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Bring Your Own Device: A Case Study of a 10th Grade BYOD Program in a Rural Pennsylvania School District

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Indiana University of Pennsylvania

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BRING YOUR OWN DEVICE: A CASE STUDY OF A

10$^{\text{TH}}$ GRADE BYOD PROGRAM IN A RURAL PENNSYLVANIA SCHOOL DISTRICT

A Dissertation

Submitted to the School of Graduate Studies and Research

in Partial Fulfillment of the

Requirements for the Degree

Doctor of Education

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December 2015

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Title: Bring Your Own Device: A Case Study of a 10th Grade BYOD Program in a Rural Pennsylvania School District

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Education in the 21st century is a world of constant change with stakeholders facing many unknowns. Today's schools are struggling to prepare students for careers that have not yet been created in a financially sound manner. Implemented Bring Your Own Device (BYOD) programs have offered a solution to these problems by empowering students and teachers to utilize technology in a way which they are already familiar.

This case study was conducted in a school district in Pennsylvania in an attempt to provide an in-depth look at the perceptions and uses of a BYOD program by 10th grade students and their teachers. The completed study consisted of three components: an online survey; student/ teacher interviews; and classroom observations. All data were collected and analyzed to identify common themes in a comparison of students and teachers based on their perceptions, frequency of use, and utilization of programming, as well as the types of devices currently being used. The results of the study identified a distinct difference between Digital Natives and Digital Immigrants. Students are requesting to use the tools they have known since birth while teachers are looking for guidance and professional development on how to use these tools while participating in a monitored implementation. Despite the differences of the target groups, BYOD programming, along with professional development and structured guidelines, may be one instrument to assist today's teachers in preparing 21st students for jobs that have not yet been created.

ACKNOWLEDGEMENTS

With sincere appreciation, I would like to thank my committee for their guidance and support. Thank you Dr. Doug Lare, your "check-ins" kept me going when I just wanted to pack it up - Dr. Craig Wilson and Dr. Susie Fello for volunteering to be on my committee, it has been a learning experience and a delight working with you. Thank you Dr. David Rheinheimer – the completion of this project could never have happened without your incredible assistance!

To the faculty and students of Lakeland School District – especially R. Scott Jeffrey and Tom Kameroski, your assistance made this possible. **Thank you.**

To my family, friends and colleagues - over the years you have listened to me, tolerated my many frustrations and complaints, and provided support with "check-ins". This was truly more than *"6 credits and another degree".* **Thank you.**

To Nicole - our 5a.m. chats helped me to complete every aspect of this project. You made that awful hour bearable and in this case, friendship truly is not overrated! **Thank you.**

To Kiel, Becky, and Anne – you have no idea what your individual fights and sheer acts of determination have meant to me. To watch each of you struggle and persevere – you have been true inspirations. You have no idea how many people you have inspired! **Thank you.**

To my children – Taryn and Riley, your support and confidence have been with me every step of the way. I hope that I have made you proud because both of you have truly made me proud! **Thank you.**

Finally, to my husband and best friend, Bob – I don't know how I would have completed this without you by my side. Your patience, tolerance, and confidence in me cannot be described

in words. You have supported me in everything I have ever attempted to do and "Thank You"

simply isn't enough. **I Love You…**

DEDICATION

To my parents – I miss you and think about you both every day.

Thank you for teaching me that "enough is never really enough" and that I can achieve much more for myself than I ever imagined!

"Let it be."

To Bob, Taryn, and Riley –
without your support and patience, this never would have been possible!

Thank you for not letting me quit when I wanted to and for understanding when I needed to miss an activity when I didn't want to.

I love you all very much!

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CHAPTER 1

INTRODUCTION TO THE STUDY

In today's ever-changing world of education, educators are seeking alternate means to communicate and educate in a way that is effective, productive, manageable, and cost efficient. In secondary public education, they are striving to prepare 21st Century learners to become productive members of a society that is rapidly evolving. As a result, educators must decide how technology fits into an antiquated model of education to make it not only effective but also cost efficient.

This combined-methods case study will take an in-depth look at 10th grade students and teachers involved in a rural Pennsylvania school district's Bring Your Own Device (BYOD) program. The district (Target School) recently completed year two of such a program and have begun to review and revise their policy and procedure involving the program. This researcher explored the use of personal mobile technology within the BYD program and the effects of its use based on Vygotsky's Sociocultural Theory of Collaboration in a 10th grade cross-curricular educational setting. Data derived from this case study is expected to have implications for educators involved in developing curriculum and policy as well as those individuals governed by both. The results of this study should also help additional school districts which are contemplating adopting a Bring Your Own Device (BYOD) program to complement their current curriculum and instruction.

Background for the Study

Today's administrators are struggling with the issues and concerns faced by teachers and students regarding the effective use of technology in their secondary schools. What was once

considered to be taboo--the use of personally-owned technology in school--is now being heralded as a way to maximize learning using technology that students have become accustomed to in their daily lives while minimizing the costs. While in many school districts students and even faculty are banned from using personal mobile devices in school (November, 2007), personal technology devices are frequently the main form of learning, communicating, and managing the lives of students and adults outside the traditional educational environment.

In 2001 and 2010, Prensky stated that "today's students are no longer the people our educational system was designed to teach," with 18th century methods and materials still being used in an attempt to reach 21st century students. With over three million apps available to students and educators on smartphones and other Internet-ready devices, today's students are motivated to learn differently from the students of the past (Beyers, 2009), but they are often restricted from utilizing such devices in schools based on school district policy. Howard Gardner and Katie Davis (2013) referred to today's youth as the "App Generation" and have begun to uncover how life for this generation differs from that of their teachers and parents who came of age before the digital and Internet era.

The Internet, as we know it, has continued to grow in popularity, usage, and technicality in the approximately 30 plus years of its existence. In 2010, Lenhart, Purcell, Smith, and Zickhur released statistics revealing how prominent the use of social media, the Internet, and wireless technology had become in our society through a study focused on 18- to 29-year-olds. The statistics of use is described below:

- 93% of 18-29-year-olds have been online.
- 74% of all adults ages 18 and older have been online.
- 72% of 18-29-year-olds use social networking sites.

- 47% of online adults use social networking sites.

- 55% of 18-29-year-olds have wirelessly accessed the Internet via a smartphone.

- 75% of teens and 93% of 18-29-year-olds have a cell phone.

The use of mobile technology is not merely targeted for use by the 18- to 29-year-old age group, and today's educational system is concerned with how to incorporate technology into the daily lives of multiple age groups, ranging from Pre-K to grade 12+.

The Speak Up! National Research Project (Project Tomorrow 2011), estimated that 10 to 67% of K-12 students own and/or utilize some form of a mobile device. Table 1 illustrates the use of devices by grade levels.

Table 1

Student Mobile Device Use

Type of Device	K – 2nd Grade	3rd – 5th Grade	6th – 7th Grade	9th–12th Grade
Cell phone without Internet access	18%	29%	59%	67%
Smartphone with Internet access	14%	17%	24%	31%
Laptop/Tablet	27%	32%	53%	60%
Netbook/mini-notebook computer	--	--	11%	10%
MP3 player	36%	55%	80%	85%
Hand-held gaming device	47%	60%	64%	48%

(Project Tomorrow, 2011)

Given that 73% of students between the ages of 12 and 17 are using social media (Davis, 2010), many educators around the country are looking for ways to incorporate social media and personal mobile devices into their repertoire of pedagogical tools. In several instances, educators

have successfully integrated technology and social media tools such as Twitter and Facebook into their classrooms (Gross, 2009). An article published in *Education Week* (Davis) in 2010 noted that just a few years earlier social networking and the use of mobile technology meant little more than whether to penalize students for inappropriate comments and activities on Facebook or My Space, comments which were typically conducted and viewed from a home desktop computer. Today, educators are not only utilizing social media within the learning environment but also moving beyond the desktop computer and laptop cart to incorporating the use of personal mobile devices in their classrooms. Students of the 21st Century are now in need of the skills to demonstrate higher levels of understanding based on Bloom's Digital Taxonomy and Webb's Depth of Knowledge levels (2005). These include creativity, evaluating, analyzing, and applying, all of which are directly related to collaboration and communication skills. Collaboration through the use of technology will allow students to direct their own education based on the large amounts of information that is available (Traxler, 2010), something unavailable to an individual working in isolation without the use of technology.

With education being more about creating relationships, not only to content but also with people, technology goes beyond the simple use of social media. Personal mobile devices, and technology in general, have the potential to bring our world closer and to allow our students the opportunity to step away from the confines of their classrooms. As Couros (2011) has stated, "If we are proactive in the way we work with kids using social media, there is no limit in what we can do" in describing the collaboration of technology, social media, and education. When looking at the various ways communication via the Internet has altered the face of education, George Couros (2011) created a rather simplified list of why social media can change and is changing education. His reasons include that social media:

- Is basically free.

- Cuts down on isolation and provides a way to connect for those who are willing to take it.

- Builds tolerance and understanding of cultural diversity by providing the opportunity to connect with people from around the world with the potential of breaking down barriers.

- Can amplify passion by connecting with others from around the world who are feeling and experiencing similar interests.

- Allows the world of education to be more open by breaking down the walls and building relationships with families and communities.

(Couros, 2011)

With the increased use of technology both in the home and in education, school districts have created a more open line of communication with parents/guardians regarding how technology will be used in the school setting. The goal of the schools is to foster transparent collaborative discussions that will improve everyone's experience (Cohn, 2013). A 2013 survey conducted by Santosh Bhaskar found that the use of technology among educators has risen above the use by adults, in general, in the United States, resulting in a greater need for transparency and effective communication.

Table 2

Educators Technology Use

	Teachers	**US Adults**
Smartphones	58%	45%
Laptops	93%	61%
Tablet	39%	24%
e-book Readers	47%	19%
Facebook and/or LinkIn+	78%	69%
Twitter	26%	16%

In a 2013 survey conducted by Madden, Lenhar, Duggan, Cortesi, and Gasser, 803 teenagers between the ages of 12 and 17 were surveyed regarding their use of devices. The following statistics revealed that teens are migrating more toward mobile devices to allow them to access information virtually everywhere:

- 74% of teens claim they have accessed the Internet on cell phones/tablet at least occasionally.

- 25% of teens are "cell-mostly" Internet users, as compared to 15% of adults.

- 50% of teens own a smartphone.

- 95% of teens use the Internet.

- 93% of teens have a computer/or access to a computer at home.

As today's students become more technologically savvy through the use of "cell-mostly" Internet usage (Madden et al., 2013), educational programs have developed and evolved to meet the growing needs of this App Generation (Gardner & Davis, 2013).

One such program, "One-to-One," first emerged and became a worldwide phenomenon in the 1990s (Bohnhoff, 2012). This one-to-one (1:1) initiative looked toward providing technology, typically in the form of a laptop, to each student for use both in and out of the school environment. In the 20 plus years since its introduction, many school districts have begun to move away from one-to-one (1:1) programs because of the lack of funds to continue to fully implement the program (Bohnhoff, 2012) along with the increase in available personal mobile devices. One-to-one learning programs have been evolving into Bring Your Own Devices (BYOD) and Bring Your Own Technology (BYOT) programs throughout the country (Dixon & Tierney, 2012) over the past 10 years with BYOD are often used to describe the connection of a personally-owned device to a Wi-Fi network provided by the school (NEN – The Education

Network, 2013). BYOD programs are shifting the focus from teaching to learn and work toward

creating confident, flexible, self-directed, lifelong learners (Dixon & Tierney, 2012).

Unfortunately, there appears to be a limited number of research studies that have focused on the

BYOT and/or BYOD programs in the secondary-education environment, primarily regarding the

perceptions of the stakeholders.

Statement of the Problem

The role of social media in the form of a BYOD program in the secondary educational

system is a new field where trial and error continues to be the norm. Today's students have been

dubbed "The App Generation" by Howard Gardner and Katie Davis (2013) and have repeatedly

demonstrated their ability to navigate identity, intimacy, and imagination in a digital world,

while educators, parents, and guardians have been unable to demonstrated those traits to the

same extent (Gardner & Davis, 2014). Prensky (2001) refers to this younger generation as

"digital natives," suggesting that they have been involved with technology their entire lives. He

then refers to those individuals born prior to 1980 as "digital immigrants" because they have not

grown up with technology and often struggle to incorporate it into their personal and professional

lives at a pace comparable to the "digital natives."

As active members of society, a more effective understanding of the use of mobile

technology is needed by educators and students to maintain an educational environment that is

effective, productive, manageable, and cost efficient. In order to develop a stronger

understanding of the use of mobile technology in a BYOD program, the driving question of this

researcher was to determine what has already been learned about the BYOD program, what must

still be learned, and how the educational society will understand the growing perception and

frequency of use of a BYOD program in a secondary educational environment as educators

continue to prepare students for a global society with jobs and careers that at this time do not exist (Friedman, 2005). .

Research Questions

The purpose of this study was to examine the perceptions, frequency of use, and devices utilized by educators and students in a 10th grade cross-curricular rural school setting. This researcher sought to answer the following questions related to BYOD programming by specified stakeholders of the 10th grade cross-curricular public school environment.

1. What are the perceptions of 10th grade cross-curricular educators and students regarding BYOD programming in the educational setting?

    a. What are the perceptions of 10th grade teachers regarding BYOD programming?

    b. What are the perceptions of 10th grade students regarding BYOD programming?

    c. Is there a difference in the perceptions of educators and students regarding BYOD programming?

2. At what frequency are 10th grade educators and students utilizing a BYOD program in their classes?

    a. At what frequency are 10th grade teachers utilizing BYOD programming in their classes?

    b. At what frequency are 10th grade students utilizing BYOD programming in their classes?

    c. Is there a difference in the frequency of utilizing BYOD programming in classes between educators and students?

3. How are 10th grade educators and students utilizing a BYOD program in their classes?

    a. How are 10th grade teachers utilizing BYOD programming in their classes?

b. How are 10th grade students utilizing BYOD programming in their classes?

c. Is there a difference in how educators and students are utilizing BYOD programming in their classes?

4. What types of devices are being utilized by 10th grade educators and students in a BYOD program?

a. What types of devices are being utilized by 10th grade teachers in a BYOD program?

b. What types of devices are being utilized by 10th grade students in a BYOD program?

c. Is there a difference in the types of devices being utilized by educators and students in a BYOD program?

Rationale for the Study

The profession of education has become one of rapid change and ongoing difficulty. As social networking and the use of BYOD programs continue to grow at an astounding pace, administrators, educators, and students are faced with the dilemma of how to incorporate this programming into the curriculum while continuing to increase the overall value of education. Research is lacking in the area of the use and perception of the BYOD programs and its impact on educational programming and educational collaboration.

As educators begin increasingly to interact through the use of mobile technology, so are the students whom they serve. An ongoing educational dialogue is essential and needs to be continuously cultivated to maximize the effectiveness of a successful BYOD program. The lack of communication and focus on how schools are currently educating 21st Century students and how students are currently being trained will have a major impact on how today's and

tomorrow's students will be prepared to compete in a global community (Freidman, 2005). The proposal of this case study was to look at the use of a BYOD program and to identify the perceptions of the educators and students involved.

Brief Overview of the Study

The study is multi-faceted case study, taking an in-depth look at a 10th grade BYOD program through the use of two (2) similar surveys presented to each of the identified target groups: 10th grade cross-curricular educators/administrators and 10th grade students. The data collection was developed as a series of questions in the manner of a web-based survey to measure frequency of use, device/application use, and perception of BYOD programming. The survey was presented to the students of one grade level as well as to their corresponding educators and administrators. A follow-up interview was conducted of a sampling of volunteer participants with the number of participants being 13 and representing a cross sampling of participants. Multiple observations were also conducted to observe both sample groups in their use of BYOD programming.

Data arrived from the surveys and interviews were coded and analyzed to derive an analysis of perceptions of the educators/administrators and students in a 10th grade BYOD program. The goal of the study was to gain a greater in-depth understanding of the perceptions of 10th grade cross-curricular educators/administrators and 10th grade students about their use of a BYOD program in the secondary educational setting. The study also explored any demographic or contextual factors mediating relationships between the target groups.

Definition of terms

Acceptable - Capable, worthy, or sure of being accepted or received with pleasure; pleasing to

a receiver; agreeable (Wikipedia, 2014).

Acceptable Use Policy (AUP) - is a set of rules applied by the owner or manager of a network, website, service, or large computer system that restricts the ways in which the network, website, or system may be used (Wikipedia, 2014).

Bring Your Own Device (BYOD) - the policy of permitting employees to bring personally owned mobile devices (laptops, tablets, and smart phones) to their workplace and to use those devices to access privileged company information and applications; also used to describe the same practice applied to students using personally owned devices in education settings (Wikipedia, 2014).

Bring Your Own Laptop (BYOL) - the policy of permitting employees to bring personally owned laptops to their workplace and to use those devices to access privileged company information and applications; also used to describe the same practice applied to students using personally owned devices in education settings (Wikipedia, 2014).

Bring Your Own Technology (BYOT) - the policy of permitting employees to bring personally owned technology (laptops, tablets, and smart phones) to their workplace and to use those devices to access privileged company information and applications; also used to describe the same practice applied to students using personally owned devices in education settings (Wikipedia, 2014).

Perception – the way in which something is regarded, understood, or interpreted (Oxford English Dictionary).

Social media - interaction between people in which they create, share, and/or exchange information and ideas in virtual communities and networks, including but not limited to Facebook, Twitter, email, blogs, YouTube, TeacherTube, podcast, wiki, Instagram.

Social networking – online community that brings people with common interests, opinions, activities, and experiences together by sharing news, photos, videos, and events (Faizi et al., 2013).

Target School District – a medium rural school district in rural Northeastern Pennsylvania consisting of 1,600 K-12 students and approximately 110 faculty.

10th Grade Cross-Curricular Educators – professional teaching faculty, including administrators/classroom teachers/specialty teachers who are directly involved with the education of students in grade 10 in a public-school setting.

Assumptions

It was the assumption of the researcher that all participants would participate in the survey and interviews in an unbiased manner with honesty and integrity to provide an accurate account of their perceptions about the use of mobile devices in a BYOD program. The assumption of the study was that the results would yield information and data of value to administrators, educators, and students who are involved in the creation and implementation of programming in a secondary educational environment.

Limitations of the Study

A distinct limitation of the study was that the data and findings derived from this study could not be generalized to similar school districts of comparative size. The culture, perceptions, and prior experiences of the participants may have produced an effect on the overall participation and utilization of an effective BYOD program in a secondary educational environment. Without extensive research upon which to draw, the researcher drew upon various studies with a related theme, thus adding an additional limitation on generalization of the findings.

Delimitations of the Study

The proposed study is limited to the use of and perceptions of BYOD programming in a 10th grade BYOD program and purposely does not address the use of specific programming and/or technology in other grade levels. Access to programming may also have been limited to specific classes/grades as deemed appropriate by the school district superintendent and local school board. The perceptions and prior experiences of the participants may also have acted as a limitation.

Summary

Public educators are living on the verge of previously unimagined technological innovations. The problem lies not in what the innovations are but rather in how these innovations will affect their profession. In the general population, it has been reported that nearly three fourths of all Americans are engaged in online activities (Smith & Rainie, 2010). These online engagements vary from Facebook to Twitter to blogs to wiki spaces, often with very little regard for what is being said and what technology is being used. At this time, there have been very few studies of BYOD, BYOT, or BYOL programming and if they are being successfully utilized in secondary education. With an increasing number of educators utilizing mobile technology while also being bound by the conditions imposed by the school districts that employ them, it seems necessary for all stakeholders to be aware of the policies governing secondary education combined with the effective use of a BYOD program.

The amount of research available on the topic of BYOD programming in the secondary educational setting is limited, although numerous articles, blogs, and wikis describe the strengths and weaknesses of such programs, there is limited research directed as how personal devices can be utilized in the educational setting (Ackerman & Krupp, 2012). A void in the research

describing the use of a BYOD program and its relationship to the perceptions of educators and students combined with the theory of Vygotsky and collaboration guided the researcher in conducting this case study.

Chapter 1 provided an overview of a mixed-method research utilized in this case study on the topic of BYOD programming by 10th grade students in a rural public-school district in Pennsylvania. Through the use of surveys, interviews, and observations, the researcher was able to take a closer look at the perceptions of 10th grade cross-curricular educators and 10th grade students in regard to the use of BYOD programming in their educational setting. The researcher took a constructive approach in analyzing how BYOD programming is used by two (2) target groups as well as their frequency of use and their perception of use.

Chapter 2 presents a review of the literature as it relates to the use of BYOD programming by educators and students as a means to improve the educational environment. A review of the literature focused on Vygotsky's Sociocultural Theory and collaboration in the learning environment is also presented. Bring Your Own Device (BYOD) programs are described in general as well as how they have been implemented in specific courses and/or grades. Descriptions of programming and technology are reviewed, along with the positives and negatives encountered by school districts undertaking a BYOD initiative.

Chapter 3 discusses the methodology involved in the research study, including a discussion of the survey and the interview protocol of both the pilot study and the target study. The procedure of the study is discussed, as well as the data analysis, assumptions, limitations, and delimitations.

Chapters 4 and 5 reveals the findings of the research case study and offers areas of future research regarding the use of BYOD programming as a tool of effective educational programming in the secondary public education setting.

CHAPTER 2

LITERATURE REVIEW

Bring Your Own Device (BYOD) programs are becoming an active instructional tool in many of our K-12 educational settings. Many of today's educators are now members of the "App Generation" or "digital natives," which Gardner and Davis (2013) and Prensky (2001), referred to as those individuals who have grown up immersed in the hardware and software of the day, typically those who have been surrounded by technology since birth. With this influx of new educators comes the challenge of creating and implementing educational change to meet the growing demands of today's student (Freidman, 2005). To accomplish this change, the educational system needs to look at the impact mobile technology, and more importantly BYOD programming is having on the development of students.

When looking at BYOD programming in education, an abundance of articles, blogs, and online discussions are readily available, but what is lacking is a reservoir of peer-reviewed studies, thus making the task of research a daunting one. The researcher of BYOD programming must review a variety of topics in combination to complete a thorough synopsis of the literature related to the use of a BYOD program in educational settings. This review seeks to create an understanding of the importance of mobile technology today. To allow the researcher to gain insight into the multi-faceted topic of BYOD programming, the topic was divided into related components and reconstructed into a comprehensive literature review. Therefore, the literature will be reviewed in the following components:

- The Educational Theory of Lev Vygotsky: How can the teachings of Vygotsky be adapted to today's educational setting in terms of collaboration?

- Social Media in Education: How is social media impacting educational programming?

- Educators and Their Use of Mobile Technology/Social Media in Education: How are educators perceiving and utilizing mobile technology to impact educational programming?

- Students and Their Use of Mobile Technology/Social Media in Education: How are students perceiving and utilizing mobile technology to impact educational programming?

- Bring Your Own Device (BYOD) Programs in Education: How have BYOD programs been perceived and utilized as impacting educational programming and acceptable online behavior?

By reviewing the literature in each of the five separate categories, the researcher attempted to construct a comprehensive synopsis of BYOD programs and its impact on current educational programming.

The Educational Theory of Lev Vygotsky

The works of Lev Vygotsky have had tremendous influence on the fields of education and psychology since his death in 1934 (Geonnotti et al., n.d.). A number of Vygotsky's theories have been connected to collaboration and inclusionary practices in classrooms. Donato (2000) used the word "situatedness" to describe Vygotsky and his ultimate belief that "learning unfolds in different ways under different circumstances." In terms of BYOD programs, today's students are preparing for careers that will develop in the future under circumstances different than those being faced today – an extension of Vygotsky's "situatedness" (Donato, 2000). Collaboration and language continue to be of the utmost importance and by reviewing the many facets of Vygotsky's Sociocultural Theory, today's educators will be further identified as social agents rather than presenters of information, and BYOD programming may act as the vehicle of instruction.

The implications of Vygotsky's theories are significant when referring to the need for collaboration in guiding and directing the child's activity (Vygotsky, 1934). Students in the 21st Century will imitate the learning process presented in the classroom by re-creating previous classroom collaborations. Today's educators are learning not to control the classroom by rule and structure but to model collaboration with students to demonstrate support and direction by grouping peers of multiple levels to work toward a common goal.

