peers. (Madden et al., 2013).

Goddard (2002) stated that integrating technology leads to creativity that results in student engagement. A framework must be created to increase student engagement through cooperation, active learning, feedback, teacher-student relationships, and trust (Goddard, 2002). In order to do this, behavioral change for teachers is paramount and they must move from resistance to acceptance and embrace the change (Goddard, 2002).

Gorder (2008) argues that the most significant obstacle to integrating technology in the classroom is the teachers' efficacy in meeting student needs with effective educational technology activities. Overall, teachers use technology for organization, communication, and presentation, but do not integrate technology into the learning process (Gorder, 2008). Teachers err when teaching the skill of using technology rather than integrating into the curriculum (Gorder, 2008).

Hirsch (2005) addressed the challenges faced by schools as technology improves and accountability increases. The first step in facing such a challenge is to change stakeholder attitudes regarding student-owned devices (SOD) (Hirsch, 2005). SOD could be a low cost, transformative tool that can make school more personal and engaging for students as the potential benefits are too great to ignore, despite the challenges and risks (Hirsch, 2005).

Beyond basic access to educational technology and computing devices in the classroom, student perception of the value of educational technology plays a role in educational success. Schnellert and Keengwe (2012) stated that students perceive technology as part of their lives, not a tool or accessory. One-to-one laptop programs improve student achievement and engagement, reduce the digital divide, and change the classroom culture from teacher-focused to student-focused (Schnellert & Keengwe, 2012). Schools must support and train teachers while developing procedures to limit off task behavior (Schnellert & Keengwe, 2012).

Lindquist and Long (2011) conducted a college level needs assessment for students and faculty regarding the development of digital resources. Faculty reported that

to use Web 2.0 technologies effectively an investment of time is required, while students wanted choice in learner-centered environments (Lindquist & Long, 2011).

Thomas and McGee (2012) described the fear that teachers and administrators have that students will use the devices for texting, academic dishonesty, sexting, and cyber-bullying. However, the possession of a device does not cause these behaviors and the devices are far too valuable of an instructional tool to be disallowed (Thomas & McGee, 2012). Regardless of these changing dynamics, the one thing students never neglect to bring to class is their cell phone (Thomas & McGee, 2012). Rather than banning such devices out of fear of cheating or inappropriate or off-task behavior, the power of cell phones in the classroom should be embraced (Thomas & McGee, 2012). It is imperative that teachers model for students the ways in which personal technology can be used in acceptable manners (Thomas & McGee, 2012).

Annan-Coultas (2006) described the varied results of student laptop use in the classroom. While students enjoyed the advantages of faster communication, unlimited access to resources, and increased course transparency, the presence of laptops in the classroom presented the opportunity for off task behavior (Annan-Coultas, 2006). A lack of faculty engagement also contributed to student distraction and multi-tasking during class time (Annan-Coultas, 2006). School districts face the challenge of students obtaining new technology before school system acquisition, and such conditions impaired the school's ability to judge which technology to purchase and utilize (Annan-Coultas, 2006).

A study conducted by Fried (2006) demonstrated that off-task behavior was prevalent among students in a higher education setting when allowed to use laptops

during class time. Students were not using the laptops for the intended purposes of taking lecture notes and accessing the Internet, but rather engaging in a variety of other tasks unrelated to the course (Fried, 2006). This study demonstrated that student use of laptops during lectures resulted in a significant amount of off task behavior leading to diminished course performance (Fried, 2006). According to students, the onus is upon faculty to integrate laptop use into the course rather than allow for free utilization by students during lectures (Fried, 2006).

Students may share the frustrations and resistance felt by teachers with implementation and usage of technology in the classroom. According to D'Souza and Wood (2007), "many users of technology-based materials say that students find strong motivation in the feeling that they are in control of their own learning" and computer technology promotes "exploration and independent inquiry, shared knowledge and collaborative learning, efficiency and organization, analyzing and studying information" (p. 287). As reasons for student resistance, D'Souza and Wood cite "too few working computers, computers not working properly, the time taken to learn the software, lack of computer confidence et cetera" (p. 293).

Barak, Lipson, and Lernan (2006) described the advantages and disadvantages of wireless laptops in a university setting. Advantages included exploration that improves understanding and retention, improved communication, feedback, and collaboration, and appeal to diverse learning styles. The disadvantages included 12% of students reporting being off task and 15% describing wireless laptops as too much of a distraction (Barak et al., 2006).

Johnson (2006) stated "using technology to create engagement is ultimately unsustainable as the novelty wears off, the pride in privilege slips away, and students discover limits to the devices and encounter restrictions imposed by teachers, parents, and administrators" (p. 32). While many researchers support the use of educational technology to increase student engagement, Johnson (2006) decries the ubiquity of computers for the sole sake of engagement. Schools must adopt a multi-pronged approach with ubiquitous computing to increase student engagement (Johnson, 2006). This approach must include dynamic changes in school infrastructure and an increased focus on technology-based process improvement in order to effectively increase student engagement (Johnson, 2006).

Capo and Orellana (2011) researched the reasons for teacher reluctance to employ Web 2.0 technologies in the classroom. The primary obstacle to Web 2.0 integration was teacher perceived utility and teacher attitudes (Capo & Orellana, 2011). Only 30.7 % of teachers reported that Web 2.0 technologies were simple to incorporate, but 38% of teachers conveyed that Web 2.0 activities improved student satisfaction (Capo & Orellana, 2011).

Johnson (2004) addressed whether schools should promote or ban personally owned devices such as cell phones, handhelds, and laptops. Despite the difficulty in maintaining appropriate use, schools should embrace educational technologies for this uniquely savvy generation of students (Johnson, 2004).

Research Questions

The intent of this research was to determine what affect the use of student-owned technology in the classroom had on student engagement. The following research questions guided the focus of this survey:

1. How does the use of student-owned technology impact student engagement?
2. What constructs work best to engage students with their own technology?

Description of Terms

ACOT. Apple Computers of Tomorrow was an initiative in the mid-eighties to put a computer in every classroom.

BYOT. Bring Your Own Technology. A policy allowing individual students to bring personally owned electronic devices to school for instructional use in the classroom.

SOD. Student-owned devices.

Teacher Leader. Teachers in the school district who have received additional professional development on BYOT strategies to disseminate in their respective faculties.

21st Century Skills Assessment. A technology proficiency assessment administered to all students in grades 8-12.

Web 2.0. A variety of internet-based tools and applications that store information online rather than on individual computers or devices.

Wireless. Internet access without cabling.

Contribution of the Study

Teachers, administrators, and school districts considering policies to allow students to utilize their own electronic devices in the classroom would benefit from this

study. Very little literature existed either on the use of student owned devices or on how to measure student engagement while using technology. Initiatives such as BYOT have tremendous potential to help schools systems that are struggling financially while also meeting the needs of individual learners. Any teacher seeking to increase student engagement in their classroom would benefit from this study. The BYOT movement is a compelling one with significant potential to increase student engagement and satisfaction, but additional research was needed to determine if students were more engaged in the learning process when allowed to utilize personally owned technology.

Process to Accomplish

The research design for this study was an ethnographic model. The ethnographic research design included both quantitative and qualitative measures.

The population for this study consisted of the faculty and students of a suburban 9-12 high school in Middle Tennessee. The study began immediately upon approval by the institutional review board and the cooperating school district. The researcher worked at the school as an assistant principal during the study. Teachers who volunteered to serve as BYOT teacher-leaders agreed to host classroom observations for this research.

In order to answer the first research question, how does the use of student-owned technology impact student engagement, data were needed from teacher self-assessment surveys, student self-report instruments, researcher observations, and teacher reflections. The researcher observed each participating teacher classroom three times in the 2013-14 school year. The observations took place on days of scheduled student-owned device use, school-owned technology use, and no technology use. Prior to their first scheduled observation, participating teachers completed a technology self-assessment on Survey

Monkey that included a personal definition of engagement. At the end of each observed class, the students completed an engagement self-assessment and the teacher later completed a reflection instrument. The researcher measured student engagement during each observation with an At-Task Observation Instrument. Student engagement levels were analyzed with a within-subjects analysis of variance (ANOVA) to determine if engagement levels differed when using student-owned technology.

In order to answer the second research question, what constructs work best to engage students with their own technology, data were needed from students, teachers, and the school administration. A faculty survey was conducted via Survey Monkey to get baseline data on school-wide teacher proficiencies and attitudes towards student-owned technology in the classroom. The researcher conducted a focus group interview with the BYOT teacher-leaders during the last quarter of the 2013-2014 school year, as well as individual interviews with these same teachers. A school wide survey of students was conducted via Survey Monkey to measure student attitudes toward BYOT, the instructional activities they found most engaging, and the student's perception of frequency of use. In order to gain further insight into potential residual effects of the BYOT initiative, the researcher analyzed additional data sets. These data included daily attendance, graduation, and dropout rates. Finally, a retroactive cohort design was used to determine if there was an increase in student passing percentages on the 21st Century Skills Assessment between 2012 and 2014, the first two years of full BYOT implementation.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

What role should technology play in the educational lives of students? This compelling question has challenged teachers, parents, administrators, educational leaders, and political figures for over a century. Initiatives to integrate radio, film, television, and computing technologies into classrooms characterized much of twentieth century educational policy, albeit with mixed results (Cuban, 2001; Goddard, 2002; Hill, 2011). Given the present ubiquity and prevalence of mobile electronic devices, student use of technology is a dilemma facing educators every day in the classroom. The primary technological obstacle facing the educational establishment today is not the digital divide, but the digital disconnect (Levin & Arafeh, 2002). The digital disconnect refers to the difference between student technology use in their personal lives versus that in their educational lives while at school (Levin & Arafeh, 2002). While the digital divide continues to shrink, the digital disconnect remains entrenched in public school classrooms and is only exacerbated by the growth of personal computing technology (Madden et al., 2013).

Given the ubiquity of personal technology in the hands of students, bring your own technology or device (BYOT or BYOD) is the next step towards the vision of

authentic technology integration in the classroom. Given the novelty of the BYOT movement, little data exists on its influence on student experiences in the classroom. While there is ample research on the relationship between technology integration and student engagement, research is needed on the classroom utilization of personally owned technology and its effect on student engagement.

This review of literature traced the evolution of student engagement in a parallel manner with the growth of technology and its inclusion in the classroom. The goal of this literature review was to examine the intersection of effective use of instructional technology and student engagement in the classroom. This research describes the apex of technological advances and the rise of interest in studying student engagement. While BYOT has the potential to uniquely meet the individual needs of students and improve student engagement, there are very few studies in the literature of its effectiveness in meeting educational goals. Therefore, the researcher sought a body of literature examining the relationship between technology use and student engagement to inform the need for research on the effect of student-owned technology on student engagement.

This review of the literature was guided by focusing on two research questions:

1. How does the use of student-owned technology impact student engagement?
2. What constructs work best to engage students with their own technology?

BYOT is a distinctly recent phenomenon with little evidence in the literature of its effect on student engagement. Therefore, the researcher sought a body of work in the literature that demonstrates the relationship between technology use in the classroom and student engagement. The researcher first reviewed the extensive history of technology

integration in the classroom. This history includes government policies promoting educational technology use, the exponential growth and availability of electronic devices, and background on the BYOT movement in both educational and business environments. Next, the researcher sought studies in the literature on technology use in K-12 and college classrooms relating to student engagement. Lastly, the researcher reviewed material in the literature on the constructs that most engage students in the classroom with technology, including Web 2.0 and social media, teacher- or student-directed learning environments, obstacles and barriers to technology integration, and digital citizenship programs. Each of these focus areas contributed to an understanding of whether student owned devices (SOD) could increase student engagement and the necessity of research on the relationship between the two.

A significant body of literature exists on the long history of attempting to successfully introduce and integrate technology in the classroom. This decades-long movement resulted in varying degrees of success. The researcher also explored the history of government policies designed to encourage technology integration in classrooms. As a result of the exponential growth of personal technology, the researcher included data on the prevalence and ubiquity of current technologies that have led to the BYOT movement. The researcher also included literature on multidisciplinary recommendations for successful BYOT implementation in both business and educational environments.

The researcher then sought a body of literature investigating student engagement and its relationship to technology use in K-12 and post-secondary classrooms. Prior to exploring classroom studies, the researcher examined student engagement as a basis for

understanding the student experience in the classroom. The researcher then explored the literature on technology's impact on student engagement in both K-12 and post-secondary environments. The results of research on student engagement with technology in K-12 and college classrooms provided the researcher with an understanding of successful integration practices and the potential for BYOT's effect on student engagement.

Lastly, the researcher sought a body of literature investigating the constructs that best engage students with technology and the barriers to utilizing those methods. The researcher sought studies in which Web 2.0 technologies and student-directed learning environments affected student engagement. Additional studies were sought to determine the foremost barriers to using these constructs, including teacher resistance and a lack of responsible use by students. The researcher also reviewed the literature on the potential for educational technology to increase inappropriate and off task behaviors among students. Finally, the researcher sought studies on the effectiveness of digital citizenship curriculum in improving teacher perception of educational technology, decreasing misbehavior by students, and reducing teacher resistance to technology use in the classroom. Such factors must be considered in implementing a successful BYOD policy to increase student engagement.

This chapter reviewed literature on the integration of technology into classrooms and its effect on student engagement to demonstrate the need for research on the effect of SOD on student engagement. While the history of student experiences with technology is an extensive one, decades of attempts to successfully integrate technology in the classroom have produced mixed results. The goal of integrating technology in the

classroom, coupled with a demonstrated lack of student engagement in the educational process, creates a unique opportunity for the utilization of student-owned technology in the classroom. Research is needed to determine the impact of SOD on student engagement in the classroom. In addition, if the use of SOD increases student engagement, research is needed to determine what instructional designs and classroom constructs result in the highest levels of student engagement in a BYOT or BYOD environment.

Historical Perspective

The incorporation of current technologies into the classroom experience of students is a long-held goal of educational and political leaders. As new technologies emerged to become societal norms, educational and governmental agencies undertook measures to integrate these innovations into classrooms. A review of the research on technology integration in the classroom revealed positive and negative results over time. The literature on the history of technology in education also revealed that the vision of educational leaders often conflicts with established classroom practice and educator pedagogy.

Optimism on the potential of new technologies to drastically change educational practice often goes unrealized. In 1913, Thomas Edison is purported to have said "books will soon be obsolete in schools. Scholars will soon be instructed through the eye. It is possible to teach every branch of human knowledge with the motion picture. Our school system will be completely changed in ten years" (Saettler, 1990, p. 98). Though Edison's vision was unrealized over a century later, scholars and educational leaders continued to push for integration of current advances in technology to meet educational goals.

Prominent psychologist and behaviorist B. F. Skinner advocated the use of teaching machines to support programmed instruction in schools (Saettler, 1990). The teaching machines served as an arbiter of Skinner's theory of operant conditioning in the education of students (Saettler, 1990). Such machines, Skinner argued, uniquely met the individual needs of students by reinforcing answers that the students themselves provide (Saettler, 1990).

In a similar vein, Cook (1962) discussed the transition and application of the Socratic Method to teaching machine. Cook (1962) questioned whether teaching machines were to serve as the primary means of instructional delivery or as an additional resource for classroom instruction. Cook cryptically foreshadowed that teaching machines "reflect the trend in our society towards greater automation in our daily living. How we react to this challenge will determine to a great extent the future of education" (p. 19).

Saettler (1990) noted a seismic shift in education with the introduction of the microcomputer in the late 1970s and early 1980s. In addition to the voluminous amounts of information accessible by computer, classroom instruction began a slow and arduous transition from product-based demonstrations of learning to cognitive-based demonstrations of problem solving ability (Saettler, 1990). This lethargy in harnessing the power of computers despite their ubiquity in American classrooms is the premise of Cuban's *Oversold and Underused* (Cuban, 2001). Coley, Cradler, & Engel (1997) echoed this phenomenon by casting the key to positive outcomes with educational technology not as computer ubiquity, but teacher training in effective instructional design.

Once deployed in the hands of every student, educational technology has the potential to achieve a number of educational goals. To reduce the digital divide, many schools chose the one-to-one computing model provided by school districts, but the exorbitant cost is a barrier even given affirming results from such initiatives (Kiger, Herro, & Prunty, 2012). Johnson (2004) noted the rising popularity of 1:1 programs with laptops against the backdrop of challenging financial constraints. According to Schnellert and Keengwe (2012), one-to-one initiatives shift the classroom focus from teacher to student; eradicate the digital divide; and increase student engagement and achievement.

As technologies advanced, the impetus for teacher preparation programs to stay relevant and current with these technologies became paramount. Betrus and Molenda (2002) indicated that teacher preparation programs have kept pace with advancing technologies but noted disconnect between teacher preparation and classroom practice. The disconnect emerged at the beginning of the Information Age in the 1980s and 1990s with the proliferation of the personal computer and the Internet (Betrus & Molenda, 2002). Throughout most of the 20th century, educational use of technology was primarily audiovisual (Betrus & Molenda, 2002). Universities and teaching colleges kept pace by providing one undergraduate course in teacher preparation programs (Betrus & Molenda, 2002). Since the advent of the Internet, colleges and universities have increased pre-service teachers' exposure to technology to align with constructivism as an educational model (Betrus & Molenda, 2002).

Throughout the twentieth century, school districts, local, and state educational departments advocated for technology integration in classrooms to enrich the educational

experience of students and increase the relevance of student learning. However, educational leaders were not the only entities pushing for technology integration in schools. The role of technology in the educational lives of students quickly became a matter of government policy as well.

Government Policy

The U.S. government recognized the importance of technology-related education and put several initiatives in place in the second half of the 20th and early 21st century. These initiatives included legislation to promote scientific and technical education, funding for technology integration, and national plans to incorporate technology into the daily lives of American students. Much like educational leaders looking to engage students and remain competitive, the government saw the value of promoting technology as a matter of national interest.

The first government foray into encouraging technology in education was the National Defense Education Act (NDEA) passed in 1958 (U. S. Department of Education, 2012). This policy grew out of the pervasive fear of the Soviet Union during the Cold War. The Soviet launch of the Sputnik satellite in 1957 spawned an accelerated interest in science and technology. The NDEA (U. S. Department of Education, 2012) provided for college loans and fellowship opportunities, higher standards in math, science, and foreign language in K-12 schools, and increased access to career and technology training.

The lack of student technology preparation was also noted in *A Nation at Risk* in 1983 (National Commission on Excellence in Education, 1983). This watershed document in American public education described a coming rapid advance of technology

for which American students were woefully unprepared. The report quotes analyst Paul Copperman as prophesying:

> Each generation of Americans has outstripped its parents in education, in literacy, and in economic attainment. For the first time in the history of our country, the educational skills of one generation will not surpass, will not equal, will not even approach, those of their parents. (National Commission, 1983, paragraph 14)

A Nation at Risk goes on to state the advent of computers, technology, and robotics exacerbated this condition. As technology continued to advance at a torrid pace, the role of the government in addressing the technological shortcomings of U.S. schools became an utmost priority.

In 1994, the U.S. Congress passed legislation that was signed by President Clinton to create the Office of Educational Technology (NETP, n.d.). This organization drafted the first National Education Technology Plan (NETP) in 1996, known as *Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge*. Further iterations of the NETP in 2000, 2004, and 2010 built upon this foundation to meet the needs of American students as technology advanced.

No Child Left Behind (Enhancing education through technology, 2001) also addressed the issue of technology integration in American public schools. Section II, Part D of NCLB, also known as the *Enhancing Education Through Technology Act of 2001*, provides incentives for closing the digital divide, improving technological proficiency, and increasing student academic achievement via technology. NCLB (2001) also continued the requirement for a National Education Technology Plan that increases student achievement by integrating technology for all students.

As the government raced to promote inclusion of emerging technologies in American classrooms, the growth and development of technology in the private sector rapidly outpaced its adoption in schools. Failing to keep pace with technological advances in the private sector pushed educational and political leaders to consider alternative means of integrating technology into the classroom. The current prevalence and ubiquity of personal mobile computing has led to BYOT becoming a viable option for school districts to integrate technology while boosting student engagement.

Prevalence/Ubiquity

Prior to the 21st century, the ubiquity of educational technology referred to the vast number of school-owned computers during the late 20th century (Cuban, 2001). At present, technological ubiquity refers to the presence of mobile computing technology in the hands of nearly every student in the form of a smartphone. A report from the Pew Internet Research Project indicates that 93% of students own or have access to a laptop or desktop computer and 74% of teens access the Internet via mobile devices such as tablet computers or smartphones (Madden et al., 2013). The ubiquity of mobile technologies is the result of the exponential successes of technology behemoths Apple and Google, which currently dominate the global technology landscape. In 2013, Apple (2014) saw a 26% increase in sales of iPhones and reported over $10 billion spent by customers in the App Store. Apple's App Store contains over one million applications available for the iPhone, iPad, and iPod, with 75,000 educational applications available for download (Apple, 2013; 2014). In addition, Apple (2014) surpassed over one billion downloads of educational content on iTunes U, which promotes global educational connectivity via courseware with over 250,000 students enrolled. Google (2014) garnered $15.7 billion in

revenue in 2013 from its suite of sites, network partners, advertising and search functions, and mobile segments, representing a 22% increase in revenue in 2012. While the sales of mobile technologies continue to skyrocket, Gartner (2014) reported that global sales of personal computers dropped 10% from 2012 to 2013. The rising tide of personal, mobile technologies has put the most powerful and functional devices available into the hands of students, who often are forbidden or banned from using them for educational purposes during the school day.

Student ownership of powerful computing devices and ready access to the Internet is not sufficient to increase student engagement in the learning environment. A review of the research on technology integration into the classroom revealed other conditions that must be addressed to effectively integrate technology. Given that nearly every student is already bringing personally owned devices to school, how can schools harness the power of such technologies to increase student engagement and promote student achievement (Daggett, 2010)? Allowing students to bring their own devices and utilize them for instructional purposes may be that answer.

Bring Your Own Technology or Bring Your Own Device

The rapid advancement of innovation in personal technology is forcing many school districts and businesses to make a decision whether to allow stakeholders to bring their own electronic devices into the organization. The Bring-Your-Own-Technology or Device (BYOT or BYOD) movement in business and education is a dynamic one with significant opportunities and challenges for the organizations. Ackerman and Krupp (2012) define BYOT as "the platform for which students become active participants in learning both in and outside of the classroom setting by enabling employees and students

to use their personal devices and connect with school/employers network" (p. 35). To assess the cost and benefits of BYOT implementation, the researcher sought articles and studies in the literature on the background of the BYOD movement, advantages and disadvantages of such policies, and best practices for BYOT implementation.

In a 2011 blog posting, Stager (2011) referred to BYOD as "the worst idea of the 21st century." As an early advocate of one-to-one computing, Stager (2011) enumerated several reasons why the BYOD movement is counterintuitive to transformational learning with technology. Such reasons include school-sanctioned educational inequity, teaching to the lowest common denominator, unnecessary imposition on teachers, and further tightening of school budgets (Stager, 2011).

According to technology research giant Gartner, BYOD is a "disruptive phenomenon" that negatively affects organizations in the areas of governance and compliance, mobile device management, and security (Gartner, n.d.). The organization also acknowledged that even though such policies are challenging for organizations, they must be confronted because "BYOD is here and you can't stop it" (Gartner, n.d.).

De Waard (2014) includes BYOD as an important component of a greater movement towards mobilism and mobile learning (mLearning). De Waard (2014) characterizes mobilism as a system of universal connectivity than enables mLearning, which she defines as "learning across multiple contexts, through social and content interactions, using personal electronic devices" (p. 114). The author discusses BYOD as one of four strategies that can be utilized to introduce mobilism in the learning environment: BYOD, mobile social media, mobile apps, and mobile sensors (De Waard, 2014). BYOD is an attractive, cost effective, and engaging alternative for corporations

and educational organizations alike (De Waard, 2014). The beauty of BYOD lies in its simplicity of using Wi-Fi, chunking and compartmentalizing lessons, one touch access to links, and crowd sourcing to deliver mobile content effectively (De Waard, 2014).

Ackerman and Krupp (2012) discussed five considerations for school districts in adopting a BYOT initiative. The five components are aligned with and designed to accentuate Williard's Pyramid of BYOT implementations (Ackerman &Krupp, 2012). These essential considerations include network security, vesting of stakeholders, clearly articulated policies, professional development, and financial sustainability (Ackerman &Krupp, 2012). According to the authors, BYOT fills two existing gaps in education, one in funding and the second in classroom focus (Ackerman &Krupp, 2012).

Russell (2012) explored the deployment of one-to-one initiatives that included SOD, laptop computers, and tablets. Russell (2012) received 93 responses from a group of teachers, administrators, and technology directors. Russell (2012) also interviewed four teachers and one administrator. Sixty-four percent of survey respondents reported that mobile devices are prohibited during class time but despite these policies, 40% of students use their devices more than five to six times per semester (Russell, 2012). Only 16% of students were reported to have used their devices multiple times per week or daily (Russell, 2012). In response to the question "Does BYOT pose more of a benefit or a disruption to learning in your classroom (or if applicable, building/district)," 12% responded benefit, 55% both equally, and 32% disruption (Russell, 2012).

The adoption of a BYOD/BYOT policy presents challenges for businesses as well as educational institutions. These challenges include issues of corporate security and intellectual property rights, network security, and employee time on task. When

individuals use their own devices on corporate networks, those networks can become compromised. Some personally owned technology might also not be compatible with existing infrastructure, requiring costly upgrades or the purchase of technology for those individuals. Such a policy may also require companies to adopt more detailed non-disclosure or non-compete agreements if their networks are accessed by personally owned devices. Finally, the use of a personally owned device in a BYOD/BYOT environment could be a constant temptation for an employee to engage in personal matters or entertainment on their devices unrelated to their work. The onus on the company in at BYOD/BYOT environment is to ensure that their network is secure, their work product is protected, and their employees remain productive.

Rose (2013) describes the security and financial threats faced by companies considering a BYOD policy. Such policies create myriad threats to security and intellectual property while amassing costs greater than those assumed when providing company-owned devices (Rose, 2013). Rose (2013) cites data from Aberdeen Group that casts BYOD as 33% more expensive than an organic mobile device policy. Adopting a BYOD strategy opens the company to issues of legal entanglement with the private behavior of employees as well as the increased IT challenges of managing multiple carrier platforms (Rose, 2013). According to Rose (2013), the inherent risks of a BYOD policy far outweigh any anticipated cost savings or boost in employee productivity or morale.

Ready, Astani, and Tessema (2014) describe a number of considerations that human resource organizations must consider in a BYOT/BYOD environment. The most significant threat is the security issues faced by organizations considering a

BYOT/BYOD policy (Ready, Astani, & Tessema, 2014). The authors surveyed 57 Midwestern companies on BYOT/BYOD utilization and governance in the workplace. Based on this data, the authors propose regulations for companies to define and implement BYOT policies. The survey demonstrated that while 42% of companies have Mobile Device Management (MDM) policies, only 30% have associated training for employees in place (Ready et al., 2014). The most important concern noted was the "penetration of corporate Wi-Fi networks" and the least was "devices of users home wifi networks" (Ready et al., 2014). BYOD policies must be aligned with systematic professional development in the organization for security threats are the primary concern but policies alone are not sufficient (Ready et al., 2014).

Businesses and educational institutions should educate themselves about the benefits and challenges of the BYOT/BYOD model because as technology continues to advance at such rapid rates, neither children nor adults will be willing to leave their personally owned technology at home. Allowing employees and students to bring their own devices saves significant amounts of money, increases personal engagement and satisfaction, and improves productivity and efficiency. However, there are significant risks associated with allowing individuals to bring their own technology, such as compromised information technology networks, intellectual property breaches, and the potential for lost productivity or efficiency due to off-task behavior. Due to the proliferation of technology, the decision of whether to allow individuals to bring their own electronics is one that will face many companies and educational institutions in the very near future. Norris and Soloway (2011) predict that by 2015 all schools will be BYOD for it is the "only viable long-term solution" to achieving one-to-one (p. 77).

Schools and companies may not have had to decide upon a BYOD/BYOT strategy at present, but they will in the very near future. If organizational stakeholders are already bringing their own devices into schools and businesses, organizations must address a balance between positive benefits and unacceptable use in policy (Hirsch, 2005). What is undetermined is the effect that personally owned technology has on the attention, motivation, and engagement of the individual bringing the device into the organization.

The Effect of Technology on Student Engagement

The study of educational technology and student engagement are both fertile fields of educational research. To assess the relevant literature on student engagement with technology, the researcher sought background literature on student engagement as a construct, as well as studies from K-12 and college classrooms. The researcher sought literature on the challenge of defining and measuring engagement in the classroom as well as how students rate their level of engagement when allowed to use technology in K-12 and college classrooms. The researcher also sought studies from K-12 and post-secondary environments on instructor perception of student engagement with technology. Such understandings are essential to determine the potential for student-owned technology to positively affect student engagement in the classroom. These focus areas also contributed to the need for research to inform the development of BYOT policies to increase student engagement.

Engagement

Throughout its use, the term engagement has proven difficult both to define and quantify (Saeed & Zyngier, 2012; Schlechty, 2001; Yazzie-Mintz & McCormick, 2012). Yazzie-Mintz and McCormick (2012) describe engagement as a relationship between the

student and the learning environment and school community. Engagement has multiple levels and constructs that encompass not just behavior but cognition and emotion, and is a paradigm not to be confused with motivation (Saeed & Zyngier, 2012). In *Shaking Up the Schoolhouse*, Schlechty (2001) cited electronic media as a "new competitor" for the attention of students and a challenger to traditional school authority (p. 27). In this environment, the impetus is on classroom teachers and school leaders to foster an educational setting where students find meaning in their academic work. To this end, Schlechty (2001) described a new vision of student engagement:

> Engagement is active. It requires the student to be attentive as well as in attendance; it requires the student to be committed to the task and find some inherent value in what he or she is being asked to do. The engaged student not only does the task assigned but also does the task with enthusiasm and diligence. Moreover, the student performs the task because he or she perceives the task to be associated with a *near-term* end that he or she values. (p. 64)

In order to evaluate and assess student engagement in the classroom, Schlechty developed five levels of student engagement. These levels include authentic engagement, ritual engagement, passive engagement, retreatism, and rebellion (Schlechty, 2001).

Electronic media has often been targeted as a means to engage students in the classroom. Tucker and Courts (2010) state "the integration of multimedia in the classroom increases student awareness and attention which might lead to increased satisfaction on the part of both the student and the instructor" (p. 41). According to Mbarika et al. (2010), "multimedia provides an opportunity to reach different people with different learning styles, different skill levels, and also offers the potential to reduce the

learning curve and accelerate the learning process" (p. 31). However, Yazzie-Mintz (2010) disagrees with the use of technology just for technology's sake or as a singular means of engaging students without regard for the learning outcomes.

Saeed and Zyngier (2012) conducted a qualitative study to assess the effects of intrinsic or extrinsic motivation on student engagement. Students were surveyed on their self-perception of their own motivations for learning. Of 21 students in the study, 11 indicated they were intrinsically motivated, eight mixed between the two forms of motivation, and two extrinsically motivated (Saeed & Zyngier, 2012). The study revealed that intrinsic motivation is aligned with Schlechty's authentic engagement while extrinsic motivation corresponds with ritual compliance (Saeed & Zyngier, 2012). This study was limited by a sample that included only one elementary school class of fifth and sixth grade students. Student motivation is another construct that teachers must consider when designing classroom instruction to engage students (Saeed & Zyngier, 2012). Given the difficulty in both defining and measuring student engagement, the researcher sought classroom studies where student attention, participation, and engagement were measured from varying perspectives.