By reviewing each of the following theories, the literature can provide a theoretical framework to assist in explaining why classroom interaction is the way it is, how interactions by both educators and students can alter perceptions, expectations, and willingness to communicate, and how collaboration can affect students' ability to achieve a higher level of learning (Allahyar & Nazari, 2012). The type of assistance offered by a teacher will assist the student in mastering the concept and can be accomplished through scaffolding and the use of the Zone of Proximal Development (ZPD). Figure 1 describes the ZPD through a technical summary.

(Sincero, 2011)
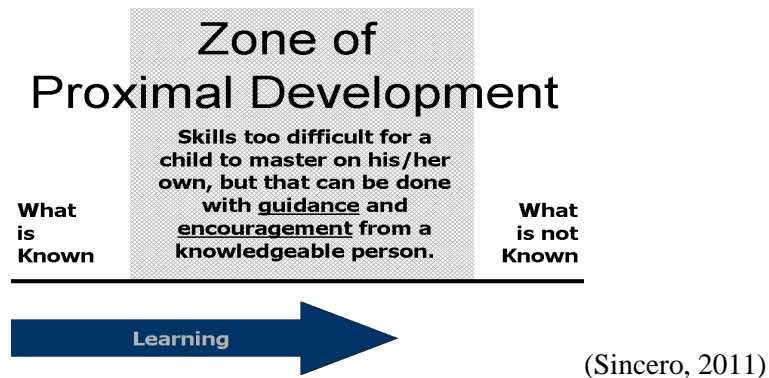
Figure 1 Zone of Proximal Development

Theory of Value

Vygotsky's theory of value stressed the importance of each individual child and of determining what is important and worthwhile for that child. Looking at the child's surroundings, an emphasis was placed on the importance of internalization of culture and social relationships and how past experiences and prior knowledge are utilized in making sense of new situations. Thus, all new knowledge and skills are greatly influenced by the child's culture and environment (Feden & Vogel, 2003). Vygotsky maintained the importance of language in the cognitive development of children in describing it as a tool for children to learn how to think, thus promoting a higher level of critical thinking and problem solving as new knowledge is gained (Silverman, 1992).

Theory of Knowledge

Vygotsky believed that knowledge was obtained through past experiences, social situations, and a child's interaction with his environment and was further developed through social interactions (Davydov & Kerr, 1995). As a child incorporates information gained through experience, he or she creates an organizational schema that is less egocentric and allows for more complex interactions aimed at problem solving (Roschelle, 1995). This knowledge may be viewed as a child viewing a social situation one way but reporting on it in a more socially acceptable manner.

Theory of Human Nature

Vygotsky stressed the importance of language as powerful tool that forms the foundation of higher-level critical thinking in a child's development and learning. It has been described as the psychological tool used by children to communicate with others in their environment and

emphasizes the concept that "humans learn best in cooperation with other humans" (Feden & Vogel, 2003). Vygotsky contended that through social interaction humans have the capacity to alter their environment for their own purposes (Vygotsky, 1934).

When looking at Vygotsky's Zone of Proximal Development, it appears that as long as a person has access to a more capable peer, any problem can be solved through collaboration and communication (Feden & Vogel, 2003). Vygotsky (1934) described the Zone of Proximal Development as the quality of social and environmental interactions used to solve problems and as a key component of the Theory of Human Nature.

Theory of Learning

Vygotsky believed that learning leads to the development of higher-order thinking through social interaction and language. The belief that a child's new knowledge will initially be referred to as inter-psychological, meaning it is learned through interaction with others. It will eventually become intra-psychological, meaning that the knowledge will become internalized by the skill being mastered on an individual level (Sincero, 2011). The Zone of Proximal Development (ZPD) maintains that learning occurs just above the student's current level of competence and that by collaborating with a more capable individual, the student will demonstrate a higher level of performance (Leong & Bedrova, 2001). According to Feden and Vogel (2003), ZPD works in conjunction with scaffolding where a student interacts with adults and/or peers to complete a task that would be otherwise impossible to complete independently.

Theory of Transmission

Vygotsky (1978) defined those who teach as being the "More Knowledgeable Other" (MKO), an instrumental component in assisting students to reach a higher ability level.

Typically, the MKO was identified as a teacher or an adult, but in relating it to today's educational process, the MKO may be viewed as a peer, sibling, or even a computer (Galloway, 2007). In today's collaborative classrooms, group interaction and socialization are key to developing intra-psychological knowledge through the use of the ZPD.

Vygotsky's findings suggest methodological procedures for the classroom (Geonnotti, n.d.) with an emphasis on scaffolding to build interest and engagement and resulting in a curriculum that challenges and stretches students' competence. Students should be provided with multiple opportunities to apply previous skills, knowledge, and experiences to real-life scenarios to demonstrate higher levels of thinking in the today's classrooms.

Theory of Society

According to Vygotsky (1934), society is the bearer of the cultural heritage without which the development of mind is impossible. This society allows learning to develop through a variety of social interactions (Geonnotti et al., n.d.). For Vygotsky, society and social interactions happened in schools that represent the larger social community (Glassman, 2001). All learning in schools has a previous history based on the child's informal education in the home and environment, first appearing between people (inter-psychological) and then in the child (intra-psychological) (Allahyar & Nazari, 2012).

Summary of Vygotsky

Len Vygotsky (1978) and his social learning theories introduced educators to the idea of learning through interactions and communications with others. Literature presents the importance of strengthening a student's ZPD by providing increased opportunity for the novice (student) and the expert (teacher/peers/others) to interact in the process of learning (Allahyar &

Nazari, 2012). By increasing the discussion, collaboration, and feedback, teachers can create a rich educational environment.

Vygotsky (1934) recognized that learning always occurs and cannot be separated from a social context which maximizes the students' opportunities to interact with each other through discussion, collaboration, and feedback. Through the incorporation of Vygotsky's social learning theories, the student-student and expert-student collaboration on real world problems or tasks that build on each person's language, skills and experiences shapes the individual's culture (Vygotsky, 1934).

Social Media in Education

The term "social media" is widely used, but, surprisingly, there is no generally accepted definition. Clark (2012) described social media as "a collection of online platforms and tools that people use to share content, profiles, opinions, insights, experiences, perspectives and media itself, facilitating conversations and interactions online between groups of people." Barnes and Laird (2010) identified social networking as a set of tools that provide people with the opportunity to create an online profile and to share that profile with others. The *Oxford English Dictionary* (http://www.oxforddictionaries.com/us) defines social media as "websites and applications that enable users to create and share content or to participate in social networking." The role of social media in education, regardless of an agreed-upon definition, continues to grow and continues to cause debate.

Role of Social Media

With social media being used throughout society and by educators at various levels, it is impossible to predict what the implications may be, but it is expected to change education as we

know it (Clark, 2012). While it is becoming increasingly common for school districts to utilize social media sites to communicate with parents, students, and the community regarding school-related policies and events, the use of the same social-media tools by teachers to communicate with their students and parents regarding instruction remains highly controversial (Carter et al., 2008). Participation in social media can enhance communication and collaboration, increase interactions, promote creativity, and assist in developing writing and reading skills (Davis, 2010). In addition, social media helps teachers to reach and engage students who would perhaps not participate in the typical classroom setting or those with more than academic concerns (Davis, 2010). It has been documented that social media can also be instrumental in reaching out to communicate with parents and guardians (Davis, 2010).

In recent years, Facebook has become the most popular form of social media, reaching more than 800 million users (*New York Times*, 2012). With the increase of use, more educators are attempting to reach a balance between their personal and professional lives; numerous teachers have faced discipline for posting what school officials regard as inappropriate and unprofessional content on social media, even though the content was posted during their personal time (Carter et al., 2008). While school districts have disciplined teachers for online postings, the courts have not yet adopted a consistent framework for cases that involve teachers and the use of social media as a pedagogical tool (Papandrea, 2012). Despite the popularity of social media, many administrators and parents believe that social media in schools may cause more harm than good (Papandrea, 2012), a belief that is opposite that which today's teens have expressed about the use of social media in a school setting (Gardner & Davis, 2013).

In a study commissioned by the John S. and James L. Knight Foundation in 2011, 49% of the teachers surveyed thought that social media had harmed student learning as compared to 39%

who believed that it helped (Dautrich, 2011). Of the same teachers surveyed, 53% had required

students to use the Internet on at least a monthly basis, a substantial increase from 36% in 2007

(Dautrich, 2011). While there has been an increase in the requirement of Internet usage in the

classroom setting, many through the use of a BYOD program, there continues to be a difference

as to what teachers say and what they require of their students (Gardner & Davis, 2014).

The Dautrich report (2011) also surveyed the teachers to determine what they felt were

the most important forms of digital media that should be adopted in the classroom. The results

indicated the following (Table 3):

Table 3

Important Forms of Digital Media

Truthfulness of online info	93%	Ensuring Privacy/Security Online	86%
Use online info	87%	Use Internet Search Engines	82%
Distributing News/Entertainment	87%	Role of Media	74%
First Amendment Freedoms	86%	How to Blog	11%

(Dautrich, 2011)

In 2011, George Couros authored a blog describing "Why Social Media Can and Is

Changing Education." Social media has become so prevalent in today's culture that it would

only seem natural for it to work its way into public education. Couros (2011) described five (5)

major impacts of social media on education today:

- It is basically free, with the exception of the Internet and the necessary technology.
- It reduces isolation by allowing teachers and students to interact with peers and
  colleagues from around the world.
- It allows students and teachers to increase tolerance and understanding of cultural
  diversity by providing the opportunity to connect on a global scale, which breaks down
  barriers and builds understanding.

- It amplifies passion by providing an opportunity to connect with peers and colleagues who share mutual interests.
- It allows the world of education to be more open. It allows teachers and administrators to break down the walls and build relationships with stakeholders: students, parents, community, and the world of education.

Comments by colleagues of Couros (2011) on his blog, included statements related to the effectiveness of social media in relationship to Professional Learning Communities (PLCs), its use as a tool of reflection, its providing additional learning opportunities in a BYOD classroom, and its ability to move beyond the confines of the brick-and-mortar classroom. As the learning environment evolves with the rapid adoption of technology, educational settings need to provide a secure way to access the network (Bradford Network, 2013) with reasonable policies and guidelines.

Regulations

When reviewing school policies regarding the use of social media, a Bradford Networks (2013) survey indicated that only 38.2% of the 600 educational institutions surveyed update their policies as new types of technologies are introduced across the school, while 18% said that their institution never updates its BYOD policy. Singh (2012) stressed that many organizational sectors have found BYOD programs to be successful except for the IT sector, which faced various security issues at the outset, such as litigation, confidentiality, and overall network security.

When developing school district policy, two major federal policies require consideration: Children's Online Privacy Protection Act (COPPA) of 1998 and the Children's Internet Protection Act (CIPA) of 2000 (Varlas, 2011). COPPA was enacted to protect students under

the age of 13 from having personal information collected without the consent of a parent. The

law places the responsibility on website providers to require that participants be 13 years old and

restricts marketing to those under 13. While the law has been in place, *Consumer Reports* noted

that 7.5 million children under the age of 13 have joined Facebook and Facebook itself has

reported that it removes approximately 20,000 13-year-olds from the site on a daily basis

(Varlas, 2011). While the law was intended to protect those who need it, it was enacted prior to

the social-media bubble and appears to now be in need of an update (Varlas, 2011).

The Children's Internet Protection Act of 2000 requires that schools provide filtering to

prevent access to offensive content along with a parent-signed Acceptable Use Policy ensuring

safe Internet access on the school-related network. All schools that are receiving E-rate funding

must address the following:

- Access by minors to inappropriate online materials.

- Safety and security of minors when utilizing electronic communication.

- Unauthorized access and other unlawful activities by students.

- Unauthorized disclosure, use, and dissemination of personal information of minors.

- Restricting minors' access to materials harmful to them.

(CIPA, 2000)

With COPPA (1998) and CIPA (2000), school district policies have had to adapt. While some

districts are restrictive in their policies, others have embraced the opportunity to expand their use

of social media and BYOD programming in the school setting. School districts are viewing

social media as a means to increase transparency by targeting their communities and becoming

more accessible to their stakeholders. Other school districts have reacted in the opposite manner.

These districts and communities are better known for what they do not allow, such as blocking sites and restricting teacher/student social-media contact (NYC-DOE, 2013).

Missouri Senate Bill 54 (S.B. 54) prohibits social-media contact between educators and students, both current and former, indefinitely. The bill, named the *Amy Kestir Student Protection Act,* was created after a student who was repeatedly victimized by a teacher through social media (Varlas, 2011). In Prince George County Public Schools of Virginia, the use of cell phones was prohibited for all students during the school day and during all school-sponsored events. This policy prohibits students and faculty from sharing photos of sporting events, plays, and other extracurricular activities (Prince George County Public Schools, n.d.). In 2011, the Pinellas County (Florida) School Board voted unanimously to block all teachers from communicating with any students via such social media sites as Facebook and Twitter. The school board hoped to prevent any form of inappropriate contact (Varlas, 2011).

The growing use of social media by students, parents, and educators has continued to influence the acceptable use policies (AUP) created by school districts nationwide. While there is tremendous opportunity for improving transparency in education, there is also the potential risk of promoting an additional way for students and adults to bully others or to engage in online harassment. When developing an AUP, school districts need to consider the implications in two areas – legal and educational. In the realm of legalities, each state has specific laws that pertain to filtering and cyber-bullying that must be incorporated into the AUPs of school districts. Pennsylvania requires school systems to develop policies prohibiting bullying, including actions through electronic means. As stated in H.B. 1067 (2008),

> A school entity shall not be prohibited from defining bullying in such a way as to encompass acts that occur outside a school setting if those acts are either directed at

another student or students; are severe, persistent, or pervasive; or have the effect of substantially interfering with a student's education, creating a threatening environment, or substantially disrupting school operations.

When reviewing the legal implication, school districts are required to protect students from harmful content on the Internet and regulate students' use of the Internet so they do not harm other students or interfere with the school's instructional program (Bosco, 2013). The educational implications focus on providing students with good access to digital media to support engaged learning (Bosco, 2013).

In 2013, the New York City Department of Education (NYC-DOE) enacted social media guidelines to be followed by all employees of NYC's public-education system. In the 14-page guideline, DOE employees should not communicate with students who are currently enrolled in DOE schools on personal social-media sites, and common sense and caution should be observed when using personal social-media sites. While NYC – DOE (2013) cannot dictate guidelines pertaining to personal social-media usage, it has provided guidance.

- DOE employees are encouraged to use appropriate privacy settings to control access to personal social-media sites.

- DOE does not recommend "tagging" photos of other DOE employees/volunteers/contractors/vendors without permission.

- Personal social-media use has the potential to result in disruption at the workplace and may be in violation of DOE policies.

- Posting student/confidential information via a personal social-media site is a violation of DOE policies.

- DOE employees are not permitted to use the DOE logo.

(NYC – DOE, 2013)

NYC – DOE (2013) does allow employees to communicate with students via social media through the use of professional social-media sites with a supervisor's approval and access. The DOE has defined social media as "any form of online publication or presence that allows interactive communication, including, but not limited to, social networks, blogs, Internet websites, Internet forums, and wikis" (NYC – DOE, 2013).

The New York City Department of Education is not the only district to enact guidelines pertaining to social media. In the past few years, districts across the country have implemented policies and guidelines that prohibit school-district faculty/staff from communicating with current or former students. While some teachers view social media as a hindrance to the educational process, many others see it as a means to reach out to students regarding school work and other school-related issues (Puzio, 2013). In a 2011 article, Adrienne Lu (2011) says, "Many educators who use social media as a part of their teaching argue that these tools have the potential to provide a tremendous benefit to students." One major advantage of utilizing social media tools to interact with students is that the students already know how to use the technology and can readily participate. The NYC – DOE Guidelines (2013) state that "today's students are learning in a digital age and that social networking has the potential to serve as a powerful tool to enhance education." Puzio (2013) wrote that not only does social media encourage student involvement and engagement in their education; it also encourages parents to take a more active role in the education of their children by providing them a voice and a platform.

In a recent ruling by NYC DOE, the Department of Education lifted the ban on cell phone use in New York City schools (Horowitz, 2015). By lifting the ban, students are no longer prohibited from bringing cell phones to school but it does not mandate that schools use the technology for learning. Media specialist Don Pedro Albizu Campos and director of digital

engagement and learning, Lisa Nielsen, stated that the lifting of the cell phone ban is an opportunity for growth and education in community and the BYOD programming will incorporate digital safety, citizenship, and responsibility (Horowitz, 2015).

The National School Public Relations Association (NSPRA) reported that meaningful school communication is the essential catalyst to getting the kind of parental and community engagement students need to succeed (NSPRA, 2013). In 2011, the NSPRA conducted a survey to gather baseline data about the communication preferences of parents in NSPRA-member districts. Fifty school districts from 22 states responded to the survey request that looked at three levels of communication: school building to home; classroom to home; and district to community. The primary focus of the survey was to gather parental feedback on communication content, delivery systems, and frequency of communication. The survey yielded 43,410 responses for a response rate of 16%. When reviewing the question related to social media, the survey data indicated that the use of social media still did not have a strong foothold among the school communities represented (NSPRA, 2013).

In 2012-13, the United States Commerce department ranked 55 employment sectors in the nation. Of the 55, education ranked the lowest for its intensiveness in Instructional Technology (IT) (Pulkit, 2014). Education today continues to bear the responsibility of preparing children for tomorrow, but it is not yet ready to embrace the digital revolution (Pulkit, 2014). One reason may be that many of today's educators are resistant to the use of social media based on their own previous experiences in the classroom as students. The students of the Internet generation are not facing the same constraints that many of their teachers faced (Pulkit, 2014). As a means of reducing the anxiety associated with using social

media in the classroom, Katie Lepi (2014) suggests that if people were to be held accountable for their actions/posts, they would more likely behave well and treat each other with respect.

Collaboration

When reviewing the background of social media as used in a BYOD program, the primary role appears to be traced back to Vygotsky's theory of social constructivism (Chen & Bryer, 2012). The most important characteristic identified in social constructivism is collaboration, which is identified by Sheninger (2014) as an essential component of education in a digital society. A study conducted by Johnson et al. (2000) suggested that collaborative learning has proven to be more effective in increasing motivation, raising achievement, and producing positive social outcomes, which is similar to a blog statement posted by Reed (2014) which stated that using Facebook and Instagram to connect with other students from around the world had improved behavior and attitude toward instruction.

In his recently published book, *Digital Leadership* (2014), Sheninger identifies five things needed by innovative schools to increase the use of social media in a digital environment:

- Innovative schools aren't afraid of change; they embrace it.

- Innovative schools continue to make mistakes and learn from them.

- Innovative schools are transparent and allow their stakeholders to be involved and informed.

- Innovative schools utilize technology as a tool used to improve learning.

- Innovative schools are connected and actively participate in multiple forms of social media.

(Sheninger, 2014)

In a recently published Project Tomorrow (2014) report, 37% of teachers involved in a 1:1 or mobile class felt that their students increased their ability to work collaboratively, and 55% of the teachers felt that their students demonstrated increased motivation to learn. Eric Sheninger (2014) said that many students are already collaborating through social media and that the schools are now in a position where they must "catch up." In the 2014 Project Tomorrow Survey, administrators, teachers, parents, and community members were asked how important "teamwork and collaboration skills" were in college and the workplace. The results were as follows (Table 4):

Table 4

Importance of Teamwork and Collaboration Skills

College and Workplace Skills	Admin.	Teachers	Parents	Community
Teamwork and collaboration skills.	83%	66%	69%	79%

(Project Tomorrow, 2014)

The Pearson Learning Curve (2014) report took a look at education across the globe and developed eight skills necessary for the future. Among the skills were communication and teamwork, which Vygotsky reported in 1934 to be essential in the educational process. In a 2011 post by BYOT Network, it was reported that the educational benefits of BYOT are heavily grounded in Vygotsky's social learning theory with one key element being the zone of proximal development (ZPD).

Students bring their own understandings to the classroom and integrate them with new learning experiences, resulting in a collaboration process based upon their ZPD (BYOT Network, 2011). By doing so, they become what Lave and Wenger (1991) refer to as a

community of practice, a community working toward a common goal or working together to solve a problem.

This interplay of technology and community can lead to a virtual community of practice that Wenger, White, and Smith (2009) described as a digital habitat. The digital habitat has been described as one that assists learners to interact meaningfully and to collaboratively develop new understandings (Wenger et al., 2009).

Classroom Use

The implementation of a BYOD program in the classroom can be both exhilarating and scary (Schwartz, 2014), but the one guiding principle that has shown to work for successful schools and programs is "How will mobile technology help shift instruction to be more collaborative, learner-driven, and inquiry based?" Tim Clark of Forsythe County Schools in Georgia, one of the leading BYOD district-based programs in the United States, is credited with stating that "…kids already know how to use their devices, but they don't know how to learn with their devices. It is the teacher's role to help them discover how to connect to content, one another and learning with a device that they may have only used for texting and Facebook previously – it's about kids being empowered in the classroom to make decisions about the ways that they are learning" (Schwartz, 2014).

The idea of inquiry-based learning becoming a product of a BYOD program is grounded in the concept of authentic projects. By utilizing the big questions or big idea, teachers are emphasizing that there is not just one right answer; they are looking for more questions to arise out of that one big question or big idea (Schwartz, 2014). Discussions conducted by Schwartz with Clark (2014) stressed the importance of taking the focus from the

final product and placing it back on the process of discovery, and by utilizing an effective BYOD program, multiple devices in the classroom will give teachers and students more opportunities and more authentic ways to showcase student work beyond turning assignments in to the teacher to be graded.

In a 2012 study conducted by Kiger, Herro, and Prunty, four third-grade math classes were involved to see if the use of iPods/mobile technology improved overall math scores. The question of whether mobile learning interventions explained a significant variation on a post-intervention skills test was proposed. In addition to increased test scores as proposed by this study, the teachers involved were looking to see if mobile technology assisted improving student engagement, peer interaction, communication, and collaboration as reportedly determined in previous studies (Allen, 2011).

For one marking period, four third-grade classes were divided into two groupings – one group participated in the *Everyday Math* curriculum while the other participated in the *Everyday Math* curriculum followed by thirty minutes of reinforcement on an iPod. Each of the participating teachers had minimal to moderate experience with utilizing technology on his/her own (Kiger et al., 2012).

The results of the study yielded the statistics that the students who utilized the mobile learning devices outperformed their counterparts who were not provided with the daily intervention (Kiger et al., 2012) on a post-intervention multiplication assessment. An added benefit of the study implied that the participating educators adjusted their instructional and operational practices to reap additional benefits in the classroom such as increased collaboration, communication, and engagement (Kiger et al., 2012).

Another form of integrating mobile technology into 21st Century classes is the flipped classroom. A flipped classroom has been described as a classroom model with inverted teaching methods – delivering instruction online and transferring homework into the classroom (Sams, 2010). Haake (2011) suggested that older students appeared to benefit from the utilization of a flipped classroom by having access to many lectures online while preparing for assessments. The online reviews allowed for the ability to revise content, pause to take notes, and access the information anywhere and anytime.

Husbye and Elsener (2013) looked at the use of mobile technology in their own literacy education courses on the college level for pre-service teachers. It had been proposed that the use of a quick-response (QR) code on a mobile device allowed students to access complex information when needed for assignment completion. The authors described how they modeled various forms of mobile technology in the teacher preparation courses, with the end result being that "we must prepare our candidates to teach even the youngest learners with technologies that have not yet been developed" (Husbye & Elsener, 2013).

To meet the demands of the 21st Century student, Marc Prensky (2005) acknowledged that computer and technology use in general is essential. Learning in today's classrooms is multi-faceted; the most frequent processes utilized include listening, observing, imitating, questioning, reflecting, trying, estimating, predicting, speculating;, and practicing (Prensky, 2005). All of these processes identified by Prensky (2005) can be supported through the use of cell phones/mobile devices in the classroom. With the number of cell phones outselling the number of laptops and tablets, the major features of voice, short messaging service (SMS), graphics, user-controlled operating systems, operating systems, downloadables, browsers,

camera functions, and geopositioning, (Prensky, 2005) make the capabilities and opportunities in the classroom endless.