K-12 Studies

In reviewing the literature on educational technology, numerous studies exist on technology's impact on student performance in K-12 classroom environments. To investigate the need for research on the effect of student-owned technology on student engagement, the researcher sought out studies in the literature that investigated technology's relationship to student engagement in K-12 classrooms.

McDowell (2013) conducted a three-pronged qualitative study of the perception of urban students, teachers, and administrators on the relationship between technology and student engagement. Students reported that technology appeals to visual learners, keeps their attention, and allows the teacher to achieve a greater level of depth with the material (McDowell, 2013). Teachers shared that while technology integration is challenging, it does increase teacher effectiveness and engages students in the classroom (McDowell, 2013). Administrators reported that technology use is aligned with the school's mission and vision and also significantly influences student engagement (McDowell, 2013). While each of the groups agreed that technology improves student engagement, they expressed differing perspectives on collaborative technology planning for coursework and frequency of device utilization (McDowell, 2013).

Ozer-Kendig (2010) examined the impact of the infusion of technology on student engagement and teacher practice as a result of the State of Pennsylvania's *Classrooms for the Future* initiative. This three-year grant resulted in an influx of classroom technology as well as funding for teacher professional development in its last year. Data analysis after the conclusion of the program revealed several compelling trends. The percentage of teachers reporting that they "rarely used technology" decreased from 32% to 9% while the percentage of teachers reporting that they "often used technology" increased from 14% to 41% (Ozer-Kendig, 2010). The researchers also used a student engagement survey in which 63% of students reported being more engaged when the teacher uses technology and 70% reported being more engaged when allowed to use technology themselves (Ozer-Kendig, 2010). When asked if they were more engaged when a teacher uses technology or when they themselves are allowed to use technology, 71% of students

responded that they were more engaged when they themselves were allowed to use technology (Ozer-Kendig, 2010). The findings of this study indicate the highest levels of student engagement occur when students are allowed to use their own technology (Ozer-Kendig, 2010).

Morgan (2008) investigated the effect of interactive whiteboard (IWB) use on student engagement in a junior high school setting. Researcher observations of student at-task behavior using an observation instrument indicated that use of the IWB increased time on task and positively affected student engagement (Morgan, 2008). Given a self-report instrument, students also reported positive attitudes towards the IWB corresponding with the researcher's observation results (Morgan, 2008).

Engel and Green (2011) studied the use of phones as an instructional tool and the potential ramifications of their inclusion in the classroom environment. The authors conducted a self-contained study involving their own high school classes. The devices were used for a number of different functions, including research, a student response system, and data and image collection (Engel & Green, 2011). If students did not have a device, the authors allowed students to check out a school-owned device, share with another student, or submit their work manually. The authors observed a considerable increase in student attention and effort when cell phones were used (Engel & Green, 2011). Additionally, the use of cell phones with audience response and social media technologies also allows for "backchannel" conversations to take place. Trust is an important consideration that teachers must develop in the classroom environment with the students and this can be developed through transparency in device use and open channels of communication (Engel & Green, 2011). The findings in this study are based

upon observations of the researchers and specific feedback from students (Engel & Green, 2011).

Spires, Lee, Turner, and Johnson (2008) conducted a study seeking middle school student feedback on their own engagement. The results of this survey and focus group study of over 4,000 students indicated that students want learning environments that model the outside world and the opportunity to use technology in the classroom. The survey and follow-up interviews also demonstrated a link between middle school use of technology and academic engagement (Spires et al., 2008). On a scale of one to six, with six as most favored and one as least favored, the student respondents ranked the following activities from most to least favored: Using computers (M = 5.39, SD = 1.23), doing research on the Internet (M = 4.87, SD = 1.58), working on projects in a group (M = 4.72, SD = 1.73), working on projects by myself (M = 3.88, SD = 1.85), listening to teacher explain things (M = 3.71, SD = 1.97), and doing worksheets (M = 3.23, SD = 1.96) (Spires et al., 2008). Students want the opportunity to utilize technology and to collaborate, which are activities facilitated by the use of student-owned technology (Spires et al., 2008). Another key precept of this study is the importance of seeking student feedback in evaluating and measuring engagement (Spires et al., 2008).

Alexiou-Ray (2006) conducted a study that investigated student learning and associated parent perceptions and student attitudes towards a one-to-one program utilizing handheld computers. The technology in this study included a generation of hand held personal digital assistants known as Pocket PCs. The study involved one classroom of 23 fifth grade students and compared one nine weeks grading period of spelling achievement with another grading period using the Pocket PC's as an instructional

resource. The researcher also conducted a student and parent survey as well as focus group interviews with four randomly selected students. This study revealed that use of the Pocket PC's resulted in a minimal effect on student spelling achievement (Alexiou-Ray, 2006). However, students felt positive about the use of handheld devices as an instructional resource but the surveyed parents did not share the student's optimism (Alexiou-Ray, 2006). Additionally, an independent samples *t* test compared student and parent responses to the computer survey questions and found no significant difference in the five dimensions of anxiety, computer enjoyment, computer importance, motivation/persistence, and study habits (Alexiou-Ray, 2006).

A review of the literature indicated that the use of technologies such as interactive whiteboards, iPods, handheld computers, and cell phones increased student attention, attitude, and engagement in K-12 classrooms. Student self-reports, teacher and researcher observations, and parent feedback measured student engagement from multiple perspectives. The researcher also sought out studies at the college and post-secondary levels to determine if this trend is consistent as students advance in their education and ownership of personal computing devices increases.

College and/or Post-Secondary Studies

Does the use of technology in college or university classrooms affect students differently than in K-12 classrooms? A review of the literature on technology use in K-12 classrooms indicated a positive effect on student engagement when technology is integrated. The researcher reviewed literature on technology in college classrooms to determine its effect on engagement of college students. While many college students

view technology use positively, many students report significant amounts of off-task behavior with technology that negatively affects their course achievement.

Efaw, Hampton, Martinez, and Smith (2004) conducted a study at the United States Military Academy that assessed the impact of laptop computer usage during instructional time. This quasi-experimental study involved 10 psychology instructors, six in the control group and four in the treatment group, who utilized laptops during class time. The average score of all exams for the treatment group was 86.8 while the control group tallied a mean exam score of 83.5. In addition to achievement, the instructors also used a survey to measure student perception and attitudes. Students in the treatment group also responded more favorably to 60% of questions on the survey regarding student motivation and engagement (Efaw et al., 2004). Given these results, the authors recommend specific classroom management procedures to facilitate increased learning and reduce distractions. Ultimately, the use of laptops in the classroom resulted in increased student attention, motivation, and higher achievement (Efaw et al., 2004).

Krentler and Willis-Flurry (2005) investigated the impact of online discussion boards on student achievement in a university setting. The study sample was comprised of 549 students across six marketing classes at an American public university. Student technology use was measured through frequency and quality of online contributions while student learning was measured by course grades. The resulting data demonstrated that student learning was positively affected by technology use, as those who performed better in the course were those students who utilized the available technology (Krentler & Willis-Flurry, 2005). However, those students with no discussion board use but high

levels of Internet use also performed better in the course as technology, regardless of the medium, increased student learning (Krentler & Willis-Flurry, 2005).

McCoy (2013) conducted a survey of 777 students across six American colleges to measure student technological behavior and student perception of instructional use of electronic devices. While beneficial for retrieving online resources, such devices prove a significant distraction during instructional time as respondents overwhelmingly reported significant time off-task with their own devices in class (McCoy, 2013). Of the surveyed sample, 14.8% of students reported using their device in classes for non-instructional behaviors more than 30 times in a given day (McCoy, 2013). The off-task behaviors that students most often reported engaging in were texting (85.9%), checking the time (79%), accessing email (67.9%), and social networking (66%). Respondents reported the biggest advantage of using devices in class was "to stay connected" (69.8%) and the biggest disadvantage was "don't pay attention" (89.8%) (McCoy, 2013). Access to electronic devices during instruction does not equate to student engagement and given a lack of direction may lead to disengagement.

Lin, Hoffman, and Borengasser (2013) conducted a qualitative study of student perception of Twitter at the college level. This study asked students in three computer science classes to create a unique Twitter account for the class in order to communicate with other students and provide feedback to the instructor. High initial participation sagged throughout the course. According to the authors, "collaboration did not occur when the usage was left to the students" (p. 43). Through the study, students recommended that such activities should be mandatory rather than voluntary, in order to increase participation and engagement in the process. Based on their findings, the

authors expressed reservations towards social media use in the classroom because instructional use of such social media does not align with their private use of such technologies (Lin et al., 2013). Some future teachers reported that Twitter has "no place" in their K-12 classrooms (p. 44). These findings indicate that technology use has the potential to engage college students, but instructional design is critical to keeping those students engaged throughout the course.

If technology integration at the K-12 and post-secondary levels results in increased student engagement, research is needed to determine what constructs and instructional designs best engage students with technology. Mixed results at the college level indicate the need for digital citizenship and the importance of instructional design and teacher efficacy with technology. Based on these findings, the researcher sought studies on technology use, teacher perception and resistance, and digital citizenship programming to determine which factors result in the highest levels of student engagement. Given that devices used in post-secondary classrooms are student-owned, research is needed to determine if similar trends emerge when student-owned technology is deployed in K-12 classrooms.

The Effect of Classroom Constructs on Student Engagement with Technology

Given the positive effects of technology use on student engagement, what instructional designs best engage students in the learning environment? The researcher investigated the types of constructs utilized by educators to engage students with technology. These constructs included Web 2.0 and social media applications, teacher and student-directed learning environments, teacher perception and resistance towards technology, and digital citizenship programming. The researcher sought studies to

determine if increased student engagement resulted from the use of Web 2.0 and social media tools and applications. The researcher also investigated whether an increase in student engagement decreased teacher resistance to technology in the classroom. Beyond basic access to educational technology and computing devices in the classroom, the researcher sought relevant studies to determine if teacher perception on the value of educational technology played a role in educational success. Lastly, the researcher sought research on the efficacy of digital citizenship programming in reducing teacher resistance and inappropriate student behaviors with technology. Each of these focus areas contributed to a broad picture of effective classroom environments that engage students with integrated technology.

Web 2.0 and Social Media

Web 2.0 is a revolutionary phase of the Internet that transforms individuals from consumers of information to creators of content (Palfrey & Gasser, 2008; Warschauer, 2011). Rather than simply accessing information through the Internet, individuals can now engage in what Warschauer describes as a "read-write-link-share medium" (Warschauer, 2011, p. 36). The rise and prevalence of Web 2.0 and its accompanying social media is not without its supporters or its critics. Glassman and Kang (2011) argue that Web 2.0 is a watershed achievement that can finally accomplish the century old goal of Dewey and others, while Dohn (2009) criticizes the use of Web 2.0 in education due to disconnects between Web 2.0 design and instructional practice in the classroom. Atta (2012) argues that Web 2.0 is a transformative model of learning that not only affects how individuals collect and share information, but changes classroom dynamics and

teacher practice. To determine the impact of Web 2.0 on classroom practice and student engagement, the researcher sought studies at both the K-12 and post-secondary levels.

Greenhow, Robelia, and Hughes (2009) discussed the effect of the Internet on classroom practice and research, specifically the role that Web 2.0 has played in changing instructional delivery. The primary challenge facing educators is that Web 1.0 aligns with traditional classroom instruction, practice, and communication. Web 2.0, however, represents a radical departure from this traditional practice with its active user interactions, social media, and content sharing. Greenhow et al. (2009) argued that if Web 2.0 is to be used for learning, research is needed to determine its impact on a student's life both in and out of school. To begin building this body of literature, the authors recommend studies on learner perception and creativity as well as online identity formation.

Allen (2008) investigated the effect of Web 2.0 on teacher perception of their practice in K-12 public classrooms using a qualitative case study of five teachers. These teachers agreed to participate in a year-long initiative that provided them with a wireless laptop and LCD projector. To evaluate the change in teacher practice, Allen used Mezirow's framework for transformative learning. Four of the five reported transformative learning experiences in the classroom, while the fifth teacher reported pre-existing alignment with the measurement model (Allen, 2008). Three of the participating teachers reported that Web 2.0 changed their practice outside the school day and four of the five teachers observed higher student engagement when Web 2.0 technologies were utilized (Allen, 2008). If the utilization of Web 2.0 applications changed teacher practice

and increased student engagement, research is needed to determine what specific applications and activities garner these results (Allen, 2008).

Pritchett, Wohleb, and Pritchett (2013) conducted a survey of 842 educators that investigated their perceived importance of Web 2.0 technologies and differences in perception based upon educator demographics. Social bookmarks and networks were rated as least important while virtual learning networks and video sharing were rated most important. By demographics, business educators, world language teachers, and counselors reported the highest mean scores for perceived importance of Web 2.0 utilization while math, fine arts, and physical/health educators ranked it the lowest (Pritchett et al., 2013). The findings of this study indicate that teacher subject matter is critical to instructional design with Web 2.0 technologies, and that a pervasive fear of classroom use of social networks exists among teachers (Pritchett et al., 2013).

Boksz (2012) conducted a phenomenological study of seven teachers' integration of Web 2.0 and its effect on their teacher practice. The subject teachers indicated that Web 2.0 pedagogy promoted collaboration, allowed for differentiation, increased student engagement, and led to better questioning (Boksz, 2012). While each of the subject teachers reported successful use of Web 2.0 applications, each expressed frustration with lack of access to technological resources at school and a lack of time for training and professional development with technology (Boksz, 2012).

The findings of these studies on Web 2.0 integration indicate that teacher perception of the value of technology integration and efficacy in utilizing technology for instructional use affects the frequency of technology use in the classroom. In a study by Capo and Orellana (2011), researchers identified the most significant obstacle to Web 2.0

integration as teacher attitude and teacher perceived utility of Web 2.0 applications. Even though 38% of surveyed teachers reported that Web 2.0 improved student satisfaction, teacher perceived difficulty in incorporating Web 2.0 precluded these teachers from incorporating it into their classes (Capo & Orellana, 2011). In addition to these concerns, teachers integrating technology into their classes face an evolving learning environment that may also lead to increased teacher resistance (Capo & Orellana, 2011).

Teacher-Directed Versus Student-Directed Learning Environments

A review of the literature on student engagement with Web 2.0 technologies demonstrated considerable impact on the classroom environment. The infusion of technology into the classroom affects the teacher-student dynamic and the instructional process. The incorporation of technology also has the potential to alter the direction of the learning from teacher-directed to student-directed. Rather than serving as "dispensers of knowledge," the role of teacher changes to "facilitator" (Daggett, 2010, p. 12). Hannafin, Hill, and Land (1997) note that the volume of information being produced necessitates a change from directed teaching models. Student use of technology serves as a conduit for increased engagement and student-directed learning, but can also lead to increased resistance from teachers uncomfortable with changing classroom dynamics.

According to D'Souza and Wood (2007), "many users of technology-based materials say that students find strong motivation in the feeling that they are in control of their own learning" (p. 287). In a study by Allen (2008), 80% of teachers responded affirmatively to "teacher no longer at the center" on a Web 2.0 survey question of the teacher's role in the classroom. A study by Boksz (2012) also demonstrated that Web 2.0

pedagogy significantly changed the teacher's role by making the classroom student-centered. Bauer and Kenton (2005) described the challenges even the most seasoned educators faced when attempting to integrate technology and change classroom focus. Given the positive outlook of students and the reservation of teachers to move from teacher-directed to student-directed learning, the researcher sought studies that detailed which learning environment best engaged students with technology.

Wu and Hwang (2007) studied differences in student engagement between teacher-centered (TC) and student-centered (SC) learning in technology-based classrooms. Their study measured the full spectrum of behavioral, cognitive, and emotional engagement of 54 junior high school science students over a three-week unit of instruction. Student engagement in both classes was assessed through student products and self-evaluations as well as observer notes and video tapings of instruction. The SC class was also allowed to use computers to run simulations while the teacher guided the TC class through the process by the using an LCD projector. The results of the study found that SC technological classrooms produced a significant difference in levels of emotional engagement (SC = 89.82, TC = 80.58, t (53) = -3.355, p = .002, < .01) but little difference in cognitive engagement from TC classrooms (Wu & Hwang, 2007). To investigate further, researchers asked students what cognitive activities they found most engaging. Problem solving was the most engaging in both classes (TC = 51%, SC = 48%) and the lowest was making reflections (6%), which occurred only in the SC class (Wu & Hwang, 2007).

Student access to educational technology and teacher acceptance of changing classroom environments are important considerations in integrating technology

successfully. Given these conditions, the researcher next investigated existing barriers to technology integration, teacher perception of instructional technology, and reasons for teacher resistance to technology use in the classroom.

Teacher Perception/Resistance

A number of obstacles stand in the way of successful technology integration in classrooms. These obstacles include low teacher efficacy with technology, a lack of professional development with instructional technology, and low opinion on the value added by incorporating it. Even students recognize that teachers need additional professional development if the Internet is going to be successfully integrated into the classroom (Levin & Arafeh, 2002). Goddard (2002) argued that it is past time for teachers to get over their opposition and move towards acceptance, and ultimately, embracement of educational technology. "One reason Web 2.0 technologies are not widely integrated in PreK-12 and graduate education is the lack of modeling by instructors" (Greenhow, Robelia, & Hughes, 2009, p. 252). The researcher sought studies that identified prevalent attitudes of teachers towards technology, reason for teacher resistance, and best practices in overcoming teacher resistance. The researcher discovered that faculty and staff attitudes play a significant role in increasing or limiting student use of educational technology.

A 2007 report by Hew and Brush details the myriad barriers to technology integration in K-12 classrooms. The authors evaluated empirical research on technology integration over a ten-year span. Their research identified 123 barriers by frequency of appearance in the literature (Hew & Brush, 2007). These barriers included lack of resources (40%), knowledge and skills (23%), institution (14%), attitudes and beliefs

(13%), assessment (5%), and subject culture (2%) (Hew & Brush, 2007). Of the barriers that most affect technology integration are teacher attitude and belief and teacher knowledge and skills (Hew & Brush, 2007). Based on their findings, Hew and Brush (2007) recommended several strategies to reduce or eliminate the prevalence of these barriers. These included "having a shared vision and technology integration plan, overcoming scarcity of resources, changing attitudes and beliefs, conducting professional development, and reconsidering assessments" (p. 232).

Birch (2012) examined teacher perception of middle and high school student use of cell phones and smartphones as an instructional tool. This mixed-methods study surveyed 319 educators and included 13 interviews with a group of teachers, counselors, and administrators to analyze differences in perception by location, grade level taught, and education level. Educators overall reported a negative perception of classroom use of phones, but this perception varied by teacher education and location, as well as between teachers and administrators (Birch, 2012). However, 74% of participants reported that cell phone use was prohibited during instructional time, but 57% of respondents expressed interest in using them (Birch, 2012). Results of this study indicated that suburban educators express more interest in using cell phones (Birch, 2012). The mixed results of this study indicate that alignment between policy and teacher beliefs is an important consideration when deploying instructional technology in the classroom.

Gorder (2008) conducted a study on teacher perception of technology integration differentiated by demographics. A survey of 174 teachers in South Dakota who completed a technology for teaching and learning academy indicated that teachers use technology for productivity and delivery, but not learning (Gorder, 2008). Teachers

reported using technology most often for word processing (4.14), Internet searches (3.68), and presentations (3.65), and least often for video conferencing (1.69), web-based collaboration (1.64), and blogging/wikis (1.49) (Gorder, 2008). The survey went on to show that demographics make very little difference in integration of technology. The results found no significant difference by gender, age, teaching experience, content area, or educational level (Gorder, 2008). The only significant difference found in technology integration was by grade level taught by the teacher, as high school teachers reported integrating technology most often (Gorder, 2008). To successfully integrate technology, the efficacy of the teacher is paramount. Based on the findings of the study, the authors recommend professional development, teacher collaboration, administrative support, and ongoing development with advancing technologies (Gorder, 2008). For future research, the author recommended qualitative interviews with best practitioners on technology integration.

Gu, Zhu, and Guo (2013) conducted a study to determine the difference between K-12 teacher and student perception of technology integration in four areas. The survey examined technology differences in outcome expectancy, task-technology fit, social affects, and individual preferences between teachers and students. Social influence is more of a factor for students but the major difference between the two groups is utilization and differing perceptions. The results of this study reinforced the different perspectives of teachers and students as the primary barrier to technology use in the classroom (Gu et al., 2103).

A study by Li (2007) echoed the digital disconnect described by Levin and Arafeh (2002). Li (2007) conducted a mixed methods study to assess student and teacher

attitudes toward technology integration in schools. The study involved 15 math and science teachers and 450 students. Student perception of technology use was overwhelmingly positive while teacher perception was generally negative and oppositional (Li, 2007). Student responses were 87.3% supportive, while 66.7% of teachers responded that technology should only be utilized when it is required for the activity (Li, 2007). While 18% of students reported increased confidence in their learning as the primary reason for using technology, none of the 15 teachers agreed that this dynamic exists (Li, 2007). Teacher confidence with the subject matter is an important consideration to facilitate technology use (Li, 2007). The results of this study indicated a wide gulf between teacher and student attitudes and the necessity for drastic change to reduce this divide.

Young (2012) queried a group of elementary school teachers on their perceived barriers to technology integration. This qualitative case study included survey responses from 18 teachers and six interviews. They identified a dearth of resources for students, leading to the implementation of a BYOT policy (Young, 2012). The survey results identified four barriers while the interviews revealed 13 trends (Young, 2012). The survey barriers included lack of training for teachers, parental support, teacher belief about technology in classrooms, and teacher's level of self-efficacy (Young, 2012). The most common barrier identified in the interviews was a lack of working resources and a lack of appropriate professional development (Young, 2012).

Goad (2012) surveyed 500 public school teachers on their perceived value of mobile devices, specifically, cell phones in the classroom. This multi-tiered study also included differences between subject matter teachers and teacher perception of student

engagement. Goad (2013) received 130 responses for a response rate of 26%. The survey found no significant difference between STEM teachers and others on perception of importance of integrating technology (Goad, 2013). However, STEM teachers did rate themselves significantly higher on "ability to design and assess lessons using technology" (M = 3.18, SD = .738) (M = 2.80, SD = .872) (Goad, 2013). The survey did result in a strong positive correlation between "comfort level of teachers using technology" and "integration of technology to support lessons" (Goad, 2013). A one-way ANOVA found no significant difference between frequency of technology use and student engagement as reported by the teachers. Teachers believed that change was coming way too fast and 88.12% agreed with the statement "technology has changed the way I teach" (Goad, 2013). The results of this study indicated that teacher subject matter and familiarity with technology plays a role in their willingness to incorporate technology (Goad, 2013).

Purcell, Heaps, Buchanan, and Friedrich (2013) surveyed 2,462 Advanced Placement and National Writing Project teachers regarding differences in technology use between their personal and professional lives. Forty-one percent of teachers reported that the current environment requires more work and 71% reported that it has expanded the scope of knowledge with which they have to be proficient (Purcell, Heaps, Buchanan, & Friedrich, 2013). Such additional burdens served only to further the differing visions of technology integration by teachers and students (Purcell et al., 2013).

Ertmer and Ottenbreit-Leftwich (2010) question why teachers are not expected to stay current with emerging technologies like other professionals. The authors also questioned why teachers use technology proficiently for their personal and professional responsibilities but not their classroom ones (Ertmer & Ottenbreit-Leftwich, 2010).

Ertmer and Ottenbreit-Leftwich (2010) concluded that a paradigm shift is needed in education where technology use is viewed as a requirement for student success. In order to facilitate this shift, teachers need technological knowledge and self-efficacy, pedagogical beliefs, and an accepting culture (Ertmer & Ottenbreit-Leftwich, 2010).

A review of the literature on teacher perception of and resistance to classroom technology use revealed a myriad number of challenges to technology integration. Each of these factors contributes to low teacher perception of the value of technology use and increased teacher resistance. Teachers recognize the value of technology and use it in their personal lives but not their professional lives. Teachers acknowledge a disconnect between their beliefs on technology and school and district policies. There is a rapid rate of change for which teachers are unprepared, which in turn makes more work for them. To address teacher concerns on a lack of resources, a BYOT policy may be a potential solution. Training is needed for teachers and students, professional development on technology for teachers and digital citizenship training for students. The researcher also sought studies on the digital citizenship curriculum and its effectiveness in reducing teacher resistance and off-task behaviors by students. Such a body of knowledge is needed to inform a policy allowing students to bring and use their own technology.

Digital Citizenship

The question of whether students will use electronic devices inappropriately haunts educational policymakers and leaders. With the ubiquity of personal electronic devices and increasing access to the Internet comes the opportunity for students to engage in off-task or inappropriate behaviors. The use of technology in the classroom has potential not only to engage students but to entice them into inappropriate or off-task

behaviors. The emerging patterns of appropriate behavior with technology have come to be known as digital citizenship. Ribble defines digital citizenship as "the norms of appropriate, responsible behavior with regard to technology use" (Oxley, 2011). Digital citizenship is a twofold process of behavior and teaching activities to students. The International Society for Technology in Education (ISTE) included digital citizenship as a component of the most recent iteration of their standards for students (ISTE, 2014). To inform the need for research on classroom constructs that engage students with their own technology, the research sought studies on student behaviors with technology and digital citizenship programming.

Recognizing a dearth of literature and resources on digital citizenship, Ribble (2006) designed a study that resulted in the creation of a digital citizenship handbook for leaders. The completed Technology Leader's Guide to Implementing Digital Citizenship in Schools was included in Chapter Four of Ribble's dissertation and became the basis of the Digital Driver's license (Ribble, 2006). Digital citizenship in leaders is modeled in three ways: knowledge of technology, a shared vision for technology use, and examples of appropriate behaviors (Ribble, 2006).

Hollandsworth, Dowdy, and Donovan (2011) recommended a holistic approach to digital citizenship education for K-12 students including all stakeholders. The authors conducted a survey of school media specialists to determine their perception of digital citizenship awareness in their schools and the extent to which appropriate behaviors were being taught. The media specialists reported that 57.1% of teachers and 75.1% of administrators are aware or highly aware of digital citizenship issues (Hollandsworth, Dowdy, & Donovan, 2011). Sixty-eight percent of respondents indicated they teach

about cyber bullying but only 44% covered social networking and 36% cell phone etiquette, which included sexting (Hollandsworth et al., 2011). Findings of the survey indicated a desire to see digital citizenship education begin at the early primary grades, as 86% indicated digital citizenship education should begin between PreK and 4th grade (Hollandsworth et al., 2011). Students must be equipped with the knowledge and resources to deal with the online temptations and threats that they face in an increasingly connected world and the education and empowerment of teachers as models of appropriate use (Hollandsworth et al., 2011).

Ohler (2011) debated the two lives versus one life mentality as an example of the digital disconnect. Schools have long advocated character education and digital citizenship is the next chapter of that process (Ohler, 2011). As such, Ohler (2011) recommends three approaches for local school boards to consider when adopting character education programs reflective of the digital lifestyles that students are living. These three considerations include assessing values, providing access to the Internet, and authorizing teachers and media center staff to train students (Ohler, 2011).

Mackie (2009) conducted a case study on Facebook as a model of social media to determine the reciprocal effects on digital citizenship education in schools. The study was conducted to determine what lessons can be learned from the social network site Facebook that would increase teacher efficacy with digital citizenship in the classroom. Mackie (2009) analyzed their own personal experience through the sign-up and settings process on Facebook. Mackie (2009) noted that Facebook uses a reward model to get users to share more personal information. Mackie (2009) recommends teachers use these findings as a conversation starter on issues of privacy, commercialization, and online

responsibility. The implicit danger of sharing too much personal information is constant but the site does have educational value (Mackie, 2009). Such a process promotes effective digital citizenship behavior in students (Mackie, 2009).

Lyons (2012) conducted a research study on technology behaviors of students related to digital citizenship to investigate whether gender or grade level had any bearing on those behaviors. The study involved an ex post facto causal-comparative analysis of archived survey data on digital citizenship. Lyons (2012) analyzed a sample of students from the fifth, seventh, ninth and eleventh grades and their responses to a series of yes or no questions. The yes responses were coded as a "1" and no responses as a "0" for analysis. As grade level increased, so did the propensity for inappropriate technology behavior in the areas of personal safety, digital citizenship, parental involvement, and cyberbullying (Lyons, 2012). An analysis of this data demonstrated significant differences by gender and grade level, rising from fifth grade (.40), seventh grade (.53), ninth grade (.82), and eleventh grade (.99) (Lyons, 2012). Males (.79) also demonstrated a significantly higher propensity for risky online behavior than females (.51) (Lyons, 2012). Decreasing parent involvement as grade level rises exacerbates the dangerous behaviors of students (Lyons, 2012). Based on his findings, Lyons (2012) recommends that digital citizenship curriculum be directed at middle school aged students.

A study by Boyle (2010) found that digital citizenship programming has a significant effect on appropriate student behavior with technology. The study involved five classes of 150 ninth grade students at two separate learning communities. Students in the treatment group (N = 75) completed the nine modules of Ribble and Bailey's digital driver's license (Boyle, 2010). Both treatment and control groups completed a

pre- and post-test and an ANCOVA was run on the posttest. This quasi-experimental study set in an urban school setting demonstrated that students exposed to digital citizenship curriculum made significant gains in digital etiquette, literacy, commerce, law, rights and responsibilities, and health and awareness, while having a neutral effect on digital access and security (Boyle, 2010).

A review of literature on the instructional constructs that most engage students with technology provided the researcher with ample data. Such data is invaluable in the development of BYOT policies and the design of research to measure student engagement with SOD. Web 2.0 applications and student-directed learning environments engage students but present the opportunity for off-task or inappropriate behavior. Digital citizenship programming successfully reduces inappropriate or off-task behavior by students and reduces teacher resistance to technology. To increase student engagement with technology, school districts, teachers, and students need an established digital citizenship curriculum when using technology in the classroom. The most conducive environments to engage students with technology involve student-centered learning environments with accepting teachers and established parameters for acceptable use of technology.

Conclusions

In summary, the research on student engagement with technology in this review of literature lead to a greater understanding of student engagement with technology and the constructs that best engage students with technology. Such an understanding was critical as school districts considered the adoption of BYOT or BYOD policies. This research was needed to determine what effect the use of student-owned technology has

on student engagement both in class and in the school environment. A review of the literature on technology introduction and integration into the classroom revealed numerous obstacles in increasing student engagement. Discovered obstacles included teacher resistance, fear of inappropriate use, digital citizenship issues, and teacher-directed educational environments.

A policy of allowing students to bring their own electronic devices is the next step in the continuum of efforts to integrate technology in the classroom. Such a policy has the potential to increase student engagement at greater levels in the learning environment. The research on student engagement with technology in this study will lead to increased knowledge of viable instructional practices. The anticipated benefits of this study include increased engagement in the classroom and greater awareness of engaging technology-based practices. The knowledge gained from this study may benefit any teacher seeking to increase student engagement in their classroom. Teachers, administrators, and school districts considering policies to allow students to utilize their own electronic devices in the classroom would benefit from the findings of this study. The research on student engagement with technology in this study will lead to increased insight into the effectiveness of BYOT policies in promoting student success. The rising tide of SOD and BYOT is a movement not soon to recede.