Summary

The number of school districts (2011-2012), initiating a BYOD program in their buildings, in just one year, increased by 47 percent (Project Tomorrow, 2013). As district administrators strive to discover new ways to enhance student instruction, the value of utilizing a mobile device in a BYOD program has increased. Parents and administrators have increasingly emphasized the importance of technology as it relates to student success. The following chart, compiled by Project Tomorrow (2013), illustrates the growing emphasis on technology.

```
60
50
40                                                              Somewhat Important
30
20                                                              Important
10                                                              Extremely Important
 0
     Admin. 2008    Admin. 2012    Parents 2008    Parents 2012
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(Project Tomorrow, 2014)

Figure 2 Importance of Technology

In June 2014, Vicki Davis posted a blog on *The Innovative Educator* that outlined 10 ways that social media can improve writing in the classroom. Her social media impacts are:

1. Allows students to connect with their audience.

2. Allows students to find their voice.

3. Allows students to write more efficiently by incorporating hyperlinks.

4. Allows students to write more authoritatively by demonstrating their ability to perform research.

5. Allows students to interact with experts and peers.

6. Allows students to receive faster feedback.

7. Allows students to utilize a grammar guide app for editing.

8. Allows students to receive better feedback that is more personalized.

9. Allows students to conduct research more collaboratively.

10. Allows students to write collaboratively through global projects.

The use of technology and social media continues to grow in the educational setting along with the needs of students. In recent blog authored by Cristina Rojas (2015), one New Jersey elementary school has embraced the use of Twitter as their form of social media. Students are encouraged to provide snippets of what is happening in their classrooms and the teachers are tweeting out to their parent followers several times a day. The tweets offer a glimpse into the day of their child and allows parent to see what their children are working on. Districts will continue to face situations that a few years ago were not considered. According to a blog authored by John Bidder (2014), school districts need to "put a plan in place, get senior managers on board and be ready to listen" if they are to be successful in the use of social media.

Educators and the Use of Mobile Technology

Educators cannot be trapped in the past when students have changed (Sheninger, 2014). Reports indicate that innovation is necessary. Berkowicz and Myers (2014) stated that no one works alone, especially now that collaboration is made even more accessible with the availability of mobile technology.

Cell phones

A survey conducted in 2013 (Bhaskar) found that educators in the United States tend to be more advanced as users of technology compared to the general adult population and are also more active in social networking, with 78% of educators utilizing Facebook or LinkedIn and 26% of actively participating on Twitter. Statistics also indicate that there are four billion mobile

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phones in circulation worldwide, surpassing PC shipments in 2011 (Herro et al., 2013). With the rapid increase in availability and use, learning must also move from "talk and chalk" (Berkowicz & Myers, 2014) to allow for more opportunities for investigation, problem solving, and collaboration (Sheninger, 2014).

In 2013, Thomas and O'Bannon described the benefits of using cell phones in the classroom to increase the communication and collaboration of students. It is estimated that by 2015, 80% of the population will be able to access the Internet via cell phones (Johnson, 2012). With the increasing number of features on cell phones, they can be beneficial in increasing authentic learning. Specifically, Thomas and O'Bannon (2013) identified the features of Internet access, texting, audio capabilities, and digital cameras as being useful in the classroom by allowing students to research topics and information, text responses, communicate with peers, and create podcasts and vodcasts.

Along with the benefits of using cell phones in the classroom, Thomas and O'Bannon (2013) also identified barriers. A number of concerns were identified, with the overall theme being that of distractibility. The most common concern identified was the ringing of the phone to signal incoming calls and text messages. A 2011 study (Shelton et al.) found that the ringing of a phone during later-tested material had a negative impact on performance.

In a study conducted by Green and Hayes (2015), teacher respondents (71%) were comfortable with their personal cell phone use with a majority (60%) indicating that they were interested in additional professional development related to instructional cell-phone use in the classroom. The authors stated that "shifting teacher attitudes from viewing cell phones as a classroom annoyance to a meaningful tool may also require teachers to rethink their pedagogy." The International Society for Technology in Education (ISTE) recommends that professional

development be ongoing and supportive in three areas to assist in the rethinking of cell-phone use and would include (1) managing devices, (2) instructional aspects, and (3) planning/preparation time (Holubz, 2012).

Texting

Educators have also identified texting as a potential negative distraction. Three concerns have arisen regarding the use of texting during instruction. The first, identified in 2011 by Rosen, Lim, Carter and Cheever, found that texting of non-essential information during instruction resulted in lower test performance, while other studies (Drouin & Driver, 2013) have viewed the language of "textese" as having a negative effect on grammar, linguistic, reading, and spelling skills. Third, the concept of "sexting" has also risen as a concern, with Lenhart, Ling, Campbell, and Purcell (2010) reporting that 4% of teens, ages 12 to 17, have reported sending these types of messages, while 15% of this age group have reportedly received such messages.

In a September 2014 edition of *Edutopia* (Watters, 2014), newly released tools/apps were described as educational tools that are tapping into the popularity of texting and cell-phone usage. The tools described include those that send reminders, allow for mobile quizzes or polls, and allow students to organize study groups.

Digital Environment

When looking at a digital school environment, the 21st Century teacher has to develop a renewed understanding of how children are learning (Berkowicz & Myers, 2014). Holt and Burkman (2013) have stated that digital technologies have impacted today's students in key areas: where and when they learn, with whom they learn, what they learn, and how they learn. The primary goal for educators is creating a relevant, meaningful, and authentic learning culture

that allows these students to access and create real-world tools to do real-world work (Sheninger, 2014).

It is critical for teacher educators, current teachers, and pre-service teachers to accumulate the knowledge of the applications of technology (Chen & Thielemann, 2008) and to utilize this knowledge to assist in classrooms. Norris and Soloway (2011) have referred to this as the Age of Mobilism and foresee personal devices as a way to replace the "I teach" philosophy of the classroom with a "we learn together" pedagogy era. Using technology does not guarantee that the classroom will smoothly integrate with the current curriculum. Teachers cannot simply use the technology to "drill and kill" the current curriculum, nor can technology be used as electronic worksheets (Holt & Burkman, 2013). Research states that technology cannot be an add-on to the curriculum or as an afterthought to curriculum development (Norris & Soloway, 2011).

In a recent study conducted by Foulger and others (2013), the concept of teaching with mobile devices/social media was still considered relatively new and had not yet taken hold in the K-12 setting. While the use of social media/technology/mobile devices does not appear to be diminishing, recommendations made by Foulger et al. (2013) that may make the transition into the classrooms easier:

- Additional research into how mobile technology can be used.
- Identification of best practices and the design of curriculum to meet those practices.
- Additional research into how mobile technology can expand teaching and learning.
- Innovated educators sharing their experiences.
- Teacher educators being involved in the discussion.

Eric Sheninger (2014), in an online *Scholastic* blog, outlined why today's school leaders must become digital leaders, with the primary reason being that teachers today are faced with the

lofty task of preparing students for a dynamic world that is more social and connected. He went on to describe digital leadership (Sheninger, 2014) as establishing direction, influencing others, and initiating change through the access to information, and establishing relationships in order to anticipate changes pivotal to school success in the future. Sheninger (2014) strongly believes that leaders can establish a vision for the effective use of technology to improve both leadership and education.

The concepts of leading and teaching with mobile devices/social media have recently reached the Pennsylvania Department of Education (PDE) (Boccella, 2014), and school districts in Pennsylvania will now be able to offer "cyber days" to offset the days that students are unable to make it into school. PDE expects that the new program will provide opportunities to allow students to meet the required hours of instruction through the use of digital resources (Hofius-Hall, 2014). Acting PDE Secretary of Education Carolyn Dumaresq recently stated (Hofius-Hall, 2014) that, "As we continue to advance through the 21st century, our education system is adapting to and actively using technology for the delivery of instruction and educational materials." For school districts in Pennsylvania to be considered for the program, a detailed plan of curriculum and instruction and teacher and student access to technology must be submitted. School districts would have the option of creating programs that are fully online, offline, or a combination, and the delivery of special-education services must also be addressed (Boccella, 2014). In a recent conversation, Bronson Stone, Superintendent of Schools at Susquehanna Community School District, said that an informal survey of students conducted in March 2011 revealed that 97% of high school students have computers with Internet access at home. The use of "Home Education Days" or HE-Days, would allow teachers to post assignments and provide instruction to students through on-line platforms. Interactions between teachers and students

would occur through e-mail and/or telephone during the day. Students would return to school

the next day with their completed assignments and be ready for the next day's instruction. To

ensure accountability of instruction by teachers, all teachers would be required to email their HE-

day lesson plans to their building principal (Stone, 2011).

In the November 23, 2014, edition of *The Sunday Times* of Scranton, Pennsylvania, Kathleen

Bolus spoke to a number of district representatives in Northeastern Pennsylvania about their

school district's use of social media to keep parents informed of activities, cancellations, and

notifications. Of the eight representatives interviewed, fifty percent (4) are utilizing social media

to keep parents informed. Each of the school-district representatives stated that they were

familiar with and utilizing Twitter accounts and texting programs to notify parents of school

cancelations due to emergencies/weather. The remaining four were currently relying on "call

systems" to notify each household of a cancelation. As stated by one district representative, the

school district is looking to "modernize" its means of communication, and texting is "on the

horizon, parents enjoy getting information via text."

In a reference check of all eight school districts represented, only two had updated their

Facebook pages, with one other being restricted to "members only" and another not updated

since September 2012. Results of a search on Twitter resulted in fifty percent (4) of the school

districts having updated Twitter accounts and the remaining fifty percent having no school-

district-sponsored accounts.

In 2015, social media has undeniably become an important component in our lives and the

lives of our schools.   Today's superintendents have embraced Twitter as the social media tool of

choice. Randy Ziegenfuss (2015) created six compelling reasons why superintendents should be

utilizing Twitter. The reasons include:

- Engaging with your constituents – parents, students, teachers, community.

- Engaging policymakers regarding issues impacting public education.

- Connecting with professional organizations.

- Networking with other superintendents locally and nationally.

- Modeling being a lead learner in your organization.

- Building a brand – personal and orgizational.

Aspiring Teachers

In a 2013 study completed by Project Tomorrow, aspiring teachers placed a high value on the impact of technology in both their professional lives as well as those of their prospective students. Many of tomorrow's educators are turning toward social media to enhance their professional development. Schwartz (2014) reported that social media use by educators is "a way to keep up with what are the burning questions, find out what leading people are doing, give a variety of insights into that particular topic so you can get a little bit of context and understanding." Social media and technology have taken a strong hold on the lives of today's aspiring teachers, as they are considered to be digital natives (Prensky, 2001) and members of the App Generation (Gardner & Davis, 2013). Table 5 below identifies the differences between aspiring and current teachers as it pertains to the use of social media.

Table 5

Social Media Usage: Aspiring Teachers v Current Teachers

Social Media Usage:	Aspiring Teachers	Current Teachers
Participating in an online community	17%	14%
Blogging	20%	11%
Using Twitter to communicate or follow others	30%	10%
Writing via a Google Docs program or similar product	35%	16%

Communicating via discussion boards, chat sites and social networking	74%	50%
Updating a personal social networking site	80%	55%

<div align="right">(Speak Up, 2013)</div>

As aspiring teachers prepare themselves for the use of technology and social media in the classroom, current principals are expecting new teachers to know how to use the technology/media to create authentic learning experiences and to differentiate instruction. Project Tomorrow (2013) looked at the differences between principals' expectations and aspiring teachers' actual experiences with the following results (Table 6):

Table 6

Principals' Expectations v Aspiring Teachers' Expectations

	Aspiring Teachers	**Principals**
Ability to create and use video, podcasts and other media	43%	65%
Identifying and evaluating quality digital content to use in class	49%	62%
Incorporating student owned mobile devices	19%	45%
Using social media in instruction with students	25%	45%
Knowing how to teach an online class	18%	25%

<div align="right">(Speak Up, 2013)</div>

In 2014, Nancy Burns-Sardone conducted research at Georgian Court University in Lakewood, New Jersey, on "Making the Case for BYOD Instruction in Teacher Education." She stated that the BYOD movement has implications for tomorrow's work force of today's K-12 and college students. These groups of students have embraced technology as a whole and have indicated in a study that their daily media exposure is close to 11 hours (Rideout, Foehr, & Roberts, 2010).

Burns-Sardone's (2014) study of 58 teacher-education students included the following three questions:

1. Would participants want to use their smart phones for learning purposes?

2. Are participants proficient with smart phones?

3. What types of BYOD-based prototype activities do participants develop?

The results of the study in response to the three guiding questions were:

1. No negative responses were indicated, indicating that students may be used to using smart phones for personal use and learning may be viewed as being personal.

2. While some of the participants were hesitant and/or embarrassed, no off-task behaviors were noted, and following a brief explanation, it was determined that candidates were proficient with their smart phones.

3. Using the Substitution – Augmentation – Modification – Redefinition (SAMR) classification system of technology integration (Pnuentedura, 2013), it was determined that most of the activities aimed to enhance the learning experience.

(Burns-Sardone, 2014)

Burns-Sardone's (2014) study concluded that many educators understand that mobile devices are currently in the school systems and that they should be used as learning tools rather than being treated as a problem (Sangani, 2013). BYOD programs can be successful when partnered with professional development and they become the responsibility of the regular classroom teacher, not a "special" teacher (Burns-Sardone, 2014).

Summary

The use of mobile technology in the public school setting has grown in popularity, and a new wave of mobile learning appears to have taken a stronghold in K-12 education. According to Ed-Tech Stats (2010) in a survey based on state-issued report cards and data, 88% of public-school districts in the United States have developed AUPs on the use of student-owned cell phones and mobile learning. Mobile learning (Taylor, 2006) has been defined as "learning

mediated by mobile devices or mobility of learners (regardless of their devices), or mobility of content/resources in the sense that it can be accessed from anywhere."

An article published by Scholastic in 2015 (Everette), described how Twitter chats are great way for teachers to engage with other professionals from around the word. Teachers are involved in Personal Learning Networks (PLN) and Professional Learning Communities (PLCs) where the topics of interest are endless. The uninhibited form of professional development allows teachers to continue the virtual conversation for as long as needed thus providing a valuable tool for teachers in all areas.

In a recent case study completed by Chou, Block, and Jesness (2012), a four-month pilot 1:1 iPad project was studied. The project focused on four ninth grade geography classes and revealed many promising opportunities and technical challenges for both educators and students. Results of the case study (Chou, Block, & Jesness, 2012) identified previously mentioned challenges and benefits. These include:

Table 7 *Challenges and Benefits*

Challenges:	Benefits:
Distractions to students	Student-centered activities
Lack of professional development	Active engagement/enhanced teaching
Lack of sufficient time to prep/train	Increased time for assignment completion
Lack of teacher-selected apps	Improved digital literacy and digital citizenship

(Chou, Block, & Jesness, 2012)

Students and Their Use of Mobile Technology

Today's students have changed their focus in education from memorization of information to how they can access information in the classroom setting (Kelm, 2011). Active engagement will extend students' learning (Odom et al., 2013), provide a sense of ownership in their education, and thus become more motivated to learn.

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According to an Edison Research study (2013), 13 to 17-year-old teenagers in the United States are using their game consoles more for Internet usage than for gaming. With nearly 61% of teens using game consoles to go online, it demonstrates how today's teens are using a variety of devices to function in their everyday lives. Edison Research (2013) presented the following data to describe the device ownership of 13 to 17-year-old teenagers in the U.S. (Figure 3):
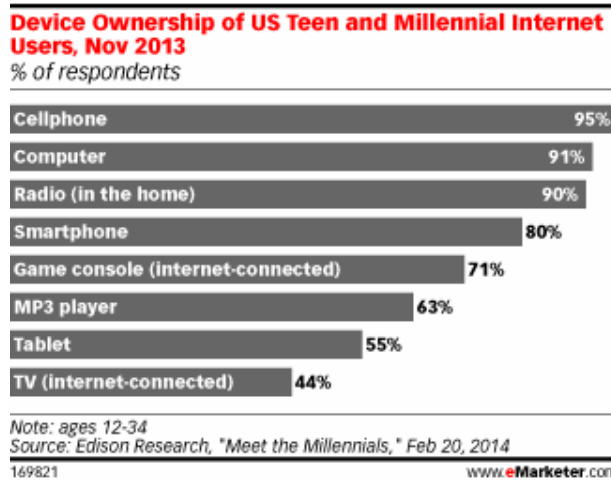
Figure 3 Device Ownership of Teens

Advantages

In a study conducted by Odom, Jarvis, Sandlin, and Peck (2013), responses from students in a leadership class showed that they were open to the idea of using social media as a benefit. Several themes emerged regarding the advantages of the use of social media in an educational setting (Odem et al., 2013) including social media

- Increasing the quality and efficiency of communication;

- Providing a technology norm;

- Allowing dissemination of information;

- Easing collaboration;

- Providing networking to form stronger connections with classmates;

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- Serving as an effective learning tool.

<div align="right">(Odom et al., 2013)</div>

While themes of advantages were clearly identified, so were several themes of disadvantages. Five key disadvantages were identified as social media

- Serving as a distraction to the learning process;

- Being kept as separate between education and social lives;

- Not being used by everyone;

- Being difficult due to unfamiliarity with the technology;

- Resulting in the loss of classroom interaction.

<div align="right">(Odom et al., 2013)</div>

According to a recent *New York Times* article written by Baker (2014), public schools around the United States are exploring the use of virtual learning as a practical solution to unpredictable weather, and many of today's students are welcoming the move. Due to recent extreme weather, the Pascack Valley (New Jersey) Regional High School District initiated the replacement of snow days with virtual days (Baker, 2014), during which teachers prepared and presented online instruction to the 2,000 students enrolled in the high school. Baker went on to state that less-motivated students may bemoan the loss of an unscheduled day off but also identified a senior who favored the virtual day by stating that her laptop offered no interruptions, thus allowing her to focus on her assignments.

The Marketing Charts Staff (2012) compiled statistics to reflect the use of mobile technology by students and found that 41.3% of students had utilized mobile technology to access social media for research or study purposes. When asked how they access social media, 50.8% cited smartphones, 95.9% stated that they have used a laptop or desktop to access media, and 16.6% used a tablet. Cox Communications published *Online Safety Research Report* in

2014 which identified how 13 to 17-year-olds access the Internet both at home and away from

home (Figure 4):

Devices Used by US Teens to Access the Internet at Home vs. Away from Home, June 2013

% of respondents

	At home	Away from home
Any mobile device	95%	78%
—Smartphone	64%	48%
—Laptop	73%	37%
—MP3 player with internet access	47%	31%
—Tablet	37%	22%
—Handheld gaming device with internet access	34%	18%
—Ereader with internet access	20%	14%
Desktop	61%	51%
Game console	61%	19%

Note: ages 13-17
Source: Cox Communications, "Online Safety Research Report," Feb 12, 2014

169488   www.**eMarketer**.com

Figure 4 Device Use of Teens

The results indicate that today's teens not only access the Internet, but they are also using a

variety of devices to do so.

In a study conducted by Kurtz (2013), 134 graduate-level students participated in a

survey to determine their perceptions of using a Facebook group and course website as their

learning space. One of the research questions was related to their perceptions of using Facebook

and/or a course website. The data supported a high level of comfort and willingness to utilize the

Facebook environment due to a level of ownership, while the course website was perceived as a

"top-down" form of communication (Kurtz, 2013). In concluding her study, Kurtz (2013), stated

that the use of "Facebook, although it was not originally created for educational purposes, can be

used as a virtual environment for discussion and sharing knowledge" and that technology should

continue to be viewed not as an end but rather as a means of instruction.

A recent publication of the online newletter *Edudemic* (Lepi, 2014) reported that all of

the research on technology and BYOD programming in the classroom can be condensed into

four descriptive ways that technology is changing how people learn. They are moving from

individual learning towards more *collaborative learning*, moving from more *passive learning* to *active learning*, *differentiated instruction* and *personalized learning* are becoming more popular, and people today are becoming *multitaskers* more than ever before (Lepi, 2014).

Assistant Professors of Education at Michigan State University Christine Greenhowand Benjamin Gleason, conducted a study entitled "Twitteracy: Tweeting is a New Literary Practice" (2012). They concluded that students, particularly college students, who tweet part of their instruction are more engaged with the actual course content, the instructor, peers/colleagues, and overall have higher grades. Greenhow and Gleason (2012) say, "The students get more engaged because they feel it is connected to something real, that it's not just learning for the sake of learning – it feels authentic to them." Greenhow and Gleason (2012) also note that Twitter usage has doubled in less than two years and that in 2012 there were more than 200 million active users posting more than 175 million tweets a day.

Challenges

As more students are using their mobile devices/social media in the classroom, additional challenges are being faced by institutions on both the K-12 and college levels. Santos (2013) identified some of challenges faced by students on today's college and university campuses:

- The need for the network infrastructure to support multiple wireless devices through increased bandwidth.
- The need for increased network security to protect sensitive information.
- The need for increased IT support of the system and the variety of mobile devices utilized.
- The issue of equity and how to address the inequity of access to technologies.

- The disruptions caused in the classroom by mobile devices

.

For today's students to fully participate in a BYOD program, educational institutions on all educational levels will need to develop clear policies about how the technology will be used and supported as well as the costs and responsibilities.

The availability of Internet-ready devices means that K-12 students no longer need to trek through the stacks of libraries to locate information that can now be accessed in a matter of seconds (Gardner & Davis, 2013). With content readily available, classrooms will become clearinghouses where students can be taught through mobile technology and social networking will be at the center of a student's learning universe (Ferriter et al., 2011).

In the 2010 Speak Up national findings (Project Tomorrow, 2011), high-school students reported great potential for the use of mobile devices to transform the current educational system.

- Wi-Fi or 3G/4G capabilities will allow students to do Internet research anytime and anywhere (68%).
- Students can utilize communication capabilities to collaborate with peers, teachers, and experts through instant messaging or text messages (53%).
- Video and audio features can allow students to create/share documents, videos or podcasts (37%) and record lectures to review at a later date (35%).

Students report that access to technology/social media/online learning provides a more level playing field for understanding, thus enabling a greater personalization with additional opportunities to collaborate with peers and experts. Project Tomorrow (2011) reported that when

asked, "Is your school doing a good job using technology to enhance learning and/or student achievement?" The results at the high school level were as follows:

High- school teachers	74%
High-school principals	72%
Parents of high-school students	62%
High-school students	47%

As a follow up to Project Tomorrow's 2009 report, high-school students have a very clear vision for how technology can enhance their achievement levels, but the educational system is not living up to their expectations. When asked to design the ultimate school (Schoolwires, 2012), students identified that they were interested in safe chat rooms for themselves and their peers (51%), tools to support personal organization of school work (45%), school/class-focused collaboration tools such as blogs, wikis, and social-networking sites (44%), and school portals to allow for access to school/class information (41%). In 2013, Project Tomorrow asked high-school students, "What device would be the best to use for these schoolwork tasks?" The results were:

Table 8

Preferred Mobile Device

Schoolwork Task	1st Choice	2nd Choice
Create a presentation	Laptop 69%	Tablet 31%
Communicate with classmates	Smartphone 68%	Laptop 38%
Collaborate on a school project	Laptop 59%	Tablet 34%
Follow experts on Twitter	Smartphone 54%	Laptop 42%
Create a video	Laptop 50%	Smartphone 40%
Take notes in class	Laptop 46%	Tablet 45%
Read a book or article	Digital Reader 44%	Figure 42%

(Schoolwires, 2012)

The number of high school students who have smart phones has risen from 28% in 2008 to 80% in 2011 (Project Tomorrow, 2013). Yet with the increase in the possession of smartphones, only 36% of 9[th] graders and 42% of 12[th] graders reported that they were allowed to use the device at school. Students are looking for programs and mobile devices that allow them to direct their own learning and personalize the classroom experience (Project Tomorrow, 2013).

Today's educators are facing the challenge of how to transform students into responsible users of mobile devices in a BYOD program (Clark, 2013). Forsyth County Schools in Cummings, Georgia, has been recognized as a leader in BYOD programming and has moved from a list of 46 directives to a guideline consisting of five statements that create the concept of TRUST: **T**hink about privacy before posting; **R**ecognize others' work and ideas; **U**nleash learning with technology; **S**tand up to inappropriate use; and **T**reat myself and others with respect (Clark, 2013), which emphasizes the trust bestowed upon students by the faculty and administration. Students are faced with the challenge and freedom of making choices that will benefit themselves and their instruction.

Summary

Students of the 21[st] Century known as Digital Natives (Prensky, 2001) or the App Generation (Gardner & Davis, 2013) are enrolled in schools and are familiar with mobile devices, social media, and the knowledge to utilize them to their advantage. Research shows that when asked, students will clearly identify their preferred device for the task at hand (Project Tomorrow, 2012). They have a vision of where they want to see their school move regarding the use of mobile devices/technology/social media in the classroom setting. Since 2003, the Speak Up project sponsored by Project Tomorrow (2013) has provided an opportunity for K-12 students to share their ideas on the effective use of technology in their learning. Over the years,

the devices, the technology, the acceptance, and the usage have changed significantly. In 2013,

Project Tomorrow asked students, parents, teachers, and administrators to rank the importance or

value of a variety of technological tools. Below is the response to the question "Do we have a

shared vision of digital learning?"
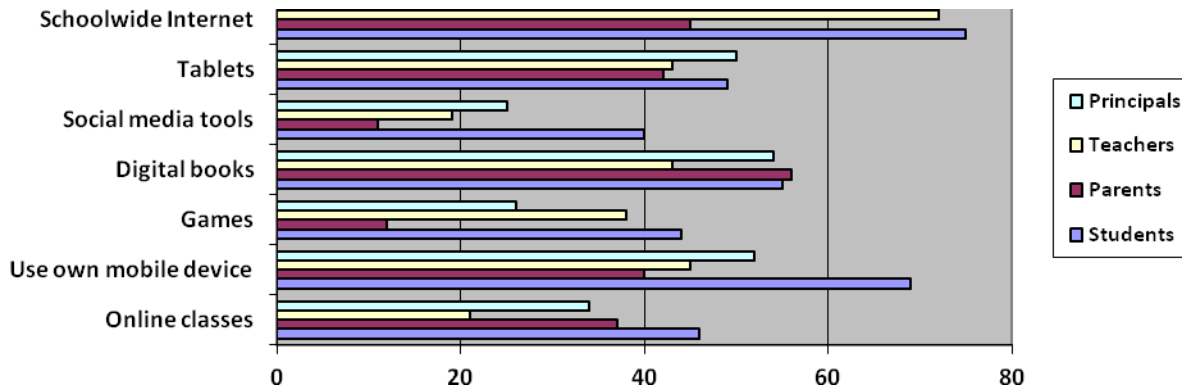
(Project Tomorrow, 2012)

Figure 5 Shared Vision of Digital Learning

In a recent Blackboard Report (2014) based on the 2013 Project Tomorrow survey, high-school

students reported that they were using mobile devices to make the process of their current

schoolwork more effective and to transform the way they approached learning. Table 9 provides

examples:

Table 9

Student Use

Making Schoolwork More Effective:	Transforming the Learning Process:
- Checking class grades (72%)	- Taking photos of class assignments (40%)
- Looking up information (65%)	- Reading books/articles on a mobile device (40%)
- Using a calculator (61%)	- Taking online tests (39%)
- Communicating with classmates and teachers	- Using social media to work on projects with

(46%)   classmates (37%)

-   Taking notes in class (44%)   -   Receiving reminders/alerts about deadlines (36%)

                                                               (Blackboard Report, 2014)

Students are aware of their needs and are looking for a classroom environment that more

closely replicates their use of mobile devices outside school (Edwards, 2014) and allows

technology to support greater communication and collaboration. "When asked how their school

could make technology easier to use to support their schoolwork, students in grades 6-12

identified the following as key changes that they would recommend (Edwards, 2014):

✓ Use of personal mobile devices in instruction (53%).

✓ Access to social media tools to support schoolwork (37%).

✓ Tools and mobile apps to facilitate greater communication (34%).

✓ Tools and mobile apps to encourage collaboration with classmates (32%).

✓ 24/7 access to teachers (28%).

On a blog associated with Education Week (2015), Katie Benmar a high school student,

discussed the importance of utilizing technology in her education. She had stated that the best

teachers have enhanced learning by utilizing Facebook for upcoming projects or planned online

chats about books read in class. While PowerPoint presentations used by teachers in the past

were not especially beneficial, participating in an online chat allowed her to think about and

better understand the topic by listening and responding to other people's opinions that were

supported with evidence.

In a 2014 study completed on a college campus (Benham, Carvalho, & Cassens, 2014), 100%

of the students already owned mobile devices but did not utilize them in class primarily because

they were not allowed, not required, could connect to the Internet, or feared theft. The students

surveyed clearly indicated that they were interested and wanted to use technology in the classroom setting more in the future (Figure 6).

Students' Current Use vs. Future Use of Mobile Technology in Class
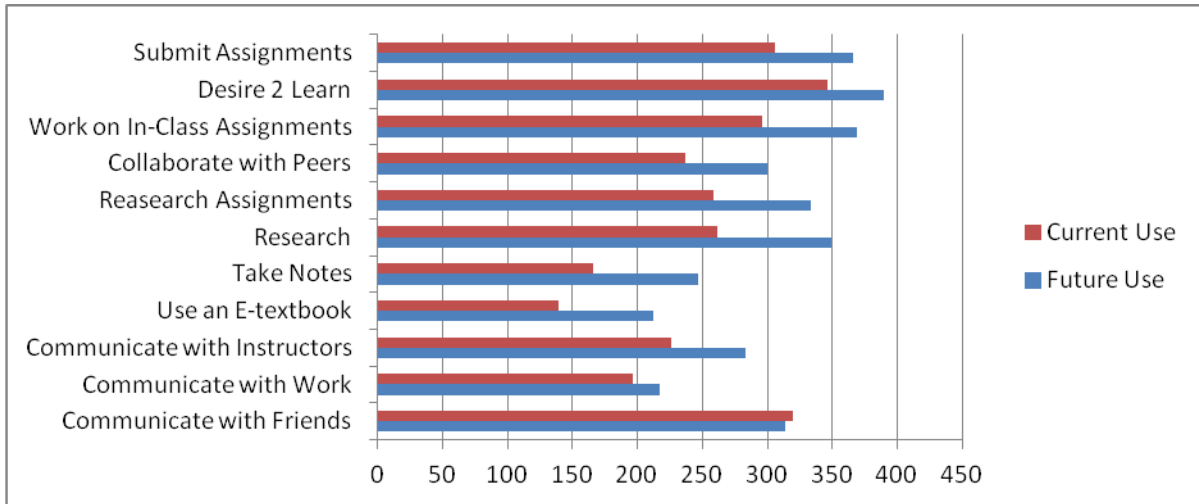
Figure 6 Student Future Use

Bring Your Own Device (BYOD)

In the world of K-12 education, initiatives have come and gone. In the 1990s, the computing initiative of "One-to-One" emerged and became a worldwide phenomenon (Bohnhoff, 2012). The one-to-one initiative sought to provide technology, typically in the form of a laptop, to each student for use both in and outside the school. In the more than 20 years since its introduction, many school districts have moved away from the one-to-one program because of a lack of implementation funds (Bohnhoff, 2012). One-to-one learning programs have been evolving into Bring Your Own Devices (BYOD) and Bring Your Own Technology (BYOT) programs throughout the country (Dixon & Tierney, 2012). The term BYOD was proposed in a conference paper in 2004 and was described as a practice of allowing employees to bring their own devices to the workplace (Kiger, 2015). By 2009, it gained attention in higher education and eventually emerged in K-12 education (Kiger, 2015). BYOD programs are often

used to describe the connection of a personally-owned device to a Wi-Fi network provided by the school (NEN – The Education Network, 2013). BYOD programs are shifting the focus from teaching to learning and working toward creating confident, flexible, self-directed, lifelong learners (Dixon & Tierney, 2012). Districts utilizing the BYOD model have noticed several major benefits over one-to-one programs: schools do not need to equip every student with a device; schools do not need to troubleshoot or maintain the devices, both of which are cost-saving measures (Bohnhoff, 2012); and teachers are becoming more aware of varied applications and teaching strategies that use personal technologies to increase student engagement (Johnson, 2012). On the other hand, in a 2012 whitepaper developed by Intel, a successful BYOD program requires extensive planning, communication, and ongoing evaluation.

The development of a BYOD program involves good planning for the multiple personal devices to minimize problems and to increase the likelihood of the positive use of those devices (Johnson, 2012). If individual devices are utilized in the classroom, the teacher will need to cater to the least powerful device in the classroom to ensure optimal effectiveness (Bohnhoff, 2012).

As devices differ among students, so do the frameworks in our public-school districts. Security remains a major concern in schools that utilize a BYOD program (Ackerman & Krupp, 2012). Ackerman and Krupp (2012) described security as infrastructure, bandwidth, wireless networks, and access points, all of which raise difficulties with individual devices in a BYOD program. While a BYOD program provides students with the necessary tools for research and allows them to reach their individual potential (Giordano, 2011), creating a potential buy-in from all stakeholders is essential to promote the success of the program (Ackerman & Krupp, 2012).

To create an environment of buy-in and prior to implementing a BYOD program, all stakeholders must be informed of the usage protocols (Harris, 2012), and students must be taught

appropriate social-networking procedures to augment learning and eliminate improper usage (Ackerman & Krupp, 2012). Professional development will also be essential in the overall buy-in of a BYOD program to assist in the movement from teacher-centered instruction to student-centered/problem-based/project-based/case-based/inquiry-based/active learning/constructivism/learn-by-doing programming (Prensky, 2010). Since information is readily available via the Internet, teachers will no longer be needed to pose questions. They will instead be needed to present higher-order thinking questions to promote critical thinking, analysis, collaboration, transfer, and application (Ackerman & Krupp, 2012). Providing opportunities for professional development will allow teachers to expand their knowledge and skill sets.

When looking at the laptop initiatives, Richardson et al. (2013) attempted to catalog all large-scale 1:1 initiatives around the world. By doing so, they discovered that little is actually known about the prevalence, scale, and scope of the programs, nor is there a common definition of what actually constitutes a 1:1 program. While there appears to be a growing interest in these initiatives, there is still very little research available on the benefits or drawbacks of the programs (Richardson et al., 2013). One study in particular (Bebell & Kay, 2010), identified the greatest academic gains to be in the area of writing skills as well as changes in the behaviors and attitudes of both students and teachers.

In 2011, Schaffhauser investigated a Bring Your Own Laptop (BYOL) program where seventh graders were able to utilize a personally owned laptop while in school. While the challenges included the lack of a common device, theft, and the access to inappropriate sites, the benefits of the program were many. Student motivation was increased, textbooks turned into ebooks, and students began to take ownership of their learning (Schaffhauser, 2011). Miller-

Cochran and Gierdowski (2013) took the study of a BYOL program further and identified that the program was cost effective for schools.

When looking at school budgets in the 21st Century, Miller-Cochran and Gierdowski (2013) described how programs that utilize mobile technology allow for more flexibility and increased access to instruction as well as being able to save money. Mille-Cochran and Gierdowski (2013) found that the cost to outfit a traditional computer classroom with new technology would be approximately $34,700, whereas the cost of equipping a flexible classroom that utilizes students' technology is approximately $14,500, which would allow students who did not have their own laptops to be able to sign out laptops from a central repository near the classroom. In taking a further look at the costs associated with a BYOD program, Costa (2013) looked at how schools could save on the rising licensing costs of software by utilizing a 90/10 value. Costa (2013) believes that schools, through research, can identify free programs that will do 90% of what a licensed for-fee program will do. At that point, Costa (2013) urges schools to look to see if the 10% of the functionality of the for-fee program makes up for the100% licensure cost.

BYOD is grounded in Vygotsky's social learning theory by allowing students to interact with their peers to develop cognitively and guide them in the process of learning (Wenger et al., 2002). By students working together on common interests, they can offer information and advice while exploring the flexibility of utilizing social media and mobile technology.

Successful BYOD Programs

Various BYOD programs have emerged in K-12 school districts around the country, with several districts appearing in the literature. Forsyth County School District, located in

Cummings, Georgia, has appeared in the literature since it officially piloted aBYOD programming in 2009 in seven schools with 40 K-12 teachers. In five years, the BYOD program was integrated into all of the district's 36 schools (Lacey, 2014). Forsyth County School District currently offers informational tours for visitors to witness first-hand the successful implementation of the BYOD program (Forsyth, 2014). Tim Clark, the district's coordinator of instructional technology, said that the focus of the BYOD program is on learning, not the adaptation around specific devices, and that there are limits on how personal devices can be utilized in the classroom (Lacey, 2014). Mark Klinger, the district's director of technology services, reported that upon initial implementation of the BYOD program, Forsyth students were required to sign acceptable-use guidelines that had 46 points. Currently, students sign a policy with five "I will" statements (Lacey, 2014). The reduction in the restrictions resulted from no students attempting to break the rules or access inappropriate content.

Faifax County Public Schools in Virginia is the 11[th] largest school district in the United States and in 2013, won a technology award for their BYOD programming. Community members, teachers, students, administrators, and tech support were all involved in the planning of the program and were integral to the program's success. Today the program services approximately 180,000 students and 23,000 staff/faculty members in 194 schools (FCPS, 2015).

The Franklin Academy High School in North Carolina initiated a 1:1 iPad program for the 2010-11 school year, and over the 2011-12 and 2012-13 school years expanded it to all students in grades 9-12. In April 2014, 475 students were invited to participate in a survey, and 242 completed it. The results of the survey indicated that the students exhibited the following positive student behaviors (Walsh, 2014):

- Increased motivation

- High confidence level with use of technology

- Opportunities for collaboration

- Organizational benefits

- Efficiency in completing tasks

- Self-directed and extended learning opportunities

- Increased independence towards becoming a continuous learner

- Developing skills of a problem solver

In Pennsylvania, the West Shore School District (WSSD), located in Cumberland County, is described as a large, suburban, public-school district with a student population of approximately 8,000 (WSSD, 2014). West Shore School District has posted the results of a 2010-11 "Teacher Technology Applications Survey" along with the results of a "Student Device Survey." Both surveys emphasized the strength of the BYOD program in the school district and provided the district with essential information regarding the frequency of use of mobile technology, social media, and applications. The teachers identified believed that 50% to 75% of their students were carrying some form of a mobile device with them on a daily basis. Forty-three percent of the teachers completing the survey felt somewhat comfortable in allowing students to bring personal devices to school for instructional purposes. Another 38% of the teachers felt that they were still somewhat uncomfortable but were willing to try to utilize mobile technology in their classes. Students said that technology was being utilized in their classes on a daily basis at a 48% response rate. When those same 1,852 students were asked if they would be willing to bring a laptop/mobile device to school to be used during class time, 73% indicated "yes" while 70% stated that their parents would allow them to bring a device. Overall, 77.7% of students stated that they currently bring a device to school, but when asked how often they were allowed to

utilize their device(s) for the completion of assignments, only 26.6% indicated that they are allowed "Often (at least once a week)," the results of the surveys were used to construct the district's current BYOD program which went into effect for the fall semester of the 2011-12 school year.

The Donegal School District (DSD, 2014), located in Mount Joy, Pennsylvania, is described as a rural school district with approximately 2,538 students. The DSD utilizes a 16 point "Term of Participation" form that must be signed prior to allowing a student to participate in the BYOD program along with a device registration to assist in identifying lost or stolen devices. Donegal School District realizes that "by acknowledging that smartphones, tablets, and laptops are a factual component in the lives of every human being and by embracing openly and actively in the exploratory use of these tools for both education and entertainment we are opening the door for our students that leads to the heart of the 21st century experience" (DSD, 2014).

The East Penn School District (EPSD), which is located in the Lehigh Valley of Pennsylvania , enrolls nearly 8,100 students and launched a BYOD pilot program at the start of the 2013-14 and 2014-15 school years. The goal of their pilot program is to help to enhance instruction by increasing students' ability to access educational materials online. Students who are registered with the BYOD pilot will be given instructions on how to connect their device to the filtered wireless network. Students will be allowed to use their device with BYOD teachers only. Parents must sign the AUP and identify their student's device, which is registered.

Peters Township School District (PTSD) is a large suburban school district located in southwestern Pennsylvania with a student population of approximately 4,500. During the pilot phase of the BYOD program, a pilot group of teachers were involved in a nine-week roll-out

period to ensure that the district's network was capable of handling the increased load (PTSD, 2014). Teachers not involved in the pilot were allowed to participate in "BYOD Wednesdays" to allow all students the opportunity to utilize personal mobile devices.

Digital Citizenship

Prensky (2010) refers to today's students as "digital natives," but Merrow (2012) wonders whether they are also digital citizens. According to Waters (2012), "digital citizenship has less to do with safety and civility than participation in the worldwide online conversation." As the definition of community evolves into a worldwide community, technology has permanently invaded the lives of both educators and students. According to Scott Steinberg (2012), little has been done to prepare adults and children for life in a connected world. The 2011 Norton Online Family Report indicated that:

> Overall, almost 62 percent of kids across the world said that they have had a negative experience while online. Nearly 4 in 10 (39%), however, have had a serious negative experience online, such as receiving inappropriate pictures from strangers, being bullied or becoming the victim of cybercrime. The report also shows that kids who are active on social networks open up more doors for content or situations that can be tricky for them to handle: 74 percent of kids on social networks find themselves in unpleasant situations online, compared to 38 percent who stay away from social networking.

The report stated that three out of every four adolescents own a cellphone and 20% of these students do not share information with their parents regarding negative online experiences for fear of getting into trouble. Steinberg (2012) remarked that for generations, parents and grandparents were capable of modeling appropriate behavior, but today in a world of 24/7 access, the reality is that the most innocent of mistakes can live on in infamy with help from the Internet.

In 2004, Ribble, Bailey, and Ross identified nine general areas of behavior that make up digital citizenship. These include:

Table 10

Digital Citizenship

Etiquette	Electronic standards of conduct or procedure
Communication	Electronic exchange or information
Education	The process of teaching/learning about technology and the use of technology
Access	Full electronic participation in society
Commerce	Electronic buying and selling of goods
Responsibility	Electronic responsibility for actions and deeds
Rights	Those freedoms extended to everyone in the digital world
Safety	Physical well-being in a digital technology world
Security	Electronic precautions to guarantee safety

Ribble, Bailey, and Ross, 2004

As technology continues to improve, society will need additional assistance on how to act in the digital world. The most basic of example is that "when students see adults using technologies inappropriately, they can assume it is the norm. This assumption may lead to inappropriate technology behavior on the part of students" (Ribble, Bailey, & Ross, 2004).

A quote by U.S. Supreme Court Justice Thurgood Marshall (1975) was used by Ribble, Bailey, and Ross in 2004 to help place the importance and urgency of teaching digital citizenship:

Education is not the teaching of the three R's. Education is the teaching of the overall citizenship, to learn to live together with citizens, and above all to learn to obey the law.

Summary

Bring Your Own Device (BYOD) initiatives provide the opportunity for students to use their own mobile devices/technology to increase engagement and to provide anytime, anywhere access to information (Peng et al., 2009). Kolb and Tonner (2012) stated that mobile technology is dramatically changing how we communicate, share content, and retrieve information, especially for a generation of youth who are used to the immediate and collaborative nature of the informal learning they engage in outside the constraints of formalized learning in school.

Research has discussed advantages and disadvantages of BYOD implementation, with specific advantages being that students exhibit increased involvement (Markett et al., 2006), as well as linking informal and formal learning experiences with the collaboration of peers and experts (So, Seow, & Looi, 2009). While BYOD programming is not new, it still requires excessive preparation in the form of technology and professional development prior to implementation. Administrators and educators need to be aware of how to implement mobile devices into the curriculum, parents need to be involved and informed, and students need to be taught appropriate protocol when navigating among social media sites.

With today's students indicating what they need and desire from their schools (Project Tomorrow, 2012) and parents indicating that they would purchase their student a mobile device to assist in their education (Project Tomorrow, 2011), the implementation of a BYOD program now rests with the educators and schools.

A number of successful district-implemented BYOD programs were also reviewed with a common theme being piloting programs prior to full implementation and collaboration among all stakeholders. All initiatives emphasize the importance of having students participate in higher-level thinking activities involving the use of technology (Clark, 2011). Clark states that teachers

can progress to the practice of sharing the standards for student learning and that the students can determine the strategies for researching those concepts and communicating them to others. BYOD programs are not simply about the device, they are about the empowerment students feel when they are using those devices and feel a sense of control over their learning through the collaborative support of their teachers and peers (Clark, 2011).

As school districts struggle with the implementation of technology and BYOD programs, the International Society for Technology in Education (ISTE) has developed appropriate standards for administrators, teachers, and students in 2007, 2008, and 2009. Figure 17 summarizes the standards needed to develop a digital citizenship curriculum.

Table 11

ISTE Standards

Administrators	Teachers	Students
Visionary leadership	Facilitate and inspire student learning and creativity	Creativity and innovation
Digital age learning culture	Design and develop digital age learning experiences and assessments	Communication and collaboration
Excellence in professional practice	Model digital age work and learning	Research and information fluency
Systemic improvement	Promote and model digital citizenship and responsibility	Critical thinking, problem solving and decision making
Digital citizenship	Engage in professional growth and leadership	Digital citizenship
		Technology operations and concepts

(ISTE, 2007-09)

Literature Gap

A review of the literature found various online articles, blogs, websites, and chat rooms related to the topic of the use of mobile technology in the 21[st] Century classroom, but a lack of research-based studies related to the use of technology, specifically as it relates to the utilization

of a BYOD program to increase educational programming through collaboration. The Project Tomorrow projects (2009, 2011, 2012, 2013, 2014) looked at the perceptions of educators/parents/students of the use of technology but lacked the focus of perceptions of mobile technology in a BYOD educational program.

The research on the importance of Vygotsky's theory (1934) of collaboration and the Zone of Proximal Development (ZPD) is affected by a BYOD program is inconsistent. Vygotsky (1934) stressed the importance of past experiences and prior knowledge in making sense of new situations, but the literature is limited in demonstrating a relationship between digital natives and digital immigrants (Prensky, 2001).

As the World Wide Web (www) celebrated its 25[th] anniversary in March 2014 (Wagstaff, 2014), it was a mere infant compared to the original Internet, which was introduced in a crude form in 1958 by the U.S. Department of Defense's Advanced Research Projects Agency (ARPA), (Wagstaff, 2014). In the 46 years it took to develop the Web from the inception of the Internet, education remained in a 19[th] Century industrial mode (Friedman, 2005). Between 1998 and 2003, the student to computer ratio declined from 12:1 to 4.4:1 (Honey, 2005) and continues to decline. Educators and students in the 21[st] Century cannot wait another 46 years to develop strategies involving technology to prepare students for emerging careers. .

A 2013 paper written by Richardson et al., describes a growing deployment of 1:1 initiatives but no agreement about what constitutes "1:1 computing." Educators disagree on the minimum level of access the students have as well as the availability of services at the students' disposal (Richardson et al., 2013). This researcher will attempt to present a case study that focuses on the overall perception of educators and students currently participating in a BYOD as well as the impact of the mobile technology on educational programming.

Summary

Chapter 2 investigated research in the areas of BYOD programming/social media in K-12 public education. The topics were presented in five areas:

- The Educational Theory of Lev Vygotsky
- Social Media in a BYOD Program
- Educators and Their Use of Mobile Technology/Social Media
- Students and Their Use of Mobile Technology/Social Media
- Bring Your Own Device (BYOD)

As social media continues to grow at an astounding rate, it is evident that there is a lack of research related to social media, mobile technology, and the perceptions of the stakeholders who utilize these tools in the K-12 educational environment.

A review of how mobile technology and social media are used in school systems, followed by how classroom teachers are utilizing both formats, was presented. Educators are active with social media through mobile technology, as represented by 78% of teachers currently using Facebook or LinkedIn. This data compares to 69% of all American adults. Educators also make up 28% of the adult population using Twitter as opposed to nearly 16% of all adults in the United States (Bhaskar, 2013). With so many educators utilizing multiple social-media formats on various types of devices, additional training has been identified as a need for all stakeholders.

Today's students have never known a world without technology and devices. According to a publication by Swan Christian College (2012), today's students have only ever know a world with Google, Wikipedia, Myspace/Facebook and mobile phones with high-speed Internet service.

With the continued growth of social-media usage, school districts will need to provide additional training to all stakeholders prior to the implementation of programming and may consider a pilot program prior to a complete "rollout" of a BYOD program (Ackerman & Krupp, 2012).

Chapter 3 will discuss the methodology involved in the research study, including a discussion of the survey and the interview protocol. The pilot study will be discussed as well as the data analysis, assumptions, limitations, and delimitations. The final two chapters, 4 and 5, will discuss the results of the completed study and implications for additional research.

The number of published studies measuring the knowledge and perception of secondary educators regarding their understanding and use of BYOD programs is extremely limited. When coupled with the knowledge and perception of secondary students, the number of published studies drops even further. This researcher was able to identify a published doctoral dissertation submitted to Virginia Commonwealth University (Andrews, 2012), entitled *"Into the Tangled Web:7-12 Educators, Free Speech Rights, and Social Media,"* which suggested that schools need to train and educate educators and administrators in the use of social media, the First Amendment, and how they relate to school policies (Andrews, 2012). A second dissertation, entitled *"School Communications 2.0: A Social Media Strategy for 7-12 Principals and Superintendents,"* which was submitted by Daniel Dean Cox in 2012 at Iowa State University, was also reviewed. This doctoral study was useful in familiarizing the researcher with the experiences of principals and superintendents who were currently utilizing social media in their school districts. A third dissertation, *"Students' Personal Mobile Devices in the Classroom: A Case study of a BYOT District,"* (O'Sullivan-Donnell, 2013) was reviewed in detail to increase the researcher's knowledge of BYOT/BYOD programs.