CHAPTER III

METHODOLOGY

Introduction

The purpose of this research study was to investigate the relationship between student engagement and the use of student-owned technology in a high school setting. Specifically, the study sought to determine what affect the use of SOD had on student engagement during instructional time, as well as the environmental factors, instructional models, and Web 2.0 applications that work best to engage students with their own technology. Due to an emerging engagement gap among high school students, the need to meet students' needs on this issue is paramount (Yazzie-Mintz, 2010). According to the 2010 National Educational Technology Plan (NETP) the pervasive use of technology in students' lives outside of school must be used to "provide engaging and powerful learning experiences," (p. 7). While the use of technology in education has often been cited as a panacea for educational problems, the historical results of the effectiveness of instructional technology are mixed. The most recent development in educational technology is the movement towards BYOT or BYOD policies, which allow students to bring personally owned devices to school for instructional use. Due to the novelty of this movement, little research exists in the literature on its effectiveness in improving student outcomes. This research is needed to investigate whether policies allowing students to use their own technological devices result in higher student engagement as experienced,

observed, and reported by students, teachers, and the researcher alike. Given the research on student engagement and the expansion of policies allowing students to bring their own devices for instructional use, the need for this research is imperative.

This study sought to determine what relationship exists between the use of student-owned technology and student engagement in high school classrooms. This ethnographic study was guided by two research questions:

1. How does the use of student-owned technology impact student engagement?
2. What constructs work best to engage students with their own technology?

The rise of the BYOT movement across the business and educational spheres has created a dilemma for organizational leaders. As employees and students are already bringing personally owned devices into their schools and workplaces, how can organizations harness the power of these devices to push cost savings, increase engagement, and improve organizational performance? Before making such decisions, research is needed to determine what effect personally owned devices have on user engagement. Across the educational spectrum, such research is the next step in the continuum of research on educational technology and would add a significant piece to the existing literature on both student engagement and instructional technology. The anticipated benefits of this research study include greater understanding of engaging technology-based practices with SOD as well as increased student engagement in the learning environment. The insight gained into student and teacher attitudes and perception towards BYOT may play a critical role in the design of BYOT policies and the development of digital citizenship programs. The knowledge gleaned from this study may benefit teachers and administrators seeking to increase student engagement in their

schools. School districts and local education associations considering policies to allow students to utilize their own technology in the classroom would also benefit from the findings of this study.

Research Design

For the purposes of this study, the researcher used an ethnographic model. While ethnographic research is primarily a qualitative model, this research design included both quantitative and qualitative measures to accommodate for the multiple perspectives and variety of data needed to investigate this phenomenon. The ethnographic model is an appropriate research design for studies of existing conditions and those in which the researcher is embedded in the day-to-day experience of the population and the research setting (Denzin & Lincoln, 2011; Gay, Mills, & Airasian, 2012). According to Tuckman and Harper (2012), "ethnography relies on observations of interactions and interviews with participants to discover patterns and their meanings. Thus, participant observation is one of the method's major data-collection devices" (p. 388). Gay et al. (2012) define quantitative research as "the collection and analysis of numerical data to describe, explain, predict, or control phenomena of interest," while qualitative research is "the collection, analysis, and interpretation of comprehensive narrative and visual (i.e., nonnumerical) data to gather insights into a particular phenomenon of interest" (p. 7). The quantitative instruments in this ethnographic research study included student, teacher, and researcher assessments of engagement and cross-sectional surveys of both students and teachers to glean critical information on perceptions, beliefs, frequency of use, and prevalence of off-task behavior. Evaluation of student engagement from the student, teacher, and researcher perspectives allowed for triangulation. "It is important

that researchers apply the principle of triangulation throughout their ethnographic research data collection efforts" (Gay et al., p. 427). An underlying criterion for the effective deployment of technology initiatives is student and teacher attitudes and perspectives towards technology in the classroom, thus the need for the surveys in this study (Gu et al., 2013). The qualitative instruments in this ethnographic study included focus group interviews with teacher technology leaders and open-ended responses on teacher surveys. Gorder's (2008) study on teacher perception of technology integration recommends qualitative interviews with best practitioners. According to Gay et al., "the strength of qualitative research lies in its multi-instrument approach, or triangulation" (p. 427).

Participants

The population for this study was the students and faculty of the researcher's suburban 9-12 public high school in Middle Tennessee during the 2013-14 school year. The sample for the study was a convenience sample as the researcher worked at the school as an assistant principal. All five teachers serving as BYOT teacher leaders for the school agreed to host classroom observations and to serve as a focus group for this research. The school district in which the researcher's school resides was made up of 41 schools in the 2013-14 school year, consisting of 34,341 students with a free and reduced population of 11.9%. The racial makeup of the school district was 83.1% White, 5.6% Asian, 5.1% Hispanic or Latino, 5.0% Black or African American, and 0.8% Native American or Alaskan. For 2013-14, the district-wide high school average daily attendance rate was 96.8%, the high school graduation rate was 94.4, and the average ACT score was 23.5. The researcher's high school consisted of 1,698 students with a

free and reduced population of 23.0% during the 2013-14 school year. The racial makeup of the researcher's school was 67.0% White, 14.5% Black or African-American, 13.3% Hispanic or Latino, 4.2% Asian, and 0.9% Native American or Alaskan. The average daily attendance was 97.7%, the graduation rate was 92.8%, and the average ACT score was 22.2. In the research year of 2013-14, the faculty and staff consisted of 105 teachers and 25 para-professionals, and an administrative team of one principal and four assistant principals.

Data Collection

Multiple data collection methods are necessary for ethnographic research (Gay et al., 2012). To accommodate the multiple data collection methods, the researcher utilized a variety of data collection instruments for this study. These instruments included Survey Monkey, teacher and student reflections instruments, an at-task observation tool, email, interviews, and researcher analysis of historical data sets. All researcher-created instruments used in the study were peer-reviewed by six school administrators serving in positions similar to the researcher. The researcher-created instruments were revised based on the feedback from the review team. The review team consisted of a high school principal, three high school assistant principals, a middle school assistant principal, and a private school grade-level chair.

Data collection for this ethnographic research study began immediately after institutional IRB approval and school district research approval. Prior to data collection, the research sought informed consent from all participants (see Appendix A). The researcher provided letters of consent to cooperating classroom teachers for signature in the presence of the researcher and a witness. The researcher visited the cooperating

classes to explain the project and distribute the parent letter and permission slip, which were returned directly to the researcher. The researcher obtained passive permission for student participation in the school-wide student survey by communicating the means for parents to opt of the student survey by email, automated telephone call, and website announcement. Staff completion of the faculty survey implied consent for participation in the study.

In order to answer the first research question, how does the use of student-owned technology impact student engagement, data were needed from teacher self-assessment surveys, student self-report instruments, researcher observations, and teacher reflections. The researcher observed the classroom instruction of the five BYOT teacher leaders three times during the fourth quarter of the 2013-14 school year. The observations took place on days of planned student-owned device use, school-owned technology use, or no technology use. Prior to the first scheduled observation, each participating teacher completed a technology self-assessment on Survey Monkey that included an open-ended or free response definition of engagement (see Appendix B). At the end of each observed class, participating students completed an engagement self-assessment and the teacher completed a reflection instrument (see Appendices C and D). The researcher assumed the role of passive observer and measured student engagement during each observation with an at-task observation instrument (see Appendix E). The at-task observation instrument utilized in this study was adapted from Morgan's (2008) doctoral study of the effect of interactive white boards on student engagement and behavior in a junior high school setting.

During each classroom observation, the researcher served as a passive observer. According to Gay et al. (2012), a passive observer "assumes no responsibilities in the classroom setting but rather focuses on data collection" (p. 428). The researcher conducted a visual sweep of the classroom at five-minute intervals. The researcher recorded the behavior of each student, noting whether the student was on task or noting the type of off-task behavior. Due to the challenges of recording student behavior appropriately, if the students were finished with the task at hand, their behavior was noted as on-task. The researcher used eye contact as a determinant of student at-task behavior during instruction. The researcher was measuring on-task behavior while the teacher and student reflected and reported on engagement.

At the end of the lesson and when prompted by the cooperating teacher, the researcher distributed the student engagement reflection to all students, regardless of whether they had completed the informed consent process (see Appendices A and C). The researcher instructed the students to complete the slip and submit to the folder if they were confident that they had permission, or if they were unsure whether they had permission or not. Students who were sure that they had not completed a permission slip were instructed to submit a blank slip to the envelope. The researcher distributed the exact number of reflection slips as there were students present in the class. No accommodations were made for students known to be absent on the day of the observation. The collection envelope was sealed before leaving the classroom.

The student engagement assessment consisted of five statements aligned with Schlechty's student engagement continuum (Schlechty, 2001) (See Appendix C). Students checked one box next to a statement describing how they felt about class that

day. Each statement included Schlechty's (2001) level of engagement in parentheses, whether authentic, ritual, passive, retreatism, or rebellion. Student responses were scored for data analysis by an assigned point value to each response, from 1 (Rebellion) to 5 (Authentic Engagement). If a student respondent checked more than one level of engagement, the researcher averaged the responses. If a student checked all five of the boxes, the reflection was invalidated and not included in the research data.

The teacher engagement reflection mirrored that of the student reflection, consisting of five statements aligned with Schlechty's (2001) engagement scale (see Appendix D). Teachers checked one box next to a statement describing the engagement of the class as a whole during the lesson. The reflection instrument also included an open response that asked the teacher to reflect on the engagement of the class with anecdotal data that did not identify individual students. As with the student reflection, responses were scored on a scale from 1 (Rebellion) to 5 (Authentic Engagement). Teachers returned the reflection to the researcher in a separate, sealed envelope at their convenience.

In order to answer the second research question, what constructs work best to engage students with their own technology, data were needed from students, teachers, and the school administration. Cross-sectional surveys were administered to both students and faculty during the last two weeks of the 2013-14 school year (see Appendices F and G). According to Gay et al. (2012), "cross-sectional designs are effective for providing a snapshot of the current behaviors, attitudes, and beliefs in a population" (p. 185). A faculty survey was conducted via Survey Monkey to get data on school-wide teacher proficiencies and attitudes towards student-owned technology in the

classroom (see Appendix F). A school-wide survey of students was conducted via Survey Monkey to measure student attitudes toward student-owned technology, the instructional activities they were most engaged in with their own devices, and their perception of frequency of use (see Appendix G). Cooperating teachers agreed to serve as a focus group and answer group and individual questions (see Appendix H). The researcher conducted focus group and individual interviews with these technology teacher leaders. Residual data sets were analyzed as an ex post facto cohort design. These data sets included average daily attendance, graduation rate, and dropout rate. A retroactive cohort design was also used to determine if there was an increase in student pass rates on the 21st Century Skills Assessment from previous years.

The faculty survey was conducted via Survey Monkey to get baseline data on school-wide teacher proficiencies and attitudes towards student-owned technology in the classroom (see Appendix F). The teacher survey was reviewed by a team of administrators serving in a similar position as the researcher and was piloted to five teachers at a nearby school in the same district. This survey instrument consisted of 15 quantitative and two qualitative questions. The quantitative items included six demographic questions, three Likert-scale questions on teacher beliefs, and six questions regarding current teacher practice. The two open-ended questions explored teacher perception and resistance to technology. The faculty survey was conducted during the final week of the school year. The survey link was emailed to the entire school after the conclusion of the school day on the students' final day. The survey was closed on the teacher's last contracted workday. The timeline for the faculty survey allowed for 48 hours for teachers to complete the survey.

The school-wide survey of students was conducted via Survey Monkey to measure student attitudes toward BYOT usage at the school, the instructional activities they participated in most, and their perception of frequency of use (see Appendix G). The student survey could not be piloted in the research population due to institutional review board and school district research request parameters. This survey instrument consisted of 15 quantitative survey items. Twelve survey items explored the individual student's experience with technology, while three questions used a Likert-scale to examine student beliefs. The student survey was conducted during the last full week of classes prior to final exams. Announcement of the student survey and the means to opt out were communicated by automated telephone call out, corresponding email communication of the telephone message, and posted on the front page of the school website the week prior to the survey.

To administer the student survey, the researcher emailed a Microsoft Word document to homeroom teachers with the hyperlink to the student survey and a quick response (QR) code linked to the survey. The student survey took place during non-instructional time. Homeroom teachers had the option of sharing the link with the students, displaying the document with the link and QR code through a classroom LCD projector, or requesting slips with the survey information from the researcher. The researcher printed slips with the link and QR code to distribute to students and at teacher request. During this week, the media center staff also made survey information available to students as they signed into the library. Students without personally owned devices were offered the opportunity to complete the survey on desktop computers in their homeroom classroom or to go to the media center to use a school-owned device or

computer. Teachers had the choice of allowing students to complete the survey on their own devices or bringing the class to a computer lab to accommodate teacher preference and any student who may not have had a device on the day of the survey.

Also during the final month of the 2013-14 school year, the researcher collected focus group questions from each of the BYOT teacher leaders via email and met with each teacher as well to discuss the responses in greater depth. The researcher recorded teacher interview responses on a printed copy of the email answers for later analysis.

In order to gain further insight into potential residual effects of the BYOT initiative, the researcher analyzed additional data sets. These data included daily attendance rates, graduation rates, and dropout rates over a three-year span. These data were collected throughout the summer and fall of 2014 as pertinent information from the 2013-14 school year was finalized and reported. Finally, a retroactive cohort design was used to determine if there was an increase in student pass rates on the 21st Century Skills Assessment between 2012 and 2014, the first two years of full BYOT implementation.

Analytical Methods

In order to analyze the variety of data collected in this ethnographic research study, the researcher used a number of analytical methods for both quantitative and qualitative data. Because the study included both qualitative and quantitative data, the analytical methods varied throughout the two research questions.

To analyze the data collected to answer the first research question, how does the use of student-owned technology impact student engagement, the researcher used methods to analyze both quantitative and qualitative data. The quantitative data collected included student reflections, teacher reflections, and researcher observations. The

qualitative data included teacher definitions of engagement, teacher reflections on the classroom observations, and researcher notes. Quantitative data from the classroom observations were analyzed using a within-subjects ANOVA to determine different levels of student engagement between no technology, school-owned technology and student-owned technology observations. The qualitative data from the BYOT teacher leader responses to the pre-observation survey were reported and the personal definitions of student engagement provided by these teachers were coded for frequency.

To analyze data collected to answer the second research question, what constructs work best to engage students with their own technology, a number of differing analytical methods were utilized for both quantitative and qualitative data. The quantitative data included teacher and student survey responses and ex post facto cohort data on attendance, graduation and dropout rates, and success on the 21st century TLA. The qualitative data included open-ended survey responses and responses to focus group and interview questions. To analyze the quantitative data, Cronbach's Alpha was run on corresponding survey items to determine internal reliability and consistency. An independent samples *t* test was used to compare teacher and student responses to corresponding survey questions. According to Gay et al. (2012), "the *t* test for independent samples is a parametric test of significance used to determine whether, at a selected probability level, a significant difference exists between the means of two independent samples" (p. 352). BYOT teacher leader responses to both the group and individual focus group questions were reported and summarized to determine teacher and student perceptions regarding learning environments, frequency of technology use, and Web 2.0 activity.

Ex post facto cohort data were analyzed through evaluating the percentage change between cohort years. The rates for each cohort were compared and evaluated through percentage of increase or decrease to analyze trends. The cohort years included the 2011-12, 2012-13, and 2013-14 school years. These cohort years included the last year of no student-owned technology use, the first year of student-owned technology use, and the second year of the policy, which was the year the research was conducted.