In an attempt to take the research a step further, this study focused on 10th-grade cross-curricular educators and 10th-grade high-school students, examining their knowledge and perceptions as they relate to the use of a BYOD program. The purpose of this study was to determine how the adoption of a BYOD program by 10th-grade educators and students affects educational programming as well as to explore the experiences of the stakeholders. Therefore,

the research and study were designed to address the following research topic and supporting questions:

1. What are the perceptions of 10th-grade cross-curricular educators and students regarding BYOD programming in the educational setting?

    a. What are the perceptions of 10th-grade teachers regarding BYOD programming?

    b. What are the perceptions of 10th-grade students regarding BYOD programming?

    c. Is there a difference in the perceptions of educators and students regarding BYOD programming?

2. At what frequency are 10th-grade educators and students utilizing a BYOD program in their classes?

    a. At what frequency are 10th-grade teachers utilizing BYOD programming in their classes?

    b. At what frequency are 10th-grade students utilizing BYOD programming in their classes?

    c. Is there a difference in the frequency of utilizing BYOD programming in classes between educators and students?

3. How are 10th-grade educators and students utilizing a BYOD program in their classes?

    a. How are 10th-grade teachers utilizing BYOD programming in their classes?

    b. How are 10th-grade students utilizing BYOD programming in their classes?

    c. Is there a difference in how educators and students are utilizing BYOD programming in their classes?

4. What types of devices are being utilized by 10th-grade educators and students in a BYOD program?

a. What types of devices are being utilized by 10th-grade teachers in a BYOD program?

b. What types of devices are being utilized by 10th-grade students in a BYOD program?

c. Is there a difference in the types of devices being utilized by educators and students in a BYOD program?

Research Design

A case study was conducted to determine the effective use of mobile devices through the initiation of a BYOD program in a 10th-grade public-school setting. The multi-faceted case study utilized an online survey, personal interviews, and classroom observations. The survey allowed for comparative statistics to be gathered and analyzed through correlation analysis. Participants were asked to participate in the study through an on-line survey during a scheduled class period. Approval from the district administration in the form of the superintendent of schools and the board of education was granted prior to the survey being conducted. All surveys were conducted during the scheduled school day following informed parental consent.

The use of an online survey offers many advantages and conveniences to both the researcher and the participants. For the researcher, a prime advantage is that a survey is cost-efficient, with the cost per response often far less than to administer a paper or phone survey. Even if a participation incentive is offered, the cost of administering a survey remains minimal. The researcher also appreciated the extensiveness of a survey and its availability to a wider sampling population.

Surveys have proved to be useful in describing the characteristics of a large population, and no other research method can provide such a broad capability, which ensures a more

accurate sample to gather targeted results from which to draw conclusions (Wise, 2012). The

benefits to the participant(s) include flexibility and anonymity. The flexibility of a survey

typically allows the participant(s) to complete it at his/her convenience without time restraints,

while anonymity allows the respondents to be open and honest in their answers. Surveys

conducted anonymously provide an avenue for more honest and unambiguous responses than

other types of research methodologies, especially if it is clearly stated that survey answers will

remain completely confidential (Wise, 2012). An additional benefit, as described by Nosek,

Banaji, and Greenwald (2002), is that the researcher exerts less control over the participant(s)

during the completion of the survey. This factor allows for less bias and a reduction in ethical

problems.

If conducted properly, online surveys may have significant advantages over other survey

formats (Evans & Mathur-Zarb, 2005). They are relatively simple for participants to complete

and for the responses to be tabulated and analyzed. Additionally, once the final survey for a

study is submitted, the researcher instantaneously has all the data in a data base (Wilson &

Laskey 2003), allowing for a quicker analysis. According to Noyes and Garland, (2008) the

reliability of an Internet-based survey is equivalent to that of pencil and paper surveys and yields

approximately the same results while affording the researcher an opportunity to reach a larger

sample size despite geographical dispersion of the respondents.

The second facet of the study was personal interviews. A qualitative interview involves

the exploration of a specific issue in a bounded system, such as a particular setting (Creswell,

2007). The bounded system utilized for this study was a rural school district that had recently

implemented a BYOD initiative. Stake (1995) stated that qualitative interviews parallel

quantitative observations, with both seeking to aggregate perceptions or knowledge over multiple

respondents. This researcher adopted a base set of questions to maximize participant responses with a minimal amount of prompting, and all interviews were transcribed, with prior consent. The ability to conduct the interviews directly allowed for ease of transcription as well as allowing the interviewer the opportunity to encourage the interviewees to expand upon their responses.

The third component of the study was classroom observations. Naturalistic observations allow the researcher to gather knowledge of the experiences of the participants in their natural setting without any intervention by the researcher. The classroom observations provided the researcher with the opportunity to observe behavior in real-world setting and helped to establish external validity.

Pilot Study

A pilot study was conducted in a rural school district with an approximate student population of 762 K-12[th] grade students. The pilot-study district was chosen based on its current technology programming which involved a 1:1 laptop program in grades 7 to12, progressing toward a BYOD program.

A sampling of students was identified with the assistance of the district superintendent of schools and the high-school principal, resulting in a total of 20 participants. The groups were comprised of 15 students currently enrolled in the high school and five cross-curricular educators who provided direct instruction. All surveys were conducted via paper and pencil. Following the survey, individual interviews were conducted with the superintendent and the high-school principal.

The pilot study allowed the researcher the opportunity to code responses and identify areas of potential revision. The interview component allowed the researcher to "rehearse" the

act of listening while remaining in control of the data gathering (Stake, 1995). Based on a conversation with the superintendent and the high-school principal, a determination was made regarding the taping of the interviews to assist in the transcription process as well as to assist in the comfort and accuracy level of the researcher. Interviews were summarized for ease of reviewing and coding. The interview questions afforded the participants the opportunity to describe scenes that the researcher would not be witness to (Stake, 1995), giving the researcher the ability to create a complete picture of the situation/scenario described.

Through the pilot study, the decision was made to include classroom observations in an attempt to identify key components of the BYOD program that would possibly go unnoticed through a survey and/or an interview. The classroom observations would allow the researcher to observe the implementation of the BYOD program in a real-life setting. It would also provide the researcher with the opportunity to observe random students to determine their time-on-task (TOT).

Upon completion of the overall pilot study, the superintendent and school district were offered the results of the study. The offer was refused based on the resignation and change of employment of the superintendent. The data collected could have been of importance should the pilot district continue to contemplate progression toward a comprehensive BYOD program as a component of its educational programming.

Target Population and Sampling

The targeted sample of 10th-grade cross-curricular educators and 10th-grade students was in a rural school district in northeastern Pennsylvania. According to 2014-15 data, "Target" School District had a K–12th grade student population of 1,526 and a faculty/staff employment force of 110.

"Target" School District was chosen based on its current superintendent and his technology initiatives. The primary initiative included the need to increase the opportunity for students to learn collaboration, communication, creativity, and critical thinking through active participation in a BYOD program (Lakeland SD, 2013). "Target" School District and its superintendent introduced a district policy known as "BYOD" – Bring Your Own Device, in October 2013. This policy allowed students, faculty, and staff to bring their own mobile devices to school for use in their classrooms in grades 7-12. The district's Bring Your Own Device (BYOD) Responsible Use Guidelines states:

> The -------- School District (LSD) uses instructional technology as one way of enhancing our mission to teach the skills, knowledge and behaviors students will need as responsible citizens in the global community. Students learn collaboration, communication, creativity, and critical thinking in a variety of ways throughout the school day. In an effort to increase access to those 21[st] Century skills, LSD will allow personal devices on our network and school grounds for students who follow the responsibilities stated in the Acceptable Use Policy (Board Policy 815). (Lakeland SD, 2013)

> The "Target" School District was incorporating the use of such personally owned items as laptops, netbooks, cell phones, smartphones, iPods, and tablets, with browsing capabilities for educational purposes only. Gaming devices such as PSP, PS Vita, and Nintendo DS, with Internet access are not permitted.

Educator participants were encouraged to participate in and complete the survey through an email from the high-school principal followed by an email letter from the researcher. The letter was distributed to all members of the professional staff via district email with

administration consent. Parents of participating 10th-grade students also received a letter of introduction along with an explanation and a statement of informed consent.

From the original pool of participants, volunteers from the combined target groups were invited to participate in an interview process to meet the requirements of the qualitative analysis. The interview sampling included a combined total of 13: five10th-grade educators; six 10th-grade students; and two building- and district-level administrators. The teachers interviewed were volunteers who contacted the researcher directly through email to express their desire to participate. All teacher interviews were conducted via phone at the teachers' convenience and lasted 20 to 45 minutes. The student interviewees volunteered to be interviewed after being approached by the high-school administrator. A pool of 20 students was chosen by administrators to determine a level of interest in participation. From the original pool of students, six students consented to be interviewed by presenting signed parental consent.

Research Instrument

The research instrument in the form of a survey was adapted from a survey created by John David Andrews (2012) in his dissertation submitted to Virginia Commonwealth University. Several unsuccessful attempts were made to contact Andrews and his committee chairman, Jonathan Becker, to secure the rights to replicate the study.

Andrews's survey instrument (2010) was modified to meet the needs of this project and its research questions (Appendices A, B). The online surveys consisted of 14 questions for students and 17 for the 10th-grade cross-curricular educators.   All surveys were presented on the web to measure perception, frequency, and use of the implemented BYOD program, along with a determination of the types of devices being used. The final component of the survey consisted of demographics (Appendices A, B) to give the researcher the opportunity to know the participants.

A total of ninety-two completed responses were received, 79 from students and 13 from educators.

The interview component (Appendix D) was created based upon the research questions and a desire for a more in-depth understanding of the participants' perceptions. A follow-up interview of 12 questions was then conducted with a sampling of 13 participants from the pool of participants in the two target groups (Appendix C). All interviews were conducted on a one-to-one basis in a relaxed atmosphere to let the participant feel comfortable and relaxed. The interviews were summarized and coded to determine common themes, first by individual target group and then in a comparison of the two groups.

The responses to the surveys and interviews were coded and segregated to isolate descriptive statistics and identify key variables. All interview notes were coded through two cycles: cycle one utilized InVivo Coding to attempt to capture key elements using the interviewees' own words (Gavin, 2008) and cycle two involved Pattern Coding to examine causes and explanations similar in both groups. Once key variables were identified, the researcher was able to analyze the responses to determine the relationships between 10th-grade educators' levels of mobile device use, perceptions about BYOD programming in general, program usage, and general demographics. The same relationships were determined in the surveys and interviews of the 10th-grade students. A comparison was conducted to determine whether discrepancies and/or similarities existed within and between the study groups. The researcher was also able to determine the types of devices currently used by both target groups on the personal and professional levels.

Classroom observations were then scheduled with the assistance of building- and district-level administrators. All observations were conducted during the fall 2015 semester. Each

observation, for a total of three, spanned the length of a 45-minute class period. The following

observable behaviors were identified: comparison of two students to document time on task;

number of classroom transitions; description of activities; International Society for Technology

in Education (ISTE) standards observed; number of individual mobile devices; and general notes

(Appendix E). The observations were conducted in general-education classes following an

administrative request for teacher volunteers.

Validity of the Instrument

To determine the validity of the instruments used in the study, each instrument was

reviewed and analyzed to ensure there was a direct correlation to a research question (RQ). In

reviewing the survey presented to the teachers, questions 1, 2, 3, and 4 directly related to RQ 1

and assisted in discussing the perceptions of the teachers toward BYOD programming. Survey

questions 5, 6, and 7 correlated with RQ 2 – Frequency of use, while questions 8, 9, 10, and 11

provided insight to RQ 3 when reviewing the utilization of the program within the educational

setting. To establish validity for RQ 4 (devices), teacher survey question 4 was utilized. In

reviewing the teacher survey, questions 13, 14, 15, 16, and 17 provided additional independent

variables that were not utilized in this study but may provide of use in additional research.

When determining the validity of the student survey, survey questions 1, 2, 3, and 5 were

directly related to RQ 1 and addressed the perceptions of the BYOD program. Survey questions

6, 7, and 8 focused on RQ 2 – Frequency and questions 9, 10, 11, and 12 assisted in answering

RQ 3 (utilization). Survey questions 13 directly related to RQ 4 and assisted in addressing the

types of devices being utilized. In a review of the survey, questions 4 and 14 were not directly

connected to the research questions.

In a review of the interview questions, questions 1, 3, 4, 6, 7, 8, 10, 11, and 12 directly related to perception of use for both target groups while questions 2, 5, and 9 assisted in the collection of data for RQ 3 (utilization). All of the interview questions were directly correlated to the research questions presented.

To assist in addressing RQ 2 (frequency) and RQ 3 (utilization), classroom observations were employed. The researcher created observation tool provided the researcher with information on time-on-task (TOT) which assisted in responding to RQ 2 (frequency). The direct observation of the performance of the ISTE standards provided data related to RQ 4 (utilization). The classroom observation tool did provide data that were not directly used in the study but may of use for further research.

In a final determination of validity, it appeared that all of the data collected from the research instruments employed will have a direct correlation on addressing the research questions presented in Chapter 1. Additional data in the form of independent variables, will also be collected although not utilized within this survey. The unused independent variables may be of use for additional research in the area of BYOD programming.

Definition of Variables

The selection of independent variables utilized in this study through the use of the survey have been identified and categorized in Table 12 (10th-grade cross-curricular educators) and Table 13 (10th-grade students). The identified independent variables were gathered solely for the researcher to become familiar with the survey participants and were not used in any comparison analysis.

Table 12:

Description of Independent Variables 10th-grade Cross-Curricular Educators

Name of Variable	Type of Variable	Categories
Gender	Categorical	Male
		Female
Title	Categorical	Teacher
		Administrator
Years in education	Categorical	< 4 years
		4-10 years
		11-20 years
		21-30 years
		30+ years
Level of education	Categorical	Bachelors
		Bachelors + 24
		Masters/Masters equivalent
		Masters + 30
		Doctoral

Table 13:

Description of Independent Variables 10th-grade students

Name of Variable	Type of Variable	Categories
Gender	Categorical	Male
		Female

The researcher also utilized the survey data to analyze dependent variables for each of the target groups: 10th-grade teachers (Table 14); and 10th-grade students (Table 15). All data obtained from the dependent variables were used in a comparison analysis.

Table 14

Description of Dependent Variables 10th-grade Cross-Curricular Educators

Name of Variable	Description of Variable	Measure Used to Determine Variable
Perceptions of Use	Measures the perceptions of individuals participating in a BYOD program.	9 Likert items
Frequency of Use	Measures the frequency of use of mobile devices of individuals participating in a BYOD program.	3 Likert items
Utilization of Devices	Measures how mobile devices are being used in a BYOD program.	4 items
Types of Devices	Identifies the types of mobile devices being used in a BYOD program.	1 item

Table 15

Description of Dependent Variables 10th-grade Students

Name of Variable	Description of Variable	Measure Used to Determine Variable
Perceptions of Use	Measures the perceptions of individuals participating in a BYOD program.	9 Likert items
Frequency of Use	Measures the frequency of use of mobile devices of individuals participating in a BYOD program.	3 Likert items
Utilization of Devices	Measures how mobile devices are being used in a BYOD program.	5 items
Types of Devices	Identifies the types of mobile devices being used in a BYOD program.	1 item

The qualitative component of the study was created from a set of questions developed by the researcher to seek a more in-depth understanding of the responders' perceptions of the use of mobile devices in a BYOD program. Data were gathered through summarized interviews with participants who volunteered to participate as well as through classroom observations. Prospective teacher participants were asked to contact the researcher directly via email to schedule a convenient time for the interview. All student interviews were arranged with the assistance of the high-school principal. A total of 13 interviews were conducted: six students and seven teachers/administrators. The interview process consisted of 12 questions, and participants were allowed to expand upon their responses (Appendix C). Each participant was allowed to ask questions of the researcher and to share personal experiences regarding the use of mobile devices in the BYOD 10th-grade educational setting.   The researcher was also able to take notes on the interviewee's reactions, mannerisms, and perceived attitude to each interview question. The researcher was also afforded the opportunity to seek clarification of responses.

The interview questions were descriptive in nature and allowed the researcher to code and analyze the data to determine similar/consistent themes in the responses. Themes were

coded according to the target sampling group and then cross-coded in the form of a comparison of the target sample groups.

Procedures

The survey was adapted from a dissertation submitted at Virginia Commonwealth University (Andrews, 2012). Following multiple unsuccessful attempts to contact the author, the survey was adapted and modified to meet the needs of the researcher in this study. The survey was formatted on SurveyMonkey to allow the participants to remain anonymous and flexibility in participation/completion. The online survey was available for two weeks to allow the participants sufficient time to complete it. All student surveys were conducted during a scheduled study period, while the teachers were allowed to complete the survey at their convenience.

The researcher informed potential educator participants of the research being conducted and held individual meetings to answer questions related to their participation and the process. The students invited to participate in the research following the recommendation of administration to have the researcher focus solely on the10th-grade, who had actively participated in one full year of BYOD programming. A letter of participation was forwarded parents informing them of their students' anonymous participation in the online survey. The district/researcher did not receive any notification of parent/student refusal to participate in the survey.

The interview component was set up between the researcher and the participants with the assistance of the building administrator. Signed parent/guardian permissions were obtained prior to student participation in the interview process. All student interviews were conducted at the high school in an easily accessible location to avoid disrupting the educational process. All

interviews were summarized to assist in coding. Interviewees received a token of appreciation in the form of a gift card, and all participants were offered a copy of the research project upon its completion if they asked for it.

Data Analysis

The data collected were segregated into two distinct groups, including 10th-grade cross-curricular educators and 10th-grade students. The results of the segregated samplings were analyzed and compared to assist in determining whether a significant correlation existed between the target groups.

Correlations were used to compare the overall use of BYOD programming as an educational tool in a public-school 10th-grade setting. The data was reviewed to evaluate significant differences amongst different demographic groups based on contextual factors.

A descriptive statistic was used to review the qualitative component of the study. According to Yin (2011), qualitative research should follow five steps: compiling, disassembling, reassembling and arraying, interpreting, and concluding. The researcher coded and analyzed the data to identify common themes in the participants' responses. Summarized interviews with field notes were of further assistance in developing an understanding of the participants' involvement in BYOD programming.

All data were reviewed and analyzed to assist in answering the stated research questions. Table 16 represents the approach used for each research question.

Table 16

Research Questions and Data Analysis

Research Question	Related Questions Educators	Related Questions Students	Method(s) of Data Analysis
What are the perceptions of 10th-grade cross-curricular educators and students	Survey: 1,2,3,4 Interview: 1,3,4,	Survey: 1,2,3,5 Interview: 1,3,4,	Percentage data; usage mean

regarding BYOD programming in the educational setting?	6,7,8,10,11,12	6,7,8,10,11,12	
At what frequency are 10th-grade educators and students utilizing a BYOD program in their classes?	Survey: 5,6,7 Classroom Observations	Survey: 6,7,8 Classroom Observations	Frequency
How are 10th-grade educators and students utilizing a BYOD program in their classes?	Survey: 8,9,10,11 Interview: 2,5,9 Classroom Observations	Survey: 9,10,11,12 Interview: 2,5,9 Classroom Observations	Correlation comparison
What types of devices are being utilized by 10th-grade educators and students in a BYOD program?	Survey: 12	Survey: 13	Correlation comparison

Assumptions

According to Gardner and Davis (2013), the App Generation is much more comfortable communicating and seeking information through social media than the Baby Boomer Generation or even Generations X and Y, resulting in a greater and more confident use of mobile devices. Therefore, it is assumed that students would respond in a more positive manner in using mobile devices in the educational setting.

Another assumption of the researcher is that as the use of mobile devices continues to grow in the secondary public-school sector, school districts will need to provide greater professional development for all stakeholders. Policies for acceptable use will have to be revised to meet the need and demand for incorporating BYOD programming. More veteran teachers will be affected, which will alter their overall perceptions of the use of mobile devices in BYOD programs. Districts will begin to encourage professional learning communities to use the knowledge and skills of the More Knowledgeable Other (MKO) to influence the use of technology and mobile devices in a school-based BYOD program.

Tenth-grade students will likely be identified as the "digital natives" needed to assist the "digital immigrants" (Prensky, 2001) in fully understanding and participating in BYOD programs. The necessary assistance may be provided through an understanding of Vygotsky's (1934) Zone of Proximal Development (ZPD) and/or More Knowledgeable Other (MKO).

Limitations and Delimitations

The hope of this and any study is that the data and results will be generalized to a larger population. Unfortunately, it is important to understand that this study was conducted in only one medium-sized, rural school district (1,000 – 5,000 students) in northeastern Pennsylvania. The data collected is representative of a school district that is currently involved in several social media initiatives, so it may not be representative of other districts in Pennsylvania or across the nation. This important factor may be considered both a limitation and a delimitation. While the choice of the "Target" School District is a delimitation, the cooperation of the participants is a limitation since the researcher had no control over the extent of their social media use and knowledge or use and knowledge of mobile devices.

The purpose of this study was to extend the understanding of the use of mobile devices in the realm of secondary public education as well as to determine the perceptions of the stakeholders involved in a BYOD program. As more pre-service and newer teachers begin to enter public education, this study should serve to provide additional information as to the importance of utilizing educational tools that are considered to be second nature and a part of the daily lives of 21[st] Century students.

Summary

This chapter presented the study's methodology and research design. It discussed the participants, the survey, interviews, and classroom observation protocol. It also outlined the steps to be taken in the data analysis. The researcher's assumptions were reviewed, followed by the limitations and delimitations of the study. The research findings will be discussed in Chapter 4. Chapter 5 will provide a discussion of the data collected as it relates to the research questions along with implications for practice and additional research.

CHAPTER 4

RESULTS

This chapter presents the data collected for the case study entitled *Bring Your Own Device: A Case Study of a 10th-grade BYOD Program in a Rural Pennsylvania School District*. The study explored perceptions of and usage by students and teachers of BYOD programming in a 10th-grade curriculum. The study was developed utilizing mixed methods to gather data, including an anonymous online survey, personal interviews, and classroom observations. The instruments, separately and combined, addressed perceptions, frequency of use, utilization of activities and applications, types of devices, and general demographics.

The online survey was created by the researcher based on a previously administered doctoral survey (Andrews, 2012). The survey was modified to address the research questions presented in Chapter 1. The final survey included 17 questions in the teachers' version and 14 for students. All surveys were conducted online or while the participants were on campus. Teachers were encouraged to complete the survey at their convenience during two-week period. Students participated in the survey while in a scheduled study period during their typical school day.

The personal interviews consisted of 12 open-ended questions for both target groups. All five teacher interviews were conducted with teachers who volunteered by contacting the researcher via email and were conducted by phone at the interviewees' convenience. The two administrators were interviewed on campus at a pre-arranged time. The six student interviews were conducted on campus in a private office in the high-school. All of the student participants were volunteers from a pool of approximately 20 who were chosen by the high-school administrator. From the original pool, six students volunteered to participate by presenting signed parental consents.

Classroom observations were conducted with the assistance of the high-school administration and were based solely on a teacher volunteer basis. Three teachers volunteered. Each of the volunteering teachers represented a different content area and included English (Classroom Observation 1), Anatomy (Classroom Observation 2), and AP Biology (Classroom Observation 3). As a result of the request to volunteer, the teacher in Classroom Observation 1 altered the lesson plan to include the use of the BYOD program. Classroom Observations 2 and 3 described their classrooms as BYOD classes and the observation occurred without changed lesson plans.

Validity of the content of all three aspects of the study was determined by the individual interviews and discussions with the administrators of the pilot-study school. Each component was reviewed individually and then again in combination with the other components. As a result of the interviews and discussions, survey and interview questions were later omitted, added, and/or reworded in an attempt to make the study more comprehensive user-friendly.

An analysis of the data collected during the study was used to address the following research questions:

1. What are the perceptions of 10th-grade cross-curricular educators and students regarding BYOD programming in the educational setting?

    a. What are the perceptions of 10th-grade teachers regarding BYOD programming?

    b. What are the perceptions of 10th-grade students regarding BYOD programming?

    c. Is there a difference in the perceptions of educators and students regarding BYOD programming?

2. At what frequency are 10th-grade educators and students utilizing a BYOD program in their classes?

a. At what frequency are 10th-grade teachers utilizing BYOD programming in their classes?

   b. At what frequency are 10th-grade students utilizing BYOD programming in their classes?

   c. Is there a difference in the frequency of utilizing BYOD programming in classes between educators and students?

3. How are 10th-grade educators and students utilizing a BYOD program in their classes?

   a. How are 10th-grade teachers utilizing BYOD programming in their classes?

   b. How are 10th-grade students utilizing BYOD programming in their classes?

   c. Is there a difference in how educators and students are utilizing BYOD programming in their classes?

4. What types of devices are being utilized by 10th-grade educators and students in a BYOD program?

   a. What types of devices are being utilized by 10th-grade teachers in a BYOD program?

   b. What types of devices are being utilized by 10th-grade students in a BYOD program?

   c. Is there a difference in the types of devices being utilized by educators and students in a BYOD program?

Data collected from all three aspects of the case study were first coded and analyzed as a stand-alone component of either the interview, observation, or survey and then coded again as part of the case study as a whole. The researcher looked for concurrent themes and trends as the data of the three components were reviewed and summarized to address the research questions.

The results of each component are detailed in this chapter and presented first by the data collected for each study component and then by a brief summary of the data. Additional comments and discussions will be presented in Chapter 5.

Interview Results

All interview data were collected in response to a prepared Interview Protocol (Appendix C) and a signed Informed Consent Document for students (Appendix D). The teachers provided consent through email correspondence with the researcher. All conversations were collected through note-taking, and responses were read back to the interviewee to ensure that exact meanings and phrases were captured. This allowed the teachers and students to expand upon their responses and to clarify comments. Each interview session began with a brief synopsis of the study and the importance that the responses be honest. It was shared that all responses would be coded in an attempt to identify common themes and that there would be no data identifying the participants attached to the comments.

Statements and phrases were transcribed onto color-coded index cards according to whether the respondent was a teacher or a student and attached to the corresponding interview question. The comments were then further reviewed to identify common words used to express intent. Notes were also taken based on the body language of the student interviewees as well as comments made by both target groups that were not associated with direct interview questions. Common themes were identified in each target group and then compared, by interview question, to each other to determine any identifiable common themes. Themes included common words or phrases and were generalized into either negative or positive reactions.

Data collected from the teacher interviews produced the common themes of frustration, lack of organization, and an overall feeling that had they received insufficient training prior to

implementation of the BYOD program. When compared to the responses of 10th-grade

volunteer students, the reactions were somewhat different. Student interviews presented

responses such as collaborative, easier, and adapting. Table 17 lists themes derived from the

interview questions and responses.

Table 17

Interview Results

QUESTION	TEACHER	STUDENT
IQ1: What was your initial reaction to BYOD programming?	T1: *"Saw the value"* T2: *"Not surprised – knew it was what the superintendent wanted"* T3: *"Negative – thought it was a bad idea"* T4: *"Not too alarming"* T5: *"Supportive – great idea"* A1: *"Positive feedback"* A2: *"Excited, but getting into something we didn't understand"*	S1: *"Cool but probably wouldn't last"* S2: *"Excited/happy to use my phone"* S3: *"Confused – not sure what it meant"* S4: *"Asked if it was a joke"* S5: *"Super excited to use my own phone"* S6: *"We already use our phones so why not incorporate it into our classes"*
IQ2: How are you using mobile devices in your class?	T1: *"Google classroom/docs"* T2: *"Not implementing in 2 classes"* T3: *"Research"* T4: *"Quizlet – vocabulary in Notes:* T5: *"Mainly research"* A1: *"Remind 101"* A2: *"Math apps – research"*	S1: *"Chemistry is mostly online"* S2: *"Just for research"* S3: *"Multiple apps – calculator/notes/research"* S4: *"French class for word references"* S5: *"Using it all the time in Journalism and Chemistry:* S6: *"Tests/quizzes/teacher notes posted online"*
IQ3: What do you feel the benefits of BYOD programming are?	T1: *"Quick feedback"* T2: *"Hands on"* T3: *"Saves money"* T4: *"Quick access to information"* A1: *"Active engagement – better lessons"* A2: *"Better student engagement"*	S1: *"Students feel comfortable with their own devices"* S2: *"Everything you need to know is right at your hand"* S3: *"It's easier – convenient – teachers are sending assignments through our email"* S4: *"Learning at my fingertips – no waiting"*

		S5: "Easier to do research – no papers"
		S6: Easier – typing is quicker than writing"
IQ4: Describe the challenges you have encountered integrating BYOD programming?	T1: "Students misunderstood the policy" T2: "Lack of technology in the classrooms" T3: "Distractions – lack of focus" T4: "Cheating: T5: "Some students find it impossible to ignore their phones: A1: "Total buy in" A2: "Discipline"	S1: "Getting used to it was tough but now it's cool" S2: "Some students are just using it when they shouldn't be" S3: "Teachers keeping some kids on task – batteries die and some teachers don't allow you to use the outlets" S4: "Sometimes I wander and just text my friends" S5: "Some kids still take advantage" S4: "Some students are abusing it – they still just text or playing games"
IQ5: How have your teaching style/strategies changed since implementing BYOD? (T) **How has your learning style changed since implementing BYOD? (S)**	T1: "I can do a lot more – still growing" T2: "No real difference" T3: "I really haven't changed" T4: "Tested area – not allowed" T5: "Only allowed for notes" A1: "Old school teaching – not much change" A2: "Not really changing – becoming more comfortable"	S1: "I use a lot of study app but other than that, I haven't really changed" S2: "Using Google docs/apps a lot more" S3: "I focus more on the lecture instead of taking notes because my teacher forwards her presentations to us" S4: "I don't use a paper planner – everything is on my phone" S5: "My phone is my prized possession – everything is on it to make studying easier" S6: "I've always used it – I'm busy with school, work, and sports so having the ability to do my homework anywhere really helps"
IQ6: What impact do you think BYOD programming has had on your student's educational experience? (T) **What impact do you think BYOD programming has had on your educational experience? (S)**	T1: "Increased teacher/student communication" T2: "Free for all" T3: "Negative impact – it's reality but it's not working" T4: "Not focused – easily distracted" T5: "Not a positive experience – constantly on their phones: A1: "Believing that students are respecting the rules"	S1: "It's better – we're learning new things" S2: "I'm so used to using my phone – I don't remember what it was like to not use it" S3: "Our generation is so tech savvy – it's just easier" S4: "Some kids are still using it the wrong way but it's made me more responsible" S5: "It's making high-school more memorable – my parents said that I'm

	A2: *"Students are more engaged"*	*really lucky"*
		S6: *"It's 2015, we use our phones 24/7 – it makes our lives easier"*
IQ7: How has BYOD programming affected of your teaching functions? (T) **How do you think BYOD programming has affected of your teachers? (S)**	T1: *"Continuing to grow"* T2: *"Found multiple lessons to use"* T3: *"Regulating and monitoring more"* T4: *"I liked the former policy"* T5: *"It's still at my discretion"* A1: *"Teachers are more actively engaged"* A2: *"Teachers are making a big difference – students are proud"*	S1: *"Some teachers still don't allow it – some of my teachers are stressed"* S2: *"Not all of them have changed but some are very computer driven"* S3: *"Making their classes easier – one teacher used voice overs and it was great"* S4: *"Some are all for it and some are against it – they need to look at the bigger picture, we benefit from it"* S5: *"Younger teachers use more technology – for the older teachers, it's a process"* S6: *"A lot are struggling – I actually took Chemistry because the teacher's technology"*
IQ8: What are your beliefs regarding "equality" amongst your students? (T) **What is your perception regarding "equality" amongst your peers? (S)**	T1: *"Not sure how to make it equal"* T2: *"Allowed to work with a partner if quiet"* T3: *"Main reason that I don't want to do it"* T4: *"Haven't faced it in my class"* T5: *"Collaboration with peers"* A1: *"Allows students to work collaboratively"* A2: *"Increased collaboration"*	S1: *"Some teachers will print the assignments if you don't have a device"* S2: *"We work in groups"* S3: *"There are devices in class that we can use"* S4: *"It really isn't a problem – we all have phones"* S5: *"We share and collaborate on assignments"* S6: *"Some kids use the old computers or we just share and work together"*
IQ9: How do you respond to "inappropriate" on-line behavior? (T) **How do your teachers respond to "inappropriate" on-line behavior? (S)**	T1: *"Not often in my classes"* T2: *"Haven't seen it my classes"* T3: *"No experience with it – I would refer to administration"* T4: *"Only had 1 experience – I contacted the parent"* T5: *"Haven't dealt with it in my classes"* A1: *"Teachers still have control in their classes and can refer to administration"* A2: *"Privileges can be briefly revoked:*	S1: *"I don't know of any in my classes"* S2: *"Teachers give a warning – it's only allowed on green"* S3: *"Not a problem in my classes"* S4: *"Some teachers don't know what's going on but I think it can be easily monitored"* S5: *"Teachers give reminders – we have minor and major offenses"* S6: *"Not really a big issue"*

IQ10: How have you changed following the implementation of BYOD programming?	T1: "More daring" T2: "Haven't changed but interested in changing" T3: "Not fighting as much but not fully embracing" T4: "Not really changed – it's still my discretion" T5: "Giving the students greater ownership: A1: "Teachers are taking more risks" A2: "Better with using programs to check homework and assignments:	S1: "School revolves around Google classroom – it's preparing me for college. S2: "I don't think I'm paying attention as much as I can – I'm lazier" S3: "I'm more organized – I can complete my homework and email my teachers by checking my phone" S4: "I have the ability to do more on the run" S5: "I'm taking school more seriously – I'm more responsible: S6: "Personally, my grades have gone up – text to speech makes poetry more enjoyable"
IQ11: How do you think your students have changed following the implementation of BYOD programming? (T) How do you think your teachers have changed following the implementation of BYOD programming? (S)	T1: "Students are more tech savvy" T2: "More daring – no longer sneaking the device" T3: "Students love BYOD but it's a huge distraction" T4: "Too much freedom with social media" T5: "Communicating more with me" A1: "Students love using their own devices" A2: "Greater ownership of their education"	S1: "Some have changed but some really haven't changed" S2: "Some are becoming more aware of what's out there to use" S3: "Teachers are more prepared – they don't leave things at home" S4: "Incorporating technology more – finding more references" S5: "They need to get used to it – it's amazing" S6: "They're adjusting"
IQ12: What is your overall perception of BYOD programming today?	T1: "Has value – potential" T2: "Can benefit both teachers and students" T3: "Better regulations are needed" T4: "I'm not against it – there's a time and a place for phones" T5: "I like the option of using or not using it" A1: "Moving in the right direction" A2: "Benefitting both teachers and students – we need more professional development"	S1: "Schools should give it a chance – there are so many options" S2: "It's so beneficial" S3: "It's improved – convenient – it really helps" S4: "It should be regulated – it really made me more responsible" S5: "It's a great program is you don't abuse it – it's really helpful if you allow it to be" S6: "It really does help using what we already use outside of school"
Additional Comments:	T1: "More tech training needed"	S2: "We've grown up with technology – we should use it"

T2: *"Upgrade district technology"*	S1: *"I feel better prepared"*
T4: *"Implemented because it was too hard for administration to implement old policy"*	S6: *"Teachers are adjusting to this generation"*
T5: *"Better roll-out would have helped"*	S4: *"Better policy might help"*

Note: Interview questions were the same for each target group unless indicted by T (teacher interview only) or S (student interview only).

A further look at the interview responses showed recurring themes in responses to Interview Question (IQ) 1 – *What was your initial reaction to BYOD programming?* Responses of both groups expressed negative initial reactions and were verbalized as being *"concerned"* (T1)*,* that the program was *"a joke"* (S4) and that the program's implementation *"wasn't explained well"* (A2) and *"probably wouldn't last"* (S1). When prodded to expand upon their responses, none of the respondents with negative reactions had expressed their concern directly to district administration, while those in favor of the program stated that they had. A counter-reaction of positive responses from both groups included statements such as, *"I saw the value"* (T1)*, "excited"* (S2) and *"why not use technology in school since we already use it 24/7"* (S6). Several of the teachers responded that they were *"not surprised"* (T2), nor were they *"alarmed,"* (T4) with the implementation since they knew that the district superintendent wanted to move in that direction. Several responses could be categorized as unsure or neutral, including comments such as, *"curious"* (A1)*, "confused"* (S3), and number of the interviewees responded with *"unsure how it would work"* (A2)*.* When asked to expand upon their answers, both teachers and students responded that the program *"just happened"* (T4) and that they *"weren't really sure how it was going to play out"* (A1)*.*

When asked about challenges encountered with implementation of BYOD programming (IQ4), there was a common theme of negative reactions such as *"a need for a realistic policy"* (T5) and a *"lack of focus"* (T3), with responsibility of program monitoring being shifted to the

teachers and the students rather than building administration. Two of the teachers responded that their biggest challenge was *"giving up control"* (T2) of the classroom and the fear of having *"students knowing more"* (T1) than they did. Several of the students mirrored those responses by stating that *"teachers need to be more daring"* (S1) and may need *"to prepare more"* (S2) in order to keep pace with the students' knowledge. The students also realized that they needed to take on more responsibility and sometimes *"fight the urge to text friends"* (S3) during class instruction.

When comparing their initial reactions to their reactions today (at the end of the 2014-15 school year) regarding BYOD programming (IQ 12: *What is your overall perception of BYOD programming today?),* the comments were less negative but still unsure or neutral. Respondents from both target groups stated that the current BYOD program was *"much improved"* (S3) but needed *"clearer expectations"* (T5) and *"should be more regulated"* (T3)*.* Members of both groups stated that the program was *"beneficial"* (S2) and *"provided so many options"* (S1), but they felt that there was *"a time and a place for phones"* (S4) and that phones can *"really be helpful if you allow them to be"* (S5) because students are *"using what they already know"* (S6).

Both target groups were asked how students have changed as a result of BYOD programming (IQ 10 – students and IQ 11 – teachers). The responses offered by both groups were similar only in that they stated that the students have *"increased communication"* (T1) and appear to be *"more responsible"* (S5) and *"organized"* (S3) when discussing homework. One student responded that her *"study habits have changed"* (S4), while another felt that she was *"preparing for college"* (S1). None of the teacher responses indicated a positive change in the students or an indication of life activities outside of high school. All comments were stated in

relation to current conditions and included phrases such as, students are *"more daring"* (T1) and have *"too much freedom"* (T4).

When both groups were asked how teachers have changed in response to BYOD programming (IQ 11 – students and IQ 10 – teachers), the responses were very similar. Both students and teachers responded that some *"haven't changed"* (S1) but some *"are becoming more aware"* (S2) of what is available and are becoming *"more daring"* (T1). Two of the comments were complete opposites in that a teacher responded that she was *"not fully embracing the program and really doesn't want to change"* (T3) while a student responded that she purposely *"scheduled a class based on the teacher's increased use of technology"* (S6). This student felt that the *"younger teachers adapted well"* (S3), while another student stated that the teachers had a *"better understanding of what we* [students] *need"* (S4). The responses indicated that the students were much more willing to accept teacher change than the teachers in embracing student change.

Both target groups were afforded the opportunity to provide additional comments in response to BYOD programming. An underlying theme of negativity involving a lack of responsibility was identified in the teacher responses by comments such as *"more training needed"*(T1)*, "district needs to take back the monitoring of phones – I just want to teach"*(T3)*,* and *"the district should have prepared better"* (A1). The students appeared to embrace change and want to assist in moving the district further into technology: *"we've grown up with technology – so many options"* (S1)*, "it's 2015 – everyone has a phone, even the teachers"* (S6)*,* and *"maybe this will help the teachers adjust to this generation"* (S4). When questioned further, all six student respondents said that the program is *"beneficial"* (S2) and that they understood

that *"boundaries were needed"* but that *"this is the way we* [students] *live – why not meet us* [students]*"* (S6*).*

The interviews offered a more personal response to the research questions and provided data that could not be obtained through an anonymous online survey. The interview process helped the researcher to probe more deeply into responses and allowed the respondents to freely share their feelings in a non-threatening manner. All interview responses were coded first by group (student – teacher) than again as a combined group in an attempt to identify common themes and comments.

Classroom Observations

Classroom observations were conducted utilizing a researcher-developed observation tool (Appendix E) and consisted of a total of three complete classes with an approximate duration of 45 minutes each. All observations were scheduled by the building administrator and based on each teacher's willingness to participate. The classroom observations were directly correlated to research question 3 (How are 10th-grade educators and students utilizing a BYOD program in their classes?). The observations were based upon the ISTE Standards (2014), which list specific identifiable characteristics for both teachers and students. The percentage of the frequency of observable traits is detailed in Table 18.

Table 18

Observation (ISTE) Results

ISTE Standard - Teacher	*Frequency*	*ISTE Standard - Student*	*Frequency*
*Facilitate/inspire student learning and creativity.	3/3 (100)	*Creativity and innovation	2/3 (66)
*Design/develop digital learning experiences and assessments.	2/3 (66)	*Communication and collaboration.	2/3 (66)

*Model digital age work and learning.	1/3 (33)	*Research and information fluency.	3/3 (100)
*Promote/model digital citizenship and responsibility.	3/3 (100)	*Critical thinking/ problem solving/ decision making.	3/3 (100)
*Engage in professional growth and leadership.	2/3 (66)	*Digital citizenship.	3/3 (100)
		*Technology operations and concepts.	1/3 (33)

Note: All observations were conducted using a researcher created observation tool. Numbers in parentheses represent relative frequencies in percent

An analysis of Time-on-Task (TOT) was conducted by observing two random students at identical 10 minute intervals throughout the class period. Table 19 details the TOT data collected during each of the classroom observations.

Table 19:

Time-on-Task (TOT)

Classroom Observation	Student 1 (Male/Female) Device (Yes/No)	Student 2 (Male/Female) Device (Yes/No)	TOT	Number of Activity Transitions
1	F	M	4/5 (80)	4
	Y	N	4/5 (80)	
2	F	M	2/5 (40)	3
	N	Y	5/5 (100)	
3	M	F	5/5 (100)	1
	N	N	5/5 (100)	

Note: Numbers in parentheses represent relative frequencies in percent

When reviewing the data, it is important to note that the classroom observations were strictly on a volunteer basis, with one teacher (Classroom Observation 1) purposely altering her lesson plan to demonstrate the use of technology in her classroom. It should also be noted that one classroom observation (Classroom Observation 3) presented with 100% TOT because every student was involved in an individual project with no opportunity for collaboration or

conversation. The use of personal mobile devices was not permitted in this class, and all work was completed on district-provided laptops.

The opportunity to participate in classroom observations provided the researcher with a first-hand account of how programming was used in the classes. It also provided the researcher with the insight that BYOD programming presented differently in each of the three classes. Classroom Observation 1 fully embraced the use of personal mobile devices by allowing students to briefly leave class to retrieve devices from their lockers, while Classroom Observation 2 presented a hybrid acceptance of personal devices by allowing students to utilize their devices if they had them to complete their group assignments. If students did not have a personal device with them, they were allowed to use a district laptop. Classroom Observation 3, once again, did not allow personal devices to be used. When the individual teachers were engaged in conversation, each stated a personal definition of what BYOD programming looks like in their classes. Teacher 1 said, *"It's a learning experience for all of us – I'm getting better, and the kids are helping me."* A contrasting definition was identified in the comments of Teacher 2 and Teacher 3, which indicated that there was a difference in what BYOD programming should look like in their classes. Teacher 2 allowed students to work collaboratively in groups and said, *"I'm excited – I want them to take the lead to demonstrate what they know in ways they never used before."* But the teacher also said that *"so far, I'm a little disappointed – they're being too safe."* Teacher 3 responded that with BYOD programming, she wanted *"the control of what they do"* and *"I typically don't allow devices, but I want them to use technology, so I make sure the laptops work."* While each teacher favored the use of technology, not all expressed a consistent working definition of what the BYOD program was or how it should be incorporated into the traditional high-school.

Survey Results

Survey results were collected through an online survey tool (SurveyMonkey) to allow the participants to respond in anonymously. Frequency counts and relative frequencies were conducted on the results of the survey as a means to address each research question.   Table 20 outlines demographics and frequencies by group.

Table 20

Frequency Counts and Relative Frequencies by Group (Students and Teachers) for Demographic Variables

Variable	Frequency	
	Group	
	Students	Teacher
Gender		
Male	39 (49%)	5 (38%)
Female	40 (51%)	8 (62%)
Service (in years)		
<4		1
4-10		6
11-20		5
21-30		0
30+		1
Position		
Teacher		11
Administration		2
Type		
General Education		6
Specialty Education		7
Degree		
Bachelors		2
Bachelors +24		2
Masters/Masters Equivalent		5
Masters +30		4

Table 20 reports the total number of survey participants broken down by group (students and teachers (including administration)) as well as gender. The Teacher group was further dissected by Years of Service, Position, Type of Education (general education or specialty

education), as well as Level of Education as outlined in the district's collective bargaining agreement. Demographics were collected to allow the researcher insight into survey participants but provided no input in answering the research questions that drove the case study. Information collected in Table 18 may be of interest in determining whether gender, position, type of education, area of specialty, years of service, and/or level of education were identified variables regarding perception and use of BYOD programming. For the purpose of this case study, the information was collected solely to give the researcher familiarity with the respondents.