CHAPTER IV

FINDINGS AND CONCLUSIONS

Introduction

The purpose of this ethnographic research study was to explore the impact of a Bring Your Own Technology (BYOT) policy on student engagement in a high school setting. This project utilized classroom observations, cross-sectional surveys, and a teacher focus group to examine student experiences with technology, as well as student and teacher perception and beliefs that affect student engagement levels in a BYOT environment. Research for this study was collected from teachers and students at a suburban 9-12 high school in Middle Tennessee during the 2013-14 school year.

This chapter describes the findings and results from the quantitative and qualitative data collected during this ethnographic study. This study was guided by the following research questions:

1. How does the use of student-owned technology impact student engagement?
2. What constructs work best to engage students with their own technology?

To address the first research question, the researcher conducted 14 classroom observations to evaluate student engagement from student, teacher, and researcher perspectives. These observations took place during teacher-selected lessons involving no technology, school-owned technology, and student-owned technology. The second research question was informed by cross-sectional surveys of the student body and the

faculty, focus group interviews, as well as an analysis of ex post facto cohort data. Both quantitative and qualitative data were collected and analyzed to spur a deeper understanding of the effect of student-owned technology on student engagement.

Findings

Research Question 1: How does the use of student-owned technology impact student engagement?

In order to answer the first research question, the researcher utilized both qualitative and quantitative measures. Prior to the beginning of data collection, technology teacher leaders who volunteered to host classroom observations and to serve as a focus group completed an informational, cross-sectional survey (see Appendix B). The purpose of this survey was to determine teacher leader demographics, experience, perception, and beliefs about technology and student engagement. The quantitative results of this pre-observation assessment are included in Table 1 below.

Table 1

Technology Teacher Leaders

Variable	*n*	*%*
Gender		
Female	1	20.0
Male	4	80.0
Highest Level of Education		
Bachelors	1	20.0
Masters	4	80.0
Years of Teaching Experience		
3 - 5 Years	1	20.0

5 - 10 Years	3	60.0
> 15 Years	1	20.0
Subject Matter Taught		
English	1	20.0
Mathematics	1	20.0
Related Arts	1	20.0
Science	1	20.0
Social Studies	1	20.0
Technological Proficiency		
Intermediate	2	40.0
Advanced	3	60.0
Professional Development Hours		
4 - 6 Hours	1	20.0
7 or more	4	80.0
Beliefs on student use of technology		
Moderately important	2	40.0
Important	1	20.0
Extremely important	2	40.0

In addition, the teacher leaders were offered an open-ended response to describe the concept of student engagement in their own words. These qualitative responses are included below.

Teacher A: "If students are engaged they are actively working throughout the majority of the class period and focused on accomplishing the tasks at hand."

Teacher B: "When students are focused on the task in which the teacher has instructed them to be."

Teacher C: "A student self-motivated about learning takes the initiative in paying attention, asking questions, and utilizing the information learned."

Teacher D: "Students are involved in the learning process and can take ownership of the assignment. Furthermore, students are relatively free from distractions and keep focused on the task at hand for a certain period of time."

Teacher E: "Actively participating in the lesson. Their focus is on attempting to understand the concepts being introduced."

The understanding of student engagement reported by the teacher leaders echoes a consistent trend in the literature on student engagement. Not only is student engagement difficult to measure, it is commonly misunderstood as compliance, work ethic, or time on task rather than work that has personal relevance or meaning to the students. The most commonly used words reported by the teachers were "focus," "task," and "actively." In order to account for this difficulty, the researcher conducted classroom observations to garner multiple measures of feedback on student engagement from teacher, student, and researcher perspectives.

Classroom Observations

The students in the classes of the five teacher leaders who participated in the research self-reported their own engagement levels after three classroom lessons. Additionally, each teacher reflected on student engagement with a quantitative measure of engagement and a qualitative description of the engagement of each class. Lastly, the researcher evaluated student engagement during each lesson using an at-task observation

instrument. Due to an unforeseen conflict, no data were collected for Class 1 under no-technology conditions. As a result, two separate within-subject ANOVAs were run to compare the engagement levels of all students in all classes during the school-owned and student-owned technology lessons, and students in classes 2, 3, 4, and 5 during the no technology, school-owned technology, and student-owned technology lessons.

A within-subjects ANOVA was used to compare the engagement levels of students in classes 2, 3, 4, and 5 after the no-technology (M = 4.22, SD = 0.77), school-owned technology (M = 4.19, SD = 0.77), and student-owned technology lessons (M = 4.33, SD = 0.91), finding no difference among the engagement levels, F (1, 85) = 0.13.

The engagement levels of all students were compared using a within-subjects ANOVA after the school-owned technology (M = 4.07, SD = 0.76) and student-owned technology lessons (M = 4.22, SD = 0.92), finding no difference between the engagement levels, F (2, 126) = 0.94.

After each observed lesson, the cooperating teacher also evaluated student engagement through a reflection instrument (see Appendix D). The researcher also evaluated student engagement using an at-task observation instrument to determine the percentage of time that students were on task to compare with the student and teacher reflections (see Appendix E). The results of the teacher and researcher observations are included below and compared with the student reflections in Table 2.

Table 2

Student Engagement Comparisons by Lesson Type

	Respondent		
	Student	Teacher	Researcher
Observation	*M*	*n*	*%*
Class 1, School-owned Technology	4.19	5	87.0
Class 1, Student-owned Technology	4.00	4	75.0
Class 2, No Technology	4.45	4	86.5
Class 2, School-owned Technology	4.04	4	88.5
Class 2, Student-owned Technology	3.78	5	87.0
Class 3, No Technology	4.44	5	90.0
Class 3, School-owned Technology	4.20	5	92.0
Class 3, Student-owned Technology	4.45	5	92.0
Class 4, No Technology	3.40	5	82.0
Class 4, School-owned Technology	3.92	5	90.8
Class 4, Student-owned Technology	4.45	4	87.5
Class 5, No Technology	3.60	5	93.0
Class 5, School-owned Technology	4.16	5	98.0
Class 5, Student-owned Technology	4.04	5	92.5

In addition to the feedback score, the cooperating teachers also reflected on student engagement levels during the lesson. Teacher reflections on each type of lesson are included below:

Teacher A, school-owned technology: "The students were incredibly engaged in their task. They worked on their assignment diligently and their discussions with each

other were about the assignment. The responses they turned in at the end of the class period were genuine and thorough and clearly well thought out. I was very pleased with the overall engagement of the class."

Teacher A, student-owned technology: "The overall engagement of the class on this assignment was extremely high. The kids were interested and engaged in putting together videos and making them creative. I will say though that my biggest struggle was with the group that forgot to BYOT. When this happens the kids are just at a stopping point and can't do anything towards the assignment unless I give them some form of technology to work with. I also had the students in groups and when they aren't the sole person responsible for the assignment there are always a couple of student who I have to spend a lot of time redirecting. This lesson was no different."

Teacher B, no technology: "From what I could gather the students were on task and genuinely interested in the reading material. I did not notice any off task students during the activity. However, I think that the students felt the notecard part was fairly mundane as we use those quite often."

Teacher B, school-owned technology: "I felt the class was on task, but it was hard to tell how high their commitment to learning the material was."

Teacher B, student-owned technology: "I felt that there was a genuine interest in the learning activity, which contributed to authentic engagement. I saw on-task behavior by over 90% of the class during my walkthroughs or sweeps."

Teacher C, no technology: "I don't feel my class was authentically engaged nor do I feel they displayed ritual engagement. I would place them in the middle of both engagement levels. Some students demonstrate high attention, where others may

demonstrate low attention. Those demonstrating low attention does not mean they lack commitment to the learning task. Could be due to a situation that has distracted them for a moment. Some of my students today asked questions, answered questions correctly and gave input, to include pointing out a mistake I made. I had a few students whose body language led me to believe their mind was elsewhere."

Teacher C, school-owned technology: "I feel that the class demonstrated high attention and high commitment because I gave them the freedom and flexibility to choose a quote and the style of design for the slide. They also knew they had one period to complete the assignment for a grade. There was minimum free time to goof off."

Teacher C, student-owned technology: "The task was simple but all students chose to participate without hesitation. For those who had no technology or experiencing technology difficulty, their classmates were quick to offer assistance to include sharing their technology devices."

Teacher D, no technology: "Each student received his/her notes and a copy of the book. Students were informed of assignment and students read along as the audio book played the book for students. Most students took notes. Students - some, participated in the class discussion. All students responded to the essay question. Though some students checked their phone, the majority of students were on task."

Teacher D, school-owned technology: "Due to technology issues, some students were on the computers and some had to take the test on paper. All students completed a good majority of the test. Students who were on computers faced the difficulty of waiting for the test to load, and to use the book to find answers. Some students were unfamiliar with the keyboard and that caused students to take the test at a slower pace. Students who

took the paper test finished earlier because they were familiar with the setup. All students were on task. Some finished more than others because of technology issues."

Teacher D, student-owned technology: "Students were grouped by ability in groups which featured high level and low level learners. One student was given the task of tweeting the group's response. Because just one student was responding, a few students chose to talk to other students in other groups. Though students were directed to the activity, some chose not to participate. As usual some groups featured students who discussed the activity and participated. There were a few groups in which students who didn't tweet weren't as active in the group."

Teacher E, no technology: "Based on the formative assessments I embed in my lessons (guided examples, call and response questions, etc.) it was obvious to me that the class in general were engaged in the lesson. The feedback I received from them, as well as the manner in which I received it, indicated to me that they were eager to demonstrate their mastery of the content and correct their own error, should they occur. This may have been due, in part, to the content being related to a unit they were taught in Algebra I. I believe their comfort level for this was relatively high and may have led to the eagerness of the students to participate on a more demonstrative level."

Teacher E, school-owned technology: "It was an online test so the students were very engaged due to the impact on their grade."

Teacher E, student-owned technology: "This is a high-achieving and self-motivated group of students. They are engaged on a daily basis. The technology part of the lesson was taken in stride by them which is typical of this group."

Research Question 2: What constructs work best to engage students with their own technology?

A cross-sectional, school-wide survey of students was conducted during the last week of the 2013-14 school year. Of the 1,671 students enrolled at the time of the survey, 830 students completed the survey for a response rate of 49.7%. A summary of student responses is included below in Table 3.

Table 3

Student Survey Results

Question	*n*	*%*
1. During the past school year, did you bring a personally owned electronic device to school?		
Yes	818	98.6
No	12	1.4
2. If you answered yes to Question 1, what device(s) did you bring to school?		
Cell phone	293	35.6
Smart phone (iPhone, Droid, Windows Phone)	687	83.6
iPod	201	24.5
Tablet (iPad, Kindle Fire, Google Nexus, Windows Surface)	206	25.1
Laptop computer	222	27.0
3. If you answered no to Question 1, why did you not bring a device to school?		
I do not own a device	11	55.0
My parent/guardian would not let me	5	25.0
My family did not sign the Acceptable Use Agreement	4	2.0
Other reason not listed above?	13	13.0

4. If the teacher conducted a technology-based activity in class and you did not have a device, what did you do?		
Not participate in the activity	65	9.0
Work with another student who brought a device	535	74.2
Use a device owned by the school	107	14.8
Complete an alternate assignment	14	1.9
5. When allowed to use a personally owned device in class, did you use it to:		
Consume information	673	84.3
Create information	125	15.7
6. What kinds of things did you do when allowed to use your device in class? Please check all that you have used your device for during this academic year.		
Look up information on the Internet	797	97.3
Go to websites directed by the teacher	728	88.9
Access a textbook online	379	46.3
Use Web 2.0 applications like Edmodo, Poll Everywhere, Socrative, TodaysMeet, Twitter, and Wall Wisher (Padlet)	343	41.9
Writing, journaling or blogging	176	21.5
Take an assessment (Pre-test, Benchmark, practice test questions)	238	29.1
Create a document, presentation or multimedia	319	38.9
7. On average, how often did your teachers let you use your own technology in class for instructional use?		
Every day	123	15.1
Once a week	325	39.8
Once a month	276	33.8
Once a semester	70	8.6
Never	23	2.8
8. Do you wish more teachers let you use your devices in class for instructional use?		
Yes	683	84.7

No	123	15.3
9. Why do you think students do not get the opportunity to use their own devices more often? Please check what you believe to be the most significant reason why.		
The teachers are unfamiliar with the technology	66	8.2
Teachers don't think the students should be allowed to have the devices at school	111	13.8
There is too much academic work to complete	46	5.7
Fear of inappropriate or off-task behavior by students	582	72.3
10. In the past school year, have you received a disciplinary referral for using your device inappropriately during class time?		
Yes	92	11.4
No	713	88.6
11. In the past school year, have you bypassed the school's wireless network to get on a 3G/4G connection in order to access blocked websites or applications?		
Yes	527	65.4
No	279	34.6
12. When allowed to use your technology in a class, how many times do you use your device for non-instructional behaviors such as texting, tweeting, or snapchatting?		
Never	204	24.9
1 - 4 times	298	36.4
5 - 7 times	85	10.4
8 - 10 times	38	4.6
More than 10 times	193	23.6
13. Allowing students to use their own technology in class for instructional use is a positive thing for students.		
Strongly agree	356	43.4
Agree	258	31.5
Neutral	180	22.0
Disagree	19	2.3

Strongly disagree	7	0.9
14. Using my own technology in class has increased my academic success.		
Strongly agree	228	27.8
Agree	257	31.4
Neutral	263	32.1
Disagree	48	5.9
Strongly disagree	23	2.8
15. Allowing students to use their own technology in class increases student misbehavior.		
Strongly agree	52	6.3
Agree	132	16.1
Neutral	351	42.9
Disagree	169	20.6
Strongly disagree	115	14.0

A cross-sectional survey of all faculty was conducted during the final week of the 2013-14 school year. Seventy-four of 105 teachers completed the survey for a response rate of 70.4%. A summary of teacher responses are reported in three tables below: Demographics of survey respondents in Table 4, beliefs and practice in Table 5, and open-ended responses on perception and resistance in Table 6.