A review of the data collected from the survey in reference to research questions 1-4 is provided below and is presented in accordance with the corresponding research question.

RQ #1: What are the perceptions of 10th-grade cross-curricular educators and students regarding BYOD programming in the educational setting?

In reviewing survey questions as they related to perception, survey questions 1, 2, 3, and 4 of the teachers' survey and questions 1, 2, 3, and 5 of the students' survey are represented in Table 21.

Table 21

Frequency Counts and Relative Frequencies by Group (Students and Teachers) for Perception Survey Items

Variable	Frequency	
	Group	
	Student	Teacher
Q 1		
Definitely did not alter	6 (8)	4 (31)
Altered minimally	0 (0)	4 (30)
Unsure	21 (27)	1 (8)
Somewhat altered	30 (38)	3 (23)
Altered greatly	22 (28)	1 (15)
Q 2		
Extremely unconcerned	10 (13)	0 (0)
Slightly unconcerned	9 (11)	5 (39)

Unsure	20 (25)	3 (23)
Slightly concerned	22 (28)	3 (23)
Extremely concerned	18 (23)	2 (15)
Q 3		
Extremely unsupportive	3 (4)	6 (46)
Somewhat unsupportive	2 (3)	3 (23)
Unsure	4 (5)	0 (0)
Somewhat supportive	19 (24)	4 (31)
Extremely supportive	51 (65)	0 (0)
Q 5a/4a		
Extremely disorganized	10 (13)	8 (62)
Somewhat disorganized	4 (5)	3 (23)
Unsure	17 (22)	1 (8)
Somewhat organized	19 (24)	1 (8)
Extremely organized	29 (37)	0 (0)
Q 5b/4b		
Extremely ineffective	1 (1)	8 (62)
Somewhat ineffective	2 (3)	2 (15)
Unsure	17 (22)	1 (8)
Somewhat effective	20 (25)	2 (15)
Extremely effective	39 (49)	0 (0)
Q 5c/4c		
Extremely inefficient	1 (1)	6 (46)
Somewhat inefficient	1 (1)	4 (31)
Unsure	16 (20)	1 (8)
Somewhat efficient	23 (29)	2 (15)
Extremely efficient	38 (41)	0 (0)
Q 5d/4d		
Extremely difficult to implement	1 (1)	9 (69)
Somewhat difficult to implement	5 (6)	0 (0)
Unsure	24 (30)	1 (8)
Somewhat easy to implement	15 (19)	3 (23)
Extremely easy to implement	34 (43)	0 (0)
Q 5e/4e		
Extremely costly	1 (1)	2 (15)
Somewhat costly	0 (0)	0 (0)
Unsure	27 (34)	1 (8)
Somewhat cost efficient	9 (11)	1 (8)
Extremely cost efficient	42 (53)	9 (69)
Q 5f/4f		
Extremely not beneficial to students	1 (1)	5 (39)
Somewhat not beneficial to students	1 (1)	3 (23)
Unsure	6 (8)	2 (15)
Somewhat beneficial to students	16 (20)	1 (8)
Extremely beneficial to students	55 (70)	2 (15)

Note: Numbers in parenthesis represent relative frequencies in percent. Q number represents the corresponding number of the Student and Teacher survey question.

Table 21 is representative of responses that addressed (Appendices A and B):

Q1: Do you believe that you have altered your learning strategies [student survey]/instructional strategies [teacher survey] as a result of BYOD programming?

Q2: How concerned are you that you will be unable to compete on a global level academically if BYOD programming was eliminated [student survey]?

How concerned are you that you will be unable to keep up curricula and instructional changes essential to a BYOD program [teacher survey]?

Q3: How supportive are you of BYOD programming?

Q5/4: How strongly do you identify with the BYOD's level of organization, effectiveness, efficiency, implementation, cost, and level of benefit to students?

The responses presented in Table 21 indicate that the students had a more favorable perception of BYOD programming than the teachers. The students responded that they were more supportive of the program and believed that the program in general was organized, effective, efficient, easy to implement, and beneficial to their needs. In contrast to each of the categories cited, the teachers believed that the BYOD program was disorganized, ineffective, inefficient, difficult to implement, and was not beneficial to the students. Both target groups agreed that the program was cost efficient to operate (students 64%; teachers 77%).

RQ #2: At what frequency are 10th-grade educators and students utilizing a BYOD program in their classes?

Table 22 represents frequency counts and relative frequencies by group as gathered from survey questions 6, 7, and 8 of the students' survey and questions 5, 6, and 7 of the teachers' survey.

Table 22:

Frequency Counts and Relative Frequencies by Group (Students and Teachers) for Frequency Survey Items

Variable	Frequency	
	Group	
	Students	Teachers
Q 6/5		
Never	1 (1)	2 (15)
<5 x/month	8 (10)	7 (54)
6-15 x/month	9 (11)	4 (31)
16-25 x/month	8 (10)	0 (0)
Daily	53 (67)	0 (0)
Q 7/6		
Never	8 (10)	3 (23)
<5 x/month	24 (30)	6 (46)
6-15 x/month	26 (33)	4 (31)
16-25 x/month	10 (13)	0 (0)
Daily	11 (14)	0 (0)
Q 8/7		
Never	4 (5)	4 (31)
<5 x/month	16 (20)	7 (58)
6-15 x/month	18 (23)	2 (15)
16-25 x/month	14 (18)	0 (0)
Daily	27 (34)	0 (0)

Note: Numbers in parenthesis represent relative frequencies in percent. Q number represents the corresponding number of the Student and Teacher survey question.

The survey questions (Appendices A and B) represented in Table 6 were:

Q 6/5: How often do you utilize mobile devices?

Q 7/6: How often have your teachers altered the way they teach [student survey]?

How often have you utilized mobile devices to enhance the curriculum [teacher survey]?

Q 8/7: How frequently have you altered your learning style [student survey]/instructional style

[teacher survey] as a result of BYOD programming?

Table 6 represents the daily use of mobile devices by students (67%), compared to the

use of mobile devices by a majority of the teachers (85%) being only five to 15 times per month.

Students also responded that they altered their learning strategies significantly (75% - > 6 times

per month) more frequently than their teachers altered their instructional strategies (15% - > 6

times per month). Both target groups responded that the teachers utilized mobile devices in the

way they teach less than 15 times per month (students 73%; teachers; 100%).

Table 23 presents the results of descriptive statistics and *t*-test comparisons for survey questions related to perception and frequencies.

Table 23

Descriptive Statistics and t-Test Comparisons for Perceptions and Frequencies

Variable	N	Mean	Std. Deviation	t-Score	F-Ratio	p-Value
Perceptions					0.19	.000
Students	79	4.04	0.67	7.97		
Teachers	13	2.38	0.80	7.03		
Frequencies					2.19	.000
Student	79	3.59	0.91	5.93		
Teachers	13	2.03	0.67	7.35		

Note: The *F*-Ratios are the values for the tests for variance homogeneity between the group levels (students or teachers), and *p*-values are for the *t*-scores.

On a Likert Scale of 1-5, a mean of 4.04 for the student responses indicates that the students have a more favorable perception of BYOD programming as compared to a mean of 2.38 for teachers as a favorable perception. In the area of frequency of use, the students responded with a mean of 3.59, indicating a higher level of frequency as compared to the teachers' mean of 2.03, which is implicative of a lesser frequency of use of mobile devices.

RQ 3: How are 10th-grade educators and students utilizing BYOD programming in their classes?

Tables 24, 25, and 26 represent the frequency counts and relative frequencies for utilization. Data represent responses to student survey questions 10-12 and teacher questions 9-11.

Table 24

Frequency Counts and Relative Frequencies by Group (Students and Teachers) for Utilization Survey Items (1)

Variable	Frequency
	Group

	Students	Teachers
Q 10a/9a		
Assigned	3 (4)	5 (39)
Not assigned	76 (96)	8 (62)
Q 10b/9b		
Assigned	45 (57)	12 (92)
Not assigned	34 (43)	1 (8)
Q 10c/9c		
Assigned	33 (42)	7 (54)
Not assigned	46 (58)	6 (46)
Q 10d/9d		
Assigned	26 (33)	7 (54)
Not assigned	53 (67)	6 (46)
Q 10e/9e		
Assigned	57 (72)	10 (77)
Not assigned	22 (28)	3 (23)
Q 10f/9f		
Assigned	56 (71)	13 (100)
Not assigned	23 (29)	0 (0)
Q 10g/9g		
Assigned	56 (71)	11 (85)
Not assigned	23 (29)	2 (15)
Q 10h/9h		
Assigned	42 (53)	12 (92)
Not assigned	37 (47)	1 (8)
Q 10i/9i		
Assigned	42 (53)	12 (92)
Not assigned	37 (47)	1 (8)
Q 10j/9j		
Assigned	68 (86)	13 (100)
Not assigned	11 (14)	0 (0)
Q 10k/9k		
Assigned	11 (14)	6 (46)
Not assigned	67 (86)	7 (54)
Q 10l/9l		
Assigned	26 (34)	7 (54)
Not assigned	51 (66)	6 (46)
Q 10m/9m		
Assigned	59 (78)	10 (77)
Not assigned	17 (22)	3 (23)
Q 10n/9n		
Assigned	37 (47)	9 (69)
Not assigned	41 (53)	4 (31)

Note: Numbers in parentheses represent relative frequencies in percent. Q number represents the corresponding number of the Student and Teacher survey question.

Table 25

Frequency Counts and Relative Frequencies by Group (Students and Teachers) for Utilization Survey Items (2)

Variable	Frequency	
	Group	
	Students	Teachers
Q 11a/10a		
Not used in class	13 (47)	9 (69)
Used in class	66 (84)	4 (31)
Q 11b/10b		
Not used in class	8 (10)	6 (46)
Used in class	71 (90)	7 (54)
Q 11c/10c		
Not used in class	16 (20)	5 (39)
Used in class	63 (80)	8 (61)
Q 11d/10d		
Not used in class	74 (94)	13 (100)
Used in class	5 (6)	0 (0)
Q 11e/10e		
Not used in class	61 (77)	9 (69)
Used in class	18 (23)	4 (31)
Q 11f/10f		
Not used in class	66 (84)	12 (92)
Used in class	13 (17)	1 (8)
Q 11g/10g		
Not used in class	75 (95)	13 (100)
Used in class	4 (5)	0 (0)
Q 11h/10h		
Not used in class	69 (87)	13 (100)
Used in class	10 (13)	0 (0)
Q 11i/10i		
Not used in class	73 (92)	13 (100)
Used in class	6 (8)	0 (0)
Q 11j/10j		
Not used in class	67 (85)	12 (92)
Used in class	12 (15)	1 (8)
Q 11k/10k		
Not used in class	76 (96)	13 (100)
Used in class	3 (4)	0 (0)
Q 11l/10l		
Not used in class	76 (96)	13 (100)
Used in class	3 (4)	0 (0)
Q 11m/10m		
Not used in class	76 (96)	8 (62)
Used in class	3 (4)	5 (39)

Note: Numbers in parentheses represent relative frequencies in percent. Q number represents the corresponding number of the Student and Teacher survey question.

Table 26

Frequency Counts and Relative Frequencies by Group (Students and Teachers) for Utilization Survey Items (3)

Variable	Frequency	
	Group	
	Students	Teachers
Q 12a/11a		
Not used in class	76 (96)	13 (100)
Used in class	3 (4)	0 (0)
Q 12b/11b		
Not used in class	75 (95)	12 (92)
Used in class	4 (5)	1 (8)
Q 12c/11c		
Not used in class	76 (96)	13 (100)
Used in class	3 (4)	0 (0)
Q 12d/11d		
Not used in class	76 (96)	12 (92)
Used in class	3 (4)	1 (8)
Q 12e/11e		
Not used in class	77 (98)	13 (100)
Used in class	2 (3)	0 (0)
Q 12f/11f		
Not used in class	77 (98)	13 (100)
Used in class	2 (3)	0 (0)
Q 12g/11g		
Not used in class	76 (96)	12 (92)
Used in class	3 (4)	1 (8)
Q 12h/11h		
Not used in class	50 (63)	10 (77)
Used in class	29 (37)	3 (23)
Q12i/11i		
Not used in class	77 (98)	13 (100)
Used in class	2 (3)	0 (0)
Q 12j/11j		
Not used in class	16 (20)	6 (46)
Used in class	63 (80)	7 (54)
Q 12k/11k		
Not used in class	73 (92)	12 (92)
Used in class	6 (8)	1 (8)
Q 12l/11l		
Not used in class	16 (20)	6 (46)
Used in class	63 (80)	7 (54)
Q 12m/11m		
Not used in class	74 (94)	8 (67)
Used in class	5 (6)	4 (33)

Tables 24, 25, and 26 were constructed from survey questions (Appendices A and B) that addressed the following:

Q 10a-m/9a-m: What types of assignments/activities have been assigned in your class?

Q 11a-m/10a-m: What applications have you allowed for projects and/or presentations in your class?

Q 12a-m/11a-m: Which applications have you used in your classes?

A brief explanation of Tables 24, 25, and 26 is that data indicate that a variety of assignments/activities and applications are not being utilized in classes by either target group. Student and teacher responses presented data that identified a lack of variety in regard to assignments/activities as well as a lack of variety of applications utilized in the classroom setting.

An additional review of the types of activities being conducted in the BYOD program is further reviewed in Tables 27 and 28, which have a direct correlation to the classroom observations. Table 27 presents the data in relationship to student survey question 9 (Appendix B) and Table 28 is in response to teacher survey question 8 (Appendix A). Both tables relate to the International Society for Technology in Education standards for students and teachers (ISTE, 2014). Student responses totaled 78, with one student skipping the question. All 13 teachers responded.

Table 27

ISTE - Students

STUDENTS (78)

Variable	Frequency				
	Never	**< 5x/month**	**6-15 x/month**	**16-25 x/month**	**Daily**
Creativity and innovation	7 (9)	13 (17)	16 (21)	17 (22)	25 (32)
Communication and collaboration	5 (4)	10 (13)	18 (23)	12 (15)	33 (42)
Research and information fluency	4 (5)	8 (10)	11 (14)	15 (19)	40 (51)
Critical thinking/problem solving/decision making	7 (9)	10 (13)	16 (21)	15 (19)	30 (38)
Digital learning	12 (16)	18 (23)	11 (13)	11 (14)	26 (34)
Technology operations and concepts	7 (9)	17 (22)	14 (18)	17 (22)	23 (30)

Note: Numbers in parentheses represent relative frequencies in percent.

Table 28

ISTE - Teachers

Teachers (13)

Variable	Frequency				
	Never	**< 5 x/month**	**6-15 x/month**	**16-25 x/month**	**Daily**
Facilitated/inspired your students' learning and creativity	4 (31)	6 (46)	3 (23)	0 (0)	0 (0)
Designed/developed digital learning experiences and assessments	5 (39)	6 (46)	1 (8)	0 (0)	1 (8)
Modeled digital age work and learning	5 (39)	6 (46)	1 (8)	0 (0)	1 (8)
Promoted/modeled digital citizenship and responsibility	5 (39)	3 (23)	1 (8)	2 (15)	2 (15)
Engaged in professional growth and leadership	6 (46)	4 (31)	0 (0)	3 (23)	0 (0)

Note: Numbers in parentheses represent relative frequencies in percent.

The students responded that they were being challenged and indicated that they were

touching upon each of the six characteristics identified by ISTE at a rate of 16+ times per month:

creativity and innovation – 54%; communication and collaboration – 57%; research and

information fluency – 70%; critical thinking/problem solving/decision making – 57%; digital

learning – 48%; and technology operations and concepts – 52%. The teacher responses were not

as favorable in respect to the ISTE standards with all five of the standards occurring less than

five times per month: facilitated/inspired students' learning and creativity – 77%;

designed/developed digital learning experiences and assessments – 85%; modeled digital age

work and learning – 85%; promoted/modeled digital citizenship and responsibility – 62%; and

engaged in professional growth and leadership – 77%.

Table 29 reports on the analysis of frequency counts and relative frequencies by group for

the types of devices used. The results correspond to student survey question 13 and teacher

survey question 12 (Appendices A and B).

Table 29

Frequency Counts and Relative Frequencies by Group (Students and Teachers) for Devices Survey Items

Variable	Frequency	
	Group	
	Students	Teachers
iPod Touch		
Use personally	18 (23)	2 (15)
Don't use personally	61 (77)	11 (85)
Use professionally	9 (7)	0 (0)
Don't use professionally	70 (89)	13 (100)
iPhone		
Use personally	49 (62)	10 (77)
Don't use personally	30 (38)	3 (23)
Use professionally	43 (54)	8 (62)
Don't use professionally	36 (46)	5 (39)
Android Smartphone		
Use personally	17 (22)	3 (23)
Don't use personally	62 (79)	10 (77)
Use professionally	17 (22)	2 (15)
Don't use professionally	62 (79)	11 (85)
Windows Phone		
Use personally	3 (4)	0 (0)
Don't use personally	76 (96)	13 (100)

Use professionally	1 (1)	0 (0)
Don't use professionally	78 (99)	13 (100)
iPad		
Use personally	21 (27)	9 (69)
Don't use personally	58 (73)	4 (31)
Use professionally	10 (13)	6 (46)
Don't use professionally	69 (87)	7 (54)
Android Tablet		
Use personally	4 (5)	1 (8)
Don't use personally	75 (95)	12 (92)
Use professionally	3 (4)	1 (8)
Don't use professionally	76 (96)	12 (92)
Kindle Fire		
Use personally	8 (10)	4 (31)
Don't use personally	71 (90)	9 (69)
Use professionally	6 (8)	0 (0)
Don't use professionally	73 (92)	13 (100)
Barnes & Noble Nook		
Use personally	2 (3)	0 (0)
Don't use personally	77 (97)	13 (100)
Use professionally	4 (5)	0 (0)
Don't use professionally	75 (95)	13 (100)
Other		
Use personally	4 (5)	0 (0)
Don't use personally	74 (95)	13 (100)
Use professionally	2 (3)	1 (8)
Don't use professionally	77 (97)	12 (92)

Note: Numbers in parentheses represent relative frequencies in percent.

Table 29 presented data that reported that the target groups (students and teachers) utilized personal devices differently on personal and professional levels (in the school setting). Student responses showed that 17.9% used an identified mobile device on the personal level as compared to 20% using it on a professional level in a school setting. The teachers responded with 24.78% using specific devices on a personal level but only 15.4% doing so on a professional level (school setting).

Finally, Table 30 describes group comparisons for all survey questions related to utilization and devices.

Table 30

Mann-Whitney U Tests for Group Comparisons on Utilizations and Devices

Variable	*N*	Median	*p*-Value
Utilization 1			.004
Students	79	8.00	
Teachers	13	5.00	
Utilization 2			.104
Students	79	3.00	
Teachers	13	2.00	
Utilization 3			.097
Students	79	2.00	
Teachers	13	1.00	
Devices 1			.005
Students	79	1.00	
Teachers	13	2.00	
Devices 2			.087
Students	79	1.00	
Teachers	13	2.00	

Note: Utilization 1 = Sum of Q 10a/9a to Q 10n/9n/9n; Utilization 2 = Sum of Q 11a/10a to Q 11m/10m; Utilization 3 = Sum of Q 12a/11a to Q 12m/11m; Devices 1 = Sum of Currently Use: Personally for Q 12/11; Devices 2 = Sum of Currently Use: Professionally for Q 12/11. Q number represents the corresponding number of the Student and Teacher survey question.

The Mann-Whitney *U* test was used to compare the target groups (students and teachers) in utilization and device. Utilization 1 was in response to student survey question 10 and teacher survey question 9 (Appendices A and B) and presented data on the types of assignments/activities assigned to classes. Utilization 2 and Utilization 3 were in response to student survey questions 11 and 12 (Appendix B) and teacher survey questions 10 and 11 (Appendix A), which asked about applications/tools used for projects/assignments and applications/tools used in classes, respectively. A description of Devices 1 and Devices 2 is in direct response to the student survey question 13 (Appendix B) and the teacher survey question 12 (Appendix A), both of which dealt with the types of devices used personally (Devices 1) and those used professionally in a school setting (Devices 2).

Summary

Chapter 4 presented results to the mixed-methods case study *Bring Your Own Device: A Case Study of the Perceptions and Use of BYOD Programming In a 10th-grade Curriculum.* Data were presented that were representative of various tools of data collection, including individual interviews of seven teachers/administrators and six 10th-grade students, classroom observations of three classes, and an online survey that yielded a total of responses of 92 (79 students and 13 teachers). All interviews, observations, and surveys were conducted on the campus of the Target district with the approval and assistance of district- and building-level administration, with the exception of the teacher interviews, which were conducted by phone at the teachers' convenience.

To meet the requirements of a qualitative analysis, all interview responses were coded to determine themes in each individual target group as well as in a comparison of the two groups. Classroom observation data were collected and analyzed to identify common instructional themes and time on task in general-education classes on a typical academic day. Each classroom observation was approximately 45 minutes in duration and conducted in classrooms in which the teachers volunteered to participate. All qualitative data were collected with the consent of district and building administration as well as individual consent.

Quantitative data were collected through an online survey conducted in the target district during a specific class period identified by building administration on a designated day for the student population. The teachers were allowed to complete the online survey at their convenience over a two-week period. All surveys were conducted anonymously to allow for responses to be provided in a non-threatening manner. An online survey was used for this case study because it provided confidentiality.

Chapter 5 will provide an in-depth discussion of the data reported in Chapter 4 and an overview of the study's findings. The researcher will also provide a descriptive analysis of the data as means of speculating how and why the data present the BYOD programming initiative in a less-favorable way. The contrasts of the teachers' responses with those of the students will be further discussed in an attempt to discover the cause(s) of the discrepancies. Chapter 5 will also review the assumptions, limitations, and delimitations as well as the implications for practice and for further research.

CHAPTER 5

CONCLUSION AND DISCUSSION

Education continues to change rapidly. Teachers and administrators are faced with the task of training students for newly emerging jobs and careers. The educational system is being tasked to increase test scores while reducing budgets. As a result, school districts are looking for programs that not only enrich the educational environment but also deal with financial exigencies.

Since the 1980s, school districts have been looking for programs that incorporate technology into classrooms (Bohnhoff, 2012) as a means of training students for future careers. During the 1990s, many districts began to look toward 1:1 programs that would provide every student with a device such as a laptop. Many school districts only allowed the devices to be used in the classroom setting, while others provided devices to the students to be used not only during the school day but also in their homes. Over the past few years, school districts have begun to realize that 1:1 programs are not as cost- efficient as once thought. By 2009, BYOD programming gained attention in the arena of higher education (Kiger, 2015). This has led to the rise of Bring Your Own Device (BYOD) programs to include the use of mobile technology in the K-12 classroom.

Bring Your Own Device (BYOD) programming has been described as allowing students to use personally owned devices to connect to a Wi-Fi network provided by the school district (NEN, 2013). Today's BYOD programs have grown to include laptops, chromebooks, tablets, and smartphones, all of which have Internet capability. Students are welcoming the programs as a continuum of their daily lives and have often been referred to as Digital Natives (Prensky, 2010), The term refers to those who have grown up with access to technology and to the Internet.

Teachers have been viewed as counterparts to their students and are referred to as Digital Immigrants (Prensky, 2001) due to their late arrival in the digital world, with some of them becoming familiar with technology as either teens or young adults. As a result, the teachers often refer to BYOD programming as a distraction for which they need more training. While they realize that their students are more tech savvy, they also believe that there is a time and a place for the use of a phone and that the classroom may not qualify. A 2012 Intel report stated that in order for a BYOD program to be successful, the program requires extensive planning, communication, and ongoing evaluation. While the teachers who participated in this case study agree, they have added that increased amount of professional development is needed to prepare them to use the ever-changing technology becoming available. In order to connect the literature with the classroom practices identified in this paper, studies such as this are essential to understand the perceptions, frequency of use, utilization of programming, and the types of device being used by the stakeholders.

Overview of Study

This case study took an in-depth look at the perceptions, frequency of use, types of devices being used, and utilization of a BYOD program by 10th-grade cross-curricular educators and their students. Data were collected in three manners to gain in-depth knowledge of the use of a BYOD program by two identified target groups, 10th-grade students and 10th-grade cross-curricular educators. The necessary data were gathered for the study in three phases: an online survey, personal interviews, and classroom observations. The data collected through a series of questions on a web-based survey were used to measure frequency of use, device/application use, and target group perceptions of BYOD programming. The survey was followed up by personal interviews of representatives of the two target groups, and then classroom observations were

conducted to gather first-hand knowledge of BYOD programming in the classroom setting. The online survey produced 92 completed surveys completed by 79 students and 13 educators. The interview sampling included a combined total of 13, seven teachers/administrators and six 10th-grade students.

The online survey was completed by all students while in scheduled study classes on campus. The high-school principal scheduled time for the students to access either personal devices or a district computer to complete the survey. Student surveys consisted of 14 questions and covered perception, frequency, utilization, and type of devices used. Each section of the survey (Appendix B) was directly related to a research question outlined in Chapter 1. Demographics (male/female) were also collected to allow the researcher to have a better understanding of the student target group. All student respondents were enrolled in the 10th-grade.

The survey created for the teacher target group (Appendix A) was similar to the student survey with the exception of the type of demographic information requested and a question directly related to the ISTE (2014) standards. ISTE standards are specific to each target group and were not used in determining comparable data. Once again, demographic data were collected to assist the researcher in gaining a more detailed understanding of the teacher target group. Data collected in Table 18 of Chapter 4 may be of interest for a further study focused on determining whether gender, position, type of education, area of specialty, years of service, and/or level of education are significant variables regarding perception and utilization of BYOD programming. For the purpose of this study, the information was collected solely to provide the researcher with familiarity with the respondents.

The second phase of the study consisted of personal interviews with members of each target group. The invitation to participate in the interview process was forwarded to all 10th-grade faculty and district-selected students. The sampling was divided among the two target groups: seven educators (five teachers and two administrators) and six students. The teacher participants directly contacted the researcher and provided consent via email. Teacher interviews were conducted by phone at the convenience of the participants while the two interviews with district administration were conducted on campus at a time convenient for each administrator. All six student interviews were conducted on campus in the privacy of a district office, and participants were identified through a district-selected pool of 20 students. The six interviewees provided the researcher with signed parental consent forms. Data from the interviews were coded and analyzed to derive an analysis of perceptions and frequency of use of the educators and students of the BYOD program. The data was first coded by target group and then coded a second time in an attempt to create and identify comparison data. An analysis was completed to identify negative and positive reactions to the BYOD programming.

The third phase of the study was the completion of classroom observations. As detailed in Chapter 4, classroom observations were scheduled by the high-school administrator and included volunteer teachers. Three observations were conducted, each approximately 45 minutes in duration occurring on a single typical school day. Each of the classroom observations was conducted in a different content area with a different teacher.

This chapter will take a look at the data presented in Chapter 4 to create a connection to each of the research questions presented in Chapter 1 as well as to the literature reviewed in Chapter 2.

Discussion of the Results

Interpretation of Research Question (RQ) 1 results: *What are the perceptions of 10th-grade cross-curricular educators and student regarding BYOD programming in the educational setting?*

When reviewing the data collected in response to RQ 1, the quantitative results indicate that 66% of the students who participated in the survey responded that they had either "somewhat altered" or "altered greatly" their learning strategies as direct result of the implementation of a BYOD program, while 61% of the teachers who participated stated that they either "definitely did not alter" or "altered minimally" their instructional strategies. The results were similar in response to the level of support in regard to the BYOD program in the school district: students' response was 89% in support compared to 31% of teachers' supporting the BYOD program. Further analysis of the survey data indicated that the students believed that the BYOD program was more organized (61% students to 8% teachers), more effective (47% students to 23% teachers), more efficient (70% students to 15% teachers), easy to implement (62% students to 23% teachers), and more beneficial to students (90% students to 23% teachers). Both target groups responded that the BYOD program was cost efficient (64% students to 77% teachers).