Table 4

Demographics of Faculty Survey Respondents

Variable	*n*	*%*	X^2
Gender[a]			6.04*
Female	47	64.4	
Male	26	35.6	

Highest Level of Education[b]			67.51**
Bachelors	24	32.4	
Masters	45	60.8	
Education Specialist	4	5.4	
Doctorate	1	1.4	
Years of Teaching Experience[c]			11.41*
0 - 3 Years	10	13.5	
3 -5 Years	7	9.5	
5 - 10 Years	15	20.3	
10 - 15 Years	19	25.7	
> 15 Years	23	31.1	
Subject Matter Taught[d]			10.95
English	18	24.3	
Career and Tech	10	13.5	
Mathematics	13	17.6	
Related Arts	9	12.2	
Science	8	10.8	
Social Studies	12	16.2	
World Language	4	5.4	
Technological Proficiency[b]			62.87**
Beginner	0	0.0	
Novice	4	5.4	
Intermediate	44	59.5	
Advanced	24	32.4	
Expert	2	2.7	

Professional Development Hours[b]			12.38***
Zero	7	9.5	
1 - 3 Hours	21	28.4	
4 - 6 Hours	18	24.3	
7 or more	28	37.8	

[a]df = 1 [b]df = 3 [c]df = 4 [d]df = 6

*$p < .05$. **$p < .001$. ***$p < .01$

Table 5

Teacher Beliefs and Practice

Question	*n*	*%*
7. How important is it for technology to be integrated into a student's educational experience?		
Not important at all	1	1.4
Somewhat important	9	12.2
Moderately important	21	28.4
Important	31	41.9
Extremely important	12	16.2
8. I support the use of student owned technology in the classroom.		
Strongly agree	7	9.5
Agree	34	46.0
Neutral	18	24.3
Disagree	12	16.2
Strongly disagree	3	4.1
9. The use of student owned technology in the classroom increases student learning.		
Strongly agree	4	5.4
Agree	24	32.4

Neutral	23	31.1
Disagree	20	27.0
Strongly disagree	3	4.1
10. What types of school owned technology are you utilizing for instructional purposes? Please check all that you have utilized in the current school year.		
Laptop carts (Computers on wheels)	35	47.3
Smart Board	29	39.2
Student Response Systems (Clickers)	12	16.2
iPads	20	27.0
Desktop computers in the classroom	26	35.1
School computer labs	44	59.5
11. How often do you allow students to use personally owned electronic devices in class for educational purposes?		
Every day	13	17.6
Once a week	38	51.4
Once a month	16	21.6
Once a semester	2	2.7
Never	5	6.8
12. When allowed to use a personally owned device in your class, do your students primarily:		
Consume information?	59	79.7
Create information?	15	20.3
13. What kinds of things did students do most often when allowed to use personally owned technology in your class? Please check all that apply.		
Look up information on the Internet	63	85.1
Go to websites directed by the teacher	49	66.2
Access a textbook online	27	36.5
Use Web 2.0 applications like Edmodo, Poll Everywhere, Socrative, TodaysMeet, Twitter, and Wall Wisher (Padlet)	18	24.3

Writing, journaling or blogging	15	20.3
Take an assessment (Pre-test, Benchmark, practice test questions)	17	23.0
Create a document, presentation, or multimedia	28	37.8
14. In the past year, have you written a disciplinary referral for inappropriate student use of technology?		
Yes	26	35.1
No	48	64.9
15. When allowed to use their own technology in your class, how often do you observe students using their devices for non-instructional purposes in a class period?		
Never	2	2.7
1-4 times	33	44.6
5-7 times	14	18.9
8-10 times	7	9.5
More than ten times	18	24.3

Table 6

Teacher Qualitative Responses on Resistance and Support

Question	*n*	*%*
16. What to you believe to be the primary reasons for teacher resistance to the use of student-owned technology in the classroom?		
Fear of inappropriate use	64	87.7
Lack of teacher efficacy with technology	9	12.3
Other	8	11.0
Lack of teacher support	6	8.2
Lack of time	3	4.1
17. What support would you need to increase the amount of time you allow students to use their own devices in your classroom?		
Professional Development	17	25.4

None	13	19.4
Stricter Discipline	12	17.9
Stronger Wi-Fi and filters	12	17.9
1:1 or school-owned technology	10	14.9
Other	5	7.5
Research-based evidence	2	3.0

The qualitative responses to questions 16 and 17 were analyzed using the text analysis function in Survey Monkey and categorized by trend. The trends noted in question 16 mirror those of question nine on the student survey as a basis of comparison. While 72.3% of student respondents noted that fear of inappropriate behavior by students led to teacher resistance to BYOT, 87.7% of teachers mentioned this trend in their qualitative responses. However in question 17, more teachers noted the need for professional development than stricter discipline or stronger Wi-Fi and filters to expand BYOT usage.

An independent samples *t* test was used to compare student and teacher responses to five corresponding survey questions on the purpose of technology use, frequency of use and off-task behavior, support for BYOT, and BYOT's effect on student success. This test demonstrated a significant difference between students and teachers on frequency of off-task behavior, support for BYOT, and student success. There was not a significant difference between students and teachers on purpose and frequency of use. The results of this test are included below in Table 7.

Table 7

Responses to Survey Items by Condition

	Condition				
	Student		Teacher		
Item	*M*	*SD*	*M*	*SD*	*t*
Purpose[a]	1.16	0.36	1.20	0.41	-1.03
Frequency of use[b]	2.44	0.94	2.30	1.02	1.27
Frequency of off-task behavior[c]	2.66	1.50	3.08	1.28	-2.37*
Support[d]	1.86	0.90	2.59	1.01	-6.71**
Success[e]	2.24	1.01	2.92	0.99	- 5.49**

[a]df = 870 [b]df = 889 [c]df = 890 [d]df = 892 [e]df = 891

*$p < .05$. **$p < .001$.

A reliability analysis was performed to examine the internal consistency of the five survey items. The reliability analysis revealed that the items are highly inconsistent (Cronbach's $a = .296$). The analysis also showed that the reliability would improve with the removal of the survey questions on purpose, frequency of use, and off-task frequency. The reliability analysis was performed again after the removal of these three survey items. The reliability analysis performed on the remaining two survey items, support and success, revealed that these two questions are highly consistent (Cronbach's $a = .789$).

Technology Teacher Leader Focus Group

The five technology teacher leaders who hosted classroom observations for this research served as a focus group to answer questions on student-directed learning, frequency of use, and Web 2.0 applications (see Appendix H). Their responses to the focus group questions and follow up discussions are included below.

1. Teacher vs. student-directed learning

    a. Did you allow any student-directed learning activities during the last school year?

    Teacher A: Yes. I have many laboratory assignments that promote student lead learning and inquiry. I promote student-directed learning when building a prosthetic leg, designing a presentation to demonstrate understanding of muscle contraction physiology, building a website to demonstrate understanding of a specific body system. Students are also self-directing when building concept maps or graphic organizers to make connections between new vocabulary taught in Anatomy. The students are given terms and asked to build a diagram of how they think the terms are related. I also request media presentations often and students are given a topic of a "Integumentary Diseases" for example and told they can research and present what they discover in a media presentation of their choosing.

    Teacher B: Yes, quite a few. Projects, honors portfolios, Google sites about 1920s, Google decades presentation. Teacher provided rubric and students ran with it. Twenty-five percent of technology use in student-directed activities, 75% in portfolios.

    Teacher C: Yes, group discussions and writing reflections. Students chose study activities, review activities, and created Power Points on leaders chosen by students.

Teacher D: Yes. Group work helps characterization in English. Used polls (Poll Everywhere) and Padlet (Wallwisher).

Teacher E: Some, yes. Used QR codes but had problems with access and having an app installed. Some students used for online textbook.

b. Are students allowed to use their technology freely during instructional time or only at your direction?

Teacher A: I would say that 90% of the time the students can use technology to help them on their assignments. There are only a few assignments, such as quizzes and tests, where I don't allow them to use their technology.

Teacher B: Somewhat freely. There are certain times when I will not allow the use of phones (testing, strict teacher-directed activities), but 95% of the time if they can use their technology constructively then they are able to use it.

Teacher C: Only to take notes do I allow them to use it freely. If caught using inappropriately, they lose the privilege for the year.

Teacher D: Only at my direction.

Teacher E: At my discretion.

c. What do you believe to be the primary reason for teacher resistance to the use of student-owned technology in the classroom?

Teacher A: Monitoring students on their technology is a lot of work. And at the end of the day I know that I didn't re-direct every student who got off track using their technology. It is difficult to monitor every student

and assure that they are on task when I can't see all of their screens. I also think it is difficult for teachers to get a good grasp on the technology available for them to use in the classroom and how to apply it successfully to their curriculum. It requires teachers to get out of their normal routine, which is difficult for many people. I also think that teachers are not always fans of using technology only to find that the students know more about it then the teacher. This can potentially lead to classroom management issues.

Teacher B: Fear that they will not use it productively and it's very difficult to monitor off-task behavior. Teachers are also not comfortable with technology

Teacher C: Students texting, on Facebook, Instagram, and some are so caught up into taking notes that the are not hearing the entire message of the lesson (missing key points, can't type as fast as the teacher is talking, primarily due to teacher usage).

Teacher D: Control or not understanding the technology and reluctance due to intentional disruptions.

Teacher E: Off-task behavior. Not all students have smart phones.

2. Frequency of use
    a. How often are students allowed to use their technology in your classroom?

    Teacher A: Students are allowed to use their technology in my classroom almost daily. I understand that many students stay more focused when they are listening to music and I support that. I also understand that it is

helpful to use their device in finding information to help answer the questions I ask of them.

Teacher B: Pretty much all the time, around 95% of the time as I mentioned earlier.

Teacher C: Daily to take notes and about once every nine weeks for BYOT class assignment.

Teacher D: Often in first semester but less by April or May. Around 50% of the time and then down to 0-10% due to EOC testing. It all depends upon the class's responsibility.

Teacher E: On average, once a month. Students can look up info or use instructional materials on web.

b. How prevalent is off-task or inappropriate behavior by students with their technology?

Teacher A: Almost daily, it's just something I have to stay on top of constantly.

Teacher B: Not all that prevalent that I've seen. It's hard to gauge given that it's difficult to see what's on the screen of their phones. It is tough to monitor.

Teacher C: Sometimes. Four on a scale of 1-10.

Teacher D: Somewhat high. Goal is to figure out how to allow use in spite of goofballs.

Teacher E: Multiple times a week.

c. If students are off-task with their technology, what behaviors are they engaging in most often?

Teacher A: Social Media such as Twitter, Instagram and sometimes Facebook. And really, texting is probably one of the most common off-task behaviors.

Teacher B: Snapchat, Twitter, and texting. Facebook maybe. Definitely social media.

Teacher C: Texting or on Instagram. If I notice a student show their device to another student, it indicates they are off-task.

Teacher D: Usually disrupting Todays Meet with inappropriate posts or visiting recruiting websites. Most are not really mischievous, but off-task. It's hard to see cell phone screens.

Teacher E: Texting during instruction.

3. Web 2.0 Applications

a. What activities did students use their own technology for most often in the classroom?

Teacher A: Looking up answers to activities and handouts, it's quicker and easier for them to look it up on their phones than to remember their textbooks and take time to look it up in their text books.

Teacher B: Research (looking stuff up not in the textbook or difficult to find), review games, and to respond to prompts (Padlet, Todays Meet). Google everything!

Teacher C: Google Forms, assessment surveys, polls, and feedback for the teacher.

Teacher D: Group projects, visual/creative projects. Student videos of reenactment or interviews with characters

Teacher E: Links to instructional materials on web

b. What websites or applications do students find most engaging while using their own technology?

Teacher A: My students love using video maker apps such as "Stop Motion" or iMovie to make projects. It is also super convenient for them to use Google Apps for a lot of projects. I would say it's their favorite but it is super convenient!

Teacher B: Quizlet or other apps where they can make flashcards, etc. Anything other than paper/pencil.

Teacher C: Google Docs because it automatically saves.

Teacher D: Google, Todays Meet, YouTube if not on Wi-Fi

Teacher E: Construction with QR codes and doing something with their hands.

c. What is one application that you will continue to use for instructional purposes in the classroom?

Teacher A: I will for sure be using more of the Google Apps for education. It helps keep my classes organized and it makes it very convenient for the students to turn in assignments, make presentations, or work in groups. I will also use "StopMotion" for some of my video

presentations and Movie Maker is a great resource as well. Another application I have used a little but would like to incorporate more is PhotoStory. The students really enjoyed learning and researching when they were building PhotoStory.

Teacher B: Google Apps – Docs, Sites, and Presentations. Forms allow for EOC review and easy to sort data. The Google suite also promotes collaboration, allows teacher to jigsaw, and is easy to access.

Teacher C: Not sure, didn't have enough experience with one or the other to make that call. Possible Padlet.com. The wall shows everybody's comments. Students are more likely to express themselves (gives them a voice), they've lost the skill of face-to-face communication.

Teacher D: Todays Meet, Google Docs, and Videolicious. Google Docs for auto save, cloud storage, sharing stuff with students, accountability, collaboration, easy to navigate, and reduces the idea of one product.

Teacher E: QR codes. Google forms for an online test I observed.

Ex post facto cohort data

The following ex post facto analysis covers three cohort years: 2011-12 (no BYOT), 2012-13 (pilot year of BYOT), and 2013-14 (research year). The purpose of this analysis was to determine any residual effects of the BYOT policy on school-wide metrics over a three-year span. The results are included below in Table 8.

Table 8

Ex Post Facto Cohort Data

Item	Cohort Year 2011 - 2012 %	Cohort Year 2012 - 2013 %	Cohort Year 2013 - 2014 %	Change %
Daily Attendance Rate	95.2	97.3	97.7	2.6
Graduation Rate	93.6	89.2	92.8	0.9
Dropout Rate	1.9	1.8	1.4	-26.3
21st Century Skills Assessment	77.0	68.0	91.0	18.2

The results of this analysis demonstrated positive trends in all four areas, most notably in dropout rate and success on the 21st Century Skills Assessment. Particular growth was shown between the second and third years, after a full year of BYOT implementation.

Summary of the Findings

Research Question 1: How does the use of student-owned technology impact student engagement?

This research sought to determine if student engagement levels differed when using student-owned technology during instructional time. While engagement levels did vary during the observed lessons, the results of this research demonstrated no significant difference between engagement levels of students when using no technology, school-owned technology, or student-owned technology. The results of teacher reflections of the observed classroom lessons indicated that teachers view time on task and compliance as engagement and consistently rate student engagement levels higher than the students' rate

themselves. In this study, cooperating teachers described and rated student engagement levels equal to or higher than student self-reported levels in 11 of 14 observations. During only one lesson did students and the teacher report a corresponding level of engagement, but this lesson was rated the lowest of the 14 observations for on-task behavior observed by the researcher. During the research observations, the researcher noted on-task behavior equal to or higher during school-owned technology lessons than student-owned technology lessons in all five classes. In addition to the insight on technology's effect on student engagement, the results of this research also corroborated existing literature on the difficulty of measuring and assessing student engagement.

Research Question 2: What constructs work best to engage students with their own technology?

This research also sought to determine what students find most engaging when using student-owned technology. While nearly every student (98.6%) is bringing an electronic device to school, the devices are being utilized to look up information rather than as a tool to design, collaborate, and create. Students expressed a desire to use their personally owned devices more often but know that teachers are resistant due to off-task behavior by students, which 75.1% of students admit to participating in while regularly bypassing school internet filters (65.4%).

The results of cross-sectional surveys of teachers and students demonstrate a significant difference between the two groups on frequency of off-task behavior, support for the BYOT initiative, and the policy's effect on student success. A majority of teachers (58.1%) believe technology is important or extremely important for the student experience and support the BYOT policy (55.5%). However, only 37.8% agree that it

increases student learning. While 41% of students reported using Web 2.0 applications, only 24.3% of teachers indicated the use of Web 2.0 in their classrooms. Despite a policy allowing the use of SOD for instructional purposes, teachers are still relying on school-owned technology as the primary source of instructional technology. The chief obstacles to SOD use are teacher fear of off-task or inappropriate behavior, mentioned by all five focus group teachers and 87.7% of teacher survey respondents. The teachers want additional professional development opportunities to equip them to meet the needs of students. Teachers also expressed a desire for stricter discipline for misbehavior, stronger Wi-Fi signals, and tighter Internet filters.

The results of the focus group interviews with technology teacher leaders indicated that students enjoy student-directed, collaborative activities and using BYOT devices freely. While they will be off-task or multitasking, the students want to use the devices for more than retrieving information from the Internet. Meeting this need requires increased teacher efficacy with technology and effective, student-centered instructional design. Students and teachers alike enjoy using the Google suite of applications as an instructional resource in the classroom. Students also want to collaborate and create using applications like Todays Meet, Padlet, and video creation applications using stop motion technology.

Limitations

The results of this ethnographic research study were hampered by a number of threats to its validity. The primary limitations involved the timing of the study, the participants and their roles and involvement in the study, and the instruments used throughout the research.

The primary threat to the validity of this ethnographic research study was its limited timing. All of the data collection for this research took place during the 4th quarter of the 2013-14 school year. Cross-sectional surveys were conducted during the last week of school for students and after the end of school for teachers. The classroom observations took place during only during the fourth nine weeks of the school year. The timing of the study also allowed for no opportunity to ensure that all classroom observations were completed when a conflict arose that precluded one of the researcher observations. There was a high absence rate during the last week of school, particularly among seniors taking advantage of a senior exemption policy, which may have limited the response rate to less than 50% on the student survey. The results of this study may have been affected by the fatigue of the participants during the narrow time window for data collection at the end of the school year.

Another threat to validity of this study was the role of participants. Cooperating teachers had volunteered at the end of the 2012-13 year to serve as technology teacher leaders for the subsequent year. Based on the researcher's review of teacher qualitative reflections, their role as technology teacher leaders may have led to hypothesis guessing. In addition, the research class periods and observations were teacher selected rather than randomly selected. Students without personally-owned electronic devices may have not taken advantage of the opportunity to take the student survey or to participate in classroom observations, which is a common criticism of BYOT policies. In addition to researcher planned survey administration for students, school librarians passed out slips during the week before exams, which may have resulted in students taking the survey

multiple times. The researcher's role as an assistant principal over technology at the school may have influenced participation and hypothesis guessing.

The final threat to validity is the instrumentation used during the research. Even though reviewed and vetted by a team of peers, the preponderance of instruments used in this study were unreliable, researcher-created instruments. The researcher-created, cross-sectional surveys resulted in unacceptable levels of internal consistency when comparing student and teacher responses to three of five survey questions. One classroom observation was not completed, requiring an adjustment on the statistical tests used to analyze student engagement levels. While used as additional insight on the school climate, the ex post facto data is highly unrelated to the BYOT policy. Lastly, the format of the 21st Century Skills Assessment changed from 2013 to 2014, the cohort year demonstrating the most growth. The results of this assessment only include those students who have not yet demonstrated the technological proficiency required for graduation, rather than a random sampling of the entire student body.

Implications and Recommendations

The primary implication of this study is that bring your own technology policies are not sufficient to increase student engagement alone. This study demonstrated a significant difference between teacher and student attitudes, beliefs, and perceptions regarding BYOT. This research also confirmed that access to technology is not enough to increase student engagement, but primacy remains with instructional design and teacher efficacy to increase student engagement. This research study also corroborated the difficulty of assessing and measuring engagement, while differentiating it from on-task behavior and compliance. Given the novelty of the BYOT movement, there is a

steep learning curve for all stakeholders. The findings of this study will serve to inform future decision making by schools considering BYOT policies, as well as support classroom teachers with technology-based classroom management and instructional design. Additionally, this study will contribute to the literature on student engagement with technology as BYOT policies continue to expand. While such policies are not adequate to increase student engagement alone, improved student outcomes are an inherent possibility with further research and investigation in the field of educational technology and student engagement.

Given the results of this study, further research is needed to scaffold upon these findings. As more and more school districts adopt BYOT policies, districts with established, successful programs should undertake studies that investigate BYOT's effect on academic achievement and student growth. To keep up with the torrid pace of technological advancements in personal computing technology, relevant professional development for teachers should be embedded and ongoing in the learning environment. School systems and educational leaders must require digital citizenship programs that foster trust between teacher and student and promote healthy and safe classroom learning environments. Additionally, instrumentation and processes to effectively measure student engagement must continue to be developed and refined. The "digital disconnect" described by Levin and Arafeh in 2002 exists to this very day, despite revolutionary technological innovation in the intervening years. The responsibility to bridge the digital disconnect with student-owned technology lies with educational leaders and researchers, who must equip and empower a generation of teachers to meet the unique needs of post-millennial learners.

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Appendix A

Informed Consent

February 24, 2014

Dear Parent/Guardian,

Your student has the opportunity to participate in a research project I am conducting through Trevecca Nazarene University. This optional research study is a component of my dissertation as I work towards my doctoral degree. There are no costs or obligation associated with participation in the study.

My study seeks to answer the following question: ***How does the use of student owned technology affect student engagement?*** The 2010 National Educational Technology Plan (NETP) declares that technology is pervasive in students' lives outside of school and that energy must be channeled into the classroom experience. "Technology is at the core of virtually every aspect of our daily lives and work, and we must leverage it to provide engaging and powerful learning experiences…" (p. 7). According to Yazzie-Mintz (2010), there is an emerging engagement gap mirroring the achievement gap.

For these compelling reasons, I am conducting research on student engagement with technology in the classroom. This study will involve one of your student's classes being observed three times during the school year. At the conclusion of each of these three classes, your student will be asked to complete a reflection slip. The reflection slip that will be collected post-observation contains no student-identifying information and will only ask students to check one of five boxes rating their engagement level. All student engagement reflections will be sealed in a manila envelope before leaving the observed classroom.

*****Although permission has been granted to conduct the research study by [redacted], any hypotheses, findings, conclusions, or recommendations that come from the study do not reflect the opinions or support of [redacted].**

If you consent to your student's participation in this study, please complete the attached consent form and have your student return the form directly to Mr. Boyd. Anyone who agrees to participate in this study is free to withdraw from the study at any time without consequence.

Please feel free to contact me if you have any questions or concerns. My email is [redacted] and my direct phone number is [redacted].

Sincerely,

Patrick Boyd
Assistant Principal

INFORMED CONSENT DOCUMENT
FOR RESEARCH INVOLVING MINORS

I, _____, parent of
_____, grant permission for my child to participate in a study concerning technology and student engagement under the direction of Patrick Boyd.

This study will involve my child:

- Being observed in the learning environment for levels of student engagement.
- Completing a reflection instrument regarding his/her level of engagement relative to technology use in the classroom.

My child's participation in this project is voluntary, and I have been informed that I may stop my child's participation in this study at any time. If I choose not to allow my child to participate, it will not affect his/her grade (treatment/care, etc., as appropriate) in any way.

Signature _____ Date _____

Appendix B

Teacher Leader Pre-Assessment

Teacher Pre-Observation Assessment

Please respond to each of the following questions.

1. What is your level of teaching experience?
    a. Zero to three years
    b. Three to five years
    c. Five to ten years
    d. Ten to fifteen years
    e. More than fifteen years

2. What is your highest level of education?
    a. Bachelor's
    b. Master's
    c. Education Specialist
    d. Doctorate

3. What is your gender?
    a. Female
    b. Male

4. What subject matter do you teach?
    a. English
    b. Career and Technology
    c. Mathematics
    d. Related Arts (Fine Arts, JROTC, Physical Education)
    e. Science
    f. Social Studies
    g. World Language

5. How would you rate your level of technological proficiency?
    a. Beginner
    b. Novice
    c. Intermediate
    d. Advanced
    e. Expert

6. How many hours of technology-related professional development have you completed in the last three years?
    a. Zero
    b. One to three
    c. Four to six
    d. Seven or more

7. How important is it for technology to be integrated into a student's educational experience?
    a. Not important at all
    b. Somewhat important
    c. Moderately important
    d. Important
    e. Extremely important

8. Describe the concept of student engagement in your own words.

Appendix C

Student Engagement Reflection

Student Engagement Reflection

Check the box that describes best how you felt about class today:

____ I wish every class was like this every day at school (*Authentic engagement*).

____ I worked hard just to get the best grade possible (*Ritual engagement).*

____ I did what I had to do to finish my work and stay out of trouble (*Passive engagement*).

____ I was so ready for class to be over and I wish we could learn in other ways (*Retreatism).*

____ I am not going to do any work if we have class like this again (*Rebellion*).

Appendix D

Teacher Engagement Reflection

Teacher Engagement Reflection

While observing my class during instructional time today and after reflecting on the class's engagement, I believe the class as a whole was at a level of:

____ ***Authentic engagement***. The class demonstrated high attention and high commitment to the learning tasks.

____ ***Ritual engagement***. The class demonstrated high attention but low commitment to the learning tasks.

____ ***Passive engagement***. The class demonstrated low commitment and low attention to the learning tasks.

____ ***Retreatism***. The class demonstrated no attention and no commitment to the learning tasks.

____ ***Rebellion***. The class demonstrated diverted attention and no commitment to the learning tasks.

Please explain the reason for your ranking with as much anecdotal evidence as you can recall without identifying individual students.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Appendix E

At-task Observation Instrument

At-Task Observation Instrument

This technique provides data on individual student's engagement levels. Each square is a student. Scan the classroom every 3 to 5 minutes ("sweep:). Record the time of the sweep and a brief notation as to the activity taking place. Focus once on each student briefly during each sweep. For each student, record an at-task (+) or off-task notation. The following questions could be asked in reviewing the data: What was the predominant off-task behavior? During which activity did most off-task behaviors occur? During which sweeps were most students off-task? Which students were off-task most often? Possible reasons/recommendations?

Teacher ______________________________ **School** ______________________

Start Time ______________ **End Time** ______________ **Date** ______________

+ = At- Task

Off-Task Codes

A – Turned around

C – Schoolwork other than assignment

O – Out of seat

H – Head down

N – making noises/faces

S – Stalling

T – Talking

Students

1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8
1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8
1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8
1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8
1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8	1 5 2 6 3 7 4 8

Sweeps: Every 3-5 minutes record the time of the sweep and a brief notation of activity taking place at that time:

sweep 1.	sweep 2.	sweep 3.	sweep4.
sweep 5.	sweep 6.	sweep 7.	sweep 8.

Appendix F

Faculty Survey

School-wide Faculty Survey

Please respond to each of the following questions:

1. What is your level of teaching experience?
    a. Zero to three years
    b. Three to five years
    c. Five to ten years
    d. Ten to fifteen years
    e. More than fifteen years

2. What is your highest level of education?
    a. Bachelor's
    b. Master's
    c. Education Specialist
    d. Doctorate

3. What is your gender?
    a. Female
    b. Male

4. What subject matter do you teach?
    a. English
    b. Career and Technology
    c. Mathematics
    d. Related Arts (Fine Arts, JROTC, Physical Education)
    e. Science
    f. Social Studies
    g. World Language

5. How would you rate your level of technological proficiency?
    a. Beginner
    b. Novice
    c. Intermediate
    d. Advanced
    e. Expert

6. How many hours of technology-related professional development have you completed in the last three years?
    a. Zero
    b. One to three
    c. Four to six
    d. Seven or more

7. How important is it for technology to be integrated into a student's educational experience?

a. Not important at all
b. Somewhat important
c. Moderately important
d. Important
e. Extremely important

8. I support the use of student owned technology in the classroom.
    a. Strongly agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly disagree

9. The use of student owned technology in the classroom increases student learning.
    a. Strongly agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly disagree

10. What types of school owned technology are you utilizing for instructional purposes? Please check all that you have utilized in the current school year.
    a. Laptop carts (Computers on wheels)
    b. Smart Board
    c. Student Response Systems (Clickers)
    d. iPads
    e. Desktop computers in the classroom
    f. School computer labs
    g. Other technologies?

11. How often do you allow students to use personally owned electronic devices in class for educational purposes?
    a. Every day
    b. Once a week
    c. Once a month
    d. Once a semester
    e. Never

12. When allowed to use a personally owned device in your class, do your students primarily:
    a. Consume information?
    b. Create information?

13. What kinds of things did students do most often when allowed to use personally owned technology in your class? Please check all that apply.
    a. Look up information on the Internet

b. Go to websites directed by the teacher
c. Access a textbook online
d. Use Web 2.0 applications like Edmodo, Poll Everywhere, Socrative, TodaysMeet, Twitter, and Wall Wisher (Padlet)
e. Writing, journaling or blogging
f. Take an assessment (Pre-test, Benchmark, practice test questions)
g. Create a document, presentation, or multimedia
h. Other?

14. In the past year, have you written a disciplinary referral for inappropriate student use of technology?
    a. Yes
    b. No

15. When allowed to use their own technology in your class, how often do you observe students using their devices for non-instructional purposes in a class period?
    a. Never
    b. 1-4 times
    c. 5-7 times
    d. 8-10 times
    e. More than ten times

Please respond to each of the following open-ended questions:

16. What support would you need to increase the amount of time you allow students to use their own devices in your classroom?

17. What do you believe to be the primary reasons for teacher resistance to the use of student owned technology in the classroom?

Appendix G

Student Survey

School-wide Student Survey

Please respond honestly to the following questions. All responses are anonymous.

1. During the past school year, did you bring a personally owned electronic device to school?
    a. Yes
    b. No

2. If you answered yes to Question 1, what device(s) did you bring to school? Please check all that apply.
    a. Cell phone
    b. Smart phone (iPhone, Droid, Windows Phone)
    c. iPod
    d. Tablet (iPad, Kindle Fire, Google Nexus, Windows Surface)
    e. Laptop computer

3. If you answered no to Question 3, why did you not bring a device to school?
    a. I do not own a device
    b. My parent/guardian would not let me bring my device to school
    c. My family did not sign the Acceptable Use Agreement with the school system
    d. Other reason?

4. If the teacher conducted a technology-based activity in class and you did not have a device, what did you do?
    a. Not participate in the activity
    b. Work with another student who brought a device
    c. Use a device owned by the school
    d. Complete an alternative assignment

5. When allowed to use a personally-owned device in class, did you use it to:
    a. Consume information?
    b. Create information?

6. What kinds of things did you do most often when allowed to use your device in class? Please check all that apply.
    a. Look up information on the Internet
    b. Go to websites directed by the teacher
    c. Access a textbook online
    d. Use Web 2.0 applications like Edmodo, Poll Everywhere, Socrative, TodaysMeet, Twitter, and Wall Wisher (Padlet)
    e. Writing, journaling or blogging
    f. Take an assessment (Pre-test, Benchmark, practice test questions)
    g. Create a document, presentation, or multimedia
    h. Other?

7. On average, how often did your teachers let you use your own technology in class?
    a. Every day
    b. Once a week
    c. Once a month
    d. Once a semester
    e. Never

8. Do you wish more teachers let you use your devices in class for instructional use?
    a. Yes
    b. No

9. Why do you think students do not get the opportunity to use their own devices more often? Please check all that apply.
    a. The teachers are unfamiliar with the technology
    b. Teachers don't think the students should be allowed to have the devices at school
    c. There is too much academic work to complete
    d. Fear of inappropriate or off-task behavior by students
    e. Other?

10. In the past year, have you received a disciplinary referral for using your device inappropriately during class time?
    a. Yes
    b. No

11. In the past year, have you bypassed the school's wireless network to get on a 3G/4G connection in order to access blocked websites or applications?
    a. Yes
    b. No

12. When allowed to use your technology in a class, how often do you use your device for non-instructional behaviors such as texting, Tweeting or Snapchating?
    a. Never
    b. 1-4 times
    c. 5-7 times
    d. 8-10 times
    e. More than ten times

Please rate your level of agreement with the following statements:

13. Allowing students to use their own technology in class for instructional use is a positive thing for students.
    a. Strongly agree
    b. Agree
    c. Neutral

d. Disagree
e. Strongly disagree

14. Using my own technology in class has increased my academic success.
    a. Strongly agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly disagree

15. Allowing students to use their own technology in class increases student misbehavior in class.
    a. Strongly agree
    b. Agree
    c. Neutral
    d. Disagree
    e. Strongly disagree

Appendix H

Focus Group Questions

BYOT Teacher Leader Focus Group/Individual Interview Questions

1. Teacher vs. Student directed learning
    a. Did you allow any student-directed learning activities during the last school year?
    b. Are students allowed to use their technology freely during instructional time or only at your direction?
    c. What do you believe to be the primary reason for teacher resistance to the use of student-owned technology in the classroom?

2. Frequency of use
    a. How often are students allowed to use their technology in your classroom?
    b. How prevalent is off-task or inappropriate behavior by students with their technology?
    c. If students are off-task with their technology, what behaviors are they engaging in most often?

3. Web 2.0 Applications
    a. What activities did students use their own technology for most often in the classroom?
    b. What websites or applications do students find most engaging while using their own technology?
    c. What is one application that you will continue to use for instructional purposes in the classroom?