While looking at the data reveals a significant difference in perceptions between the two target groups, a more in depth question would be to ask why there is such a difference in perceptions. One explanation can be that today's students are utilizing technology, especially mobile technology, on a daily basis. They have grown up with technological devices at their fingertips and they know how to use them. Today's teachers have been instructed to teach in the manner that they were taught as students. Review your own educational background and reflect

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on the teachers who made the greatest impact on your education. They were the teachers that took a chance, who taught "out of the box," unafraid to be different. We wanted our teachers to understand us, to meet us half way, and to teach us what was important in life. Nothing has really changed for today's students. They want the same thing. Students are adjusting to life with mobile technology, and they want their teachers to meet them half way by adjusting and incorporating the new devices.

The qualitative analysis of the student responses offered a positive perspective regarding the implementation of the BYOD program. Student responses included phrases such as, *"It's 2015; we should be using what we grew up with,"* (S6) *"Our phones are prized possessions; we never forget our phones but did forget our homework – by using Googledocs, we can't forget our homework,"* (S5) and *"Some of the teachers haven't changed, and they really do need to adapt"* (S1). The teachers responded that their students are *"more tech savvy"* (T1) and they themselves need to become *"more daring"* (T1) and they feel that there is a need for additional professional development to *"adapt and change"* (T2).

When a comparison of initial and subsequent perceptions was reviewed, there was noticeable difference in that there were no truly negative responses. Both target groups emphasized the need to continue to move forward with BYOD programming, to continue to review and revise policy, and to have teachers allow the students to assume more responsibility.

A review of the data utilized to analyze RQ1indicates that the overall perceptions regarding BYOD programming in the educational setting received a more favorable response from the students in two areas of the study – interview and online survey. There was a noted difference in the responses of the teachers when comparing their initial perceptions of BYOD programming to their subsequent perceptions, with the teachers responding that there is value to

the programming and that they need to change. During the interview process, all of the students

interviewed offered similar advice to any school district contemplating the implementation of

BYOD programming: *"Go ahead and do it"* (S4) but make sure that there are *"rules in place"*

(S2).

In examining the perception of the BYOD program, it was apparent to the researcher that

the students had a more favorable response, perhaps because they had grown up with technology.

With all of the students being 10th-graders and about16 years old, the Internet and the World

Wide Web (www) were already approximately 15 years old at the time of their birth. Today's

students do not know a world without technology, whether in the form of a computer, tablet, or

smart phone. Of the teachers/administrators who participated in the survey, 11 identified having

four to 20 years of service. If the average age at college graduation is 22, then the approximate

age range of this group would be between 25 and 45. This would mean that technology would

have become important to them as either teens or adults and would classify them as being Digital

Immigrants (Prensky, 2001). By looking at each of the target groups based on age and their

perceptions, the difference between Digital Natives and Digital Immigrants becomes apparent

(Gardner & Davis, 2013). This may lead to additional research to investigate the perception of

BYOD programming based on a student's age. By looking at the onset of digital citizenship or

the introduction of BYOD programming, the results of this research question may vary greatly.

Interpretation of Research Question (RQ) 2 results: *At what frequency are 10th-grade*

educators and students utilizing a BYOD program in their classes?

A review of the data related to RQ2 was gathered from survey questions 6, 7, and 8 of the

students' survey and questions 5, 6, and 7 of the teachers' survey. Sharp contrasts were

identified in the frequency of utilization of the current BYOD program. The results indicate that

88% of the 10th-grade students surveyed utilize a mobile device more than 6 to 15 times a month, with 67% of those surveyed using their mobile devices on a daily basis. On the other hand, 100% of the teachers indicated that they utilize their mobile device fewer than 15 times per month. No teacher indicated that he or she used a mobile device on a daily basis. However, there may have been confusion over the question(s). While 67% of the students indicated that they used a mobile device daily, it is difficult to accept that 100% of the teachers used a mobile device fewer than 15 times a month. It is difficult to accept no only that no teacher/administrator used mobile device daily but also that only 67% of the students did.

Question 7 of the student survey asked, *"How often have your teachers altered the way they teach,"* with 73% of the students reporting that their teachers altered their teaching styles fewer than 15 times per month. Only 14% of the students who participated in the survey reported that they felt that their teachers altered the way they taught on a daily basis. When the teachers were faced with a similar survey question (*How often have you utilized mobile devices to enhance the curriculum?* SQ 6), 100% of the respondents indicated that they utilized mobile devices to enhance their curriculum fewer than 15 times per month. No respondents reported that they used mobile devices on a daily basis to enhance their curriculum.

The responses to this question appear to be much more realistic when compared to the previous question(s). I believe that the teachers are making an effort, regardless of how slight, and that the students are taking notice. Anything that is done "outside of the box" is going to stand out in a student's mind since it isn't considered the "norm." In a recent article published in the *New Jersey Education Association Review* (Bruder, 2014), several advantages to teachers were noted as a way to enhance the curriculum. They included students using devices to conduct research (which the teachers and students who participated in this study's survey both listed),

participating in audience response systems, creating interactive assignments (which one teacher surveyed for this study had hoped for), utilizing popular games to incorporate lessons, utilizing the Cloud to store/send assignments (the target school currently implements a Cloud-based system), and working on a global scale by incorporating Skype to allow students to collaborate with their peers in other cities/states/countries. Perhaps more teachers involved in the Target district BYOD program aren't using devices because adequate training is not provided and many teachers feel they must gain the expertise on their own. Professional Learning Communities (PLCs) may be one venue to provide professional development to increase teacher awareness, comfort, and understanding of what is available in terms of BYOD and the use of mobile devices.

The final question presented to both target groups in relation to the frequency of use asked, *"How frequently have you altered your learning style* [student survey]*/instructional style* [teacher survey] *as a result of BYOD programming?"* Once again, the results indicated that the students who participated in the survey appear to be more prone to altering their learning styles with a response rate of 75% altering their learning styles more than six times per month. The teacher responses produced a frequency of 100% of those surveyed altering their instructional style fewer than 15 times per month, with no responses indicating that they altered their instructional styles on a daily basis. Thirty-four percent of the students responded that altered their learning styles on a daily basis.

In reviewing all of the data gathered in response to RQ2, there is a difference in the frequency of use of mobile devices between the two target groups, with the students claiming a greater frequency. When combining the two target groups to answer the survey question, "*How often have your teachers altered the way they teach?*" (student Q7) and "*How often have you*

utilized mobile devices to enhance the curriculum?" (teacher Q6), the results were that 86.5% of respondents believed that the teachers utilized mobile devices to alter the way the teach fewer than 15 times per month. Only 13.5% of the responses were indicative of the use of mobile devices to alter teaching 16+ times per month, with only 7% believing that it occurred on a daily basis.

In a comparison of the teacher responses to survey Q6 and Q7 (*How often have you utilized mobile devices to enhance the curriculum?* and *How frequently have you altered your instructional style?*), 100% of the teachers surveyed indicated that they hadn't changed their instructional style or implemented mobile devices to enhance content curriculum. In contrast, 50.5% of the students who responded indicated that they utilized mobile devices on a daily basis and had altered their individual learning styles.

Alice Armstrong (2014) provided statements to support the data collected. She said that "technology is transforming students into explorers and teachers into guides" but for this to occur, students need to be taught the skills necessary to navigate the online world. This means that teachers need to change; they no longer have to be the providers of knowledge but need to become the facilitators, coaches, and real-time learning partners (Trybus, 2013). A move in direction of partner learning may be having students and teachers working collaboratively to create a learning environment not only for the students but also for the teachers. A fluid and flexible environment that allows for shared learning will help to erase the digital divide between students and teachers.

A *t*-test comparison was conducted for perceptions and frequency of use between the target groups of students and teachers. A *t*-test is often conducted to determine whether two samples are different. When looking at the variable of perceptions, the mean of the student target

group was 4.04 while the target group of teachers had a mean perception level of 2.38, both utilizing a scale of 1-5. The *p*-Value (*p*<.001) for the *t*-test for perceptions indicates that the null hypothesis of no difference for mean perception scores between students and teachers should be rejected. Students had a significantly higher perception score than the teachers.

The *t*-test results for frequency showed a significantly higher (*p* < .001) score for students (3.59) than for teachers (2.03). Therefore, the null hypothesis of no difference in mean frequency score between students and teachers was rejected.

The data collected in response to RQ 2 indicates that the student population is more willing to change and accept new things, while the teachers are comfortable with what they already know. Project Tomorrow, (2013), which was discussed in Chapter 2, revealed that aspiring teachers (college-age students) placed a high value on the impact of technology in their professional lives and in the lives of their future students. Table 5 in Chapter 2 presents data indicative of the difference in the use of social media between aspiring and current teachers. The data presents information showing that aspiring teachers placed a higher level of emphasis on the use of social media and technology when compared to current teachers. The same could be implied when looking at 10th-grade students and their current teachers.

The responses gathered from this case study compare to the student responses obtained in the 2010 Speak Up survey (Project Tomorrow, 2011) which reported that access to technology provided a more level playing field and enabled greater personalization, with additional opportunities to collaborate with peers and experts, resulting in altering learning and instructional strategies. It has been a general belief that the more an individual uses a device, the more comfortable and confident he or she will become. The information obtained in response to

RQ2 may lead to additional research in the area of hands-on professional development and its impact on BYOD programming.

Interpretation of Research Question (RQ) 3 results: *How are 10th-grade educators and students utilizing BYOD programming in their classes?*

Tables 24, 25, and 26 presented data related to the frequencies of utilization by the target groups, students and teachers. Table 24 looked specifically at the types of assignments/activities assigned to 10th-grade classes in a BYOD program. Both target groups agreed that library database access, spreadsheets, wikispaces, blogs, Googledocs, Moodle, PowerSchool, and texts to teachers were assigned in class. Unassigned assignments/activities included research and emails to teachers. A possible difference in perspective was noted regarding the following assignments: word processing (teachers – yes, students – no); presentations (teachers – yes, students – no); email to peers (teachers – yes, students – no); and texts to peers (teachers – yes, students – no).

Table 25 reported on the applications allowed and/or used for assignments or projects. Of the 12 applications listed, only two were identified by both groups as being allowed/used for assignments. They include Prezi and Googledocs. Both target groups agreed that 10 of the listed applications were not used in class. These included Keynote, iMovies, iPhoto, Garage Band, Open Office, Pages, Photoshop, Adobe Creative Suite, and Glogster.

Table 26 reviewed applications that were used in 10th-grade classes by either target group. In a comparison of the data presented, both target groups agreed that only two of the 12 applications were used in their classes, Prezi and Googledocs. It should be noted that the two applications were the same tools identified as being allowed for assignments. The remaining 10

applications (VoiceThread, Wikispaces, CoverIt Live, Blabberize, Glogster, Mixbook, Storybird, Moodle, Vocaroo, and Animoto) were not used by either target group. There were no disagreements noted in the data in relationship to applications used in 10th-grade classes.

A recent study conducted by Kim, Rueckert, Kim, and Seo (2013) that investigated students' perceptions and experiences of mobile learning noted that how students use mobile technology is dependent on what their relationship is with the ever-changing mobile technologies. Depending on the device and the program, students' perceptions may change, and if their perceptions are changing, so are their experiences. These changes in technology and devices may provide a reason for the data collected in relationship to Tables 27, 28, and 29. While changes in perceptions may not result in immediate changes in behavior, the exposure to new programs/devices may result in new venues of interaction and learning (Kim et al., 2013) not only for students but also for teachers.

Table 19 of Chapter 4 reported on a time-on-task (TOT) comparison of two students. A summation of the table observed that student TOT (frequency) was an average of 83.3% for the three classes observed. When broken down by class, the data show that the randomly chosen students (one male and one female in each class) presented an 80% TOT rate for Classroom Observation 1, a 70% TOT rate for Classroom Observation 2, and a 100% TOT rate for Classroom Observation 3. All three classes allowed students to actively use mobile devices in the form of a smartphone or a laptop for the entire class period.

Berlin Fang (2009) noted that putting devices in the hands of students can increase active learning. Active learning can be interpreted as increased time-on-task by changing the students from being the objects of teaching to becoming the subjects of learning. By engaging students and setting boundaries, we can make that change and increase the TOT of our students.

Tables 27 and 28 took a more in-depth look at the ISTE standards for both students and teachers. According to the International Society for Technology in Education (2014), specific standards were outlined for students/teachers/administrators. Tables 27 and 28 reported on individual perceptions of the students and the teachers, respectively.

Table 27 showed that students perceived that their BYOD usage allowed them to be more creative and innovative, with a reported 53.9% of the students surveyed indicating that they demonstrated those skills more than 16 times per month, with 32% of them reporting that they felt that way on a daily basis. When looking at the ability to communicate and collaborate with their peers or teachers, nearly 60% of the students felt that they exhibited these skills more than 16 times per month in the classroom. The highest reported observable trait was the area of research and information fluency, which resulted in 70.5% of the students reporting that they demonstrated that skill more than 16 times per month. Critical thinking, problem solving, and decision making yielded a 57.7% response to 16 times or more per month, and technology operations and concepts had a 51.5% response rate to more than 16 times per month. Of the six characteristics listed, digital leadership had the lowest percentage in frequency with 48% of the students responding that they exhibited the trait more than 16 times per month, while 39% percent responded that they demonstrated the skill fewer than five times per month.

Table 28 looked at the ISTE (2014) standards for teachers. When looking at whether teachers felt that they were facilitating or inspiring student learning and creativity through technology, 80% indicated that they do so fewer than five times per month. There were zero responses for the 16 to 25 times per month and daily categories. A response rate of 84.6% was recorded by the teachers in regard to designing and developing digital learning experiences and assessments to their students fewer than five times per month with only one response (7.7%)

indicating that he or she did so on a daily basis. In the other three areas, modeling digital age

work and learning yielded a frequency response rate of 84.6% indicating fewer than five times

per month, and engaging in professional growth and leadership had a frequency rate of 76.9% at

fewer than five times per month. On the standard of promoting and modeling digital citizenship

and responsibility, 30.76% of the teachers indicated that they demonstrated that skill more than

16 times per month, while 58.5% indicated that they demonstrated it fewer than five times per

month.

The ISTE Standards are more than just abstract concepts (ISTE, 2014); they are a guide

to re-design education for the digital age. When reviewing the standards, we realize that today's

technology has created a new social circle for us – a place where we may or may not always see

each other but where we can still share our hopes, dreams, and disappointments (Ribble, 2014).

To function in this new community, society needs to address digital citizenship and the

consequences of not being aware. According to Ribble (2014), digital citizenship "focuses on

using technology in an appropriate way while enjoying its vast capabilities and becoming more

productive," with a need to teach three main categories – respect, education, and protection.

In an attempt to increase the knowledge and performance of the ISTE standards,

appropriate digital etiquette needs to be provided to students. In a study conducted by the

National Cyber Security Alliance (Steinberg, 2012), over 80% of school administrators report

that they do an adequate job in preparing students for the digital world while only 36% of the

teachers state that they have received no hours of training to meet the needs of the digital world.

Combine those data with the fact that being a digital citizen means being aware of what is

available about you in digital form and how it affects you and others is a daunting task without

the appropriate training.

A further analysis of the data utilized in response to RQ 3 may be indicative of a lack of knowledge in programming and applications that are available for use in the classroom setting. A statement from the teacher in Classroom Observation 2 may offer further insight to the desired utilization of BYOD programming. The teacher said that she *"wanted them to take the lead to demonstrate what they know in ways they never used before,* (CO2) but that *"so far, I'm a little disappointed – they're being too safe."* It would appear that the students were presenting what they were presented, meaning they were doing what they and their teachers were comfortable with. In looking at an opportunity to do additional research based on RQ 2, the concept of Vygotsky's Zone of Proximal Development (ZPD), of moving from the known to the unknown through the guidance and encouragement of a knowledgeable person (Sincero, 2011), may be best met by pairing masters with novices with the unique concept of today's students being the masters and their teachers the novices. Lee (2014) stated that "scaffolding" and Vygotsky's MKO and ZPD can be created by assistance being offered by a teacher or a more competent peer to support learning of unknown material. Not noted in the literature is who that "teacher" is – can it be the traditional teacher instructing traditional students or a student taking on the role of teacher to instruct the traditional teacher along with his/her peers, or, perhaps, is it a collaborative effort of student and teacher combining knowledge to provide instruction to meet the needs of their respective peers? The world of BYOD programming and PLCs may be an untapped resource to stretch the horizon of what is already known.

Interpretation of Research Question (RQ) 4 results: *What types of devices are being utilized by 10th-grade educators and students in a BYOD program?*

An in-depth look was taken at the types of devices used by students and teachers personally and professionally (in a BYOD program). A series of commonly used devices were

presented, and each respondent indicted whether the device was used in his or her personal and/or professional life (in their school's BYOD program).

The data collected indicate that both target groups utilize an iPhone more than every other device listed. Students stated that 62% of them used the iPhone personally, while 54% used them professionally (in a BYOD program) and the teacher responses stated that 77% used the iPhone personally and 62% in a professional manner (in a BYOD program). A vast majority of the devices listed were not indicated as being used in a professional manner in a BYD program. These devices included the iPod Touch; Android Smartphone; Windows Phone; iPad (students only); Android tablet; Kindle Fire; and Barnes & Noble Nook.

The classroom observations noted that few students were utilizing a Kindle Fire (1), iPhone (1), laptop computer (3), or classroom desktop computer (1). Interviews produced similar results with all six students indicating that they preferred to use their iPhone while six of seven teacher interviews responded that their device of preference was an iPhone.

Table 30 of Chapter 4 presented data analyzed using the Mann-Whitney *U* test. The Mann-Whitney *U* test is frequently used to determine the median of two populations when the data are non-normal. Five tests were administered to compare the median for Utilization 1, which represented data related to types of assignments/activities assigned to 10th-grade classes; Utilization 2, which represented data related to types of applications used for assignments/activities; Utilization 3, which represented data related to types of applications used in class; Devices 1, which represented data related to the types of devices used personally, and Devices 2, which represented data related to the types of devices used professionally (in a BYOD program).

When reviewing the results for the test for variable Utilization 1, there was a significant difference (p < .004) in the medians the types of assignments/activities reported by students and those reported by the teachers. The results of the Mann-Whitney test for variable Utilization 2 showed no significant difference ($p < .104$) between students and teachers, in which students reported being allowed to utilize three types of applications while the teachers responded with a median of two. The comparison of median scores for variable Utilization 3 also showed no significance ($p < .097$), with scores of two for the students and one for the teachers.

The results of the Mann-Whitney test to compare the medians for Devices 1 showed a significant difference (p < .005), with median scores of one for the student target group and two for the teacher target group. Devices 2, which measured the types of devices used professionally (in a BYOD program), resulted in median scores of one for the student population and two for the teacher population, which were not significantly different ($p < .087$).

While the data presented does not present as being significant across all five tests of the Mann Whitney U test, there may be some significance in the lack of familiarization with the applications identified in the survey. In a review of tables presented in response to RQ 3 and RQ 4, a large number of the responses indicated that the identified applications and devices are not used in the classroom setting. Additional research may include an in-depth review of familiarity with the numerous applications and devices available on the market today, along with the training to use what is available.

In a study conducted by Thomas, O'Bannon, and Britt (2013), teachers reported a level of integration of mobile devices for personal and professional use. The results were similar to those obtained in this study. The teachers who participated in the study responded that they utilize the common features of their smartphones – clock, alarm, timer, calculator, calendar, camera, and

the Internet for quick research. The reasons for the low level of integration into the workplace were lack of knowledge training, modeling, school climate, and a lack of administrative support. Results of the Thomas, O'Bannon, and Britt survey and the results of this survey provide a common theme of a need for additional professional development.

In the words of Abraham Lincoln, "We teach the children so that it will not be necessary to teach the adults." It becomes difficult to teach the children if the teachers are unsure of what they are teaching. For district-level administrators, it's not uncommon to hear the complaint that the professional development being provided today is more "housekeeping" than skills for classroom application. Today's teachers are required to attend a number of training hours per academic year as outlined in their collective bargaining agreements, and in Pennsylvania, they are required to complete 180 hours of training every five years to maintain their teaching certifications. How those hours are spent is where the concern lies. As teachers and administrators strive to meet the needs of their students, perhaps more focused, data-driven trainings are needed that have relevance to the functions of our digital classrooms. These trainings should take place through professional development sessions and professional learning communities.

On a "Random Act of POW" sticker on the campus of Marywood University was a phrase that sums up the need for more effective training to meet the needs of the 21st Century classroom. The 3"x5" strip of paper said, "The world is changing and we are on the TRANSITION TEAM!" How true is this statement? If we, as teachers, are looking to change world, we need to be on that transition team, and what better way can we effect change than by gaining the knowledge we need to assist our students in becoming productive members of a rapidly evolving society.

Assumptions/Limitations/Delimitations

It was assumed that students and teachers would respond to the survey and interview questions in an unbiased manner with honesty and integrity. The aim of this study was for the data and results to be generalized to a larger population, but it is important to understand that this study was conducted in one medium-size, rural school district (1,000 – 5,000 student population) in northeastern Pennsylvania. The data collected were representative of a school district that is currently involved in several social-media initiatives and therefore may not be representative of other districts in Pennsylvania or in other parts of the United States.

A limitation of the study is that there may be variables that were not included that could have explained some of the variability in the dependent variable. Such variables include gender, years of service, level of education, and class type. The culture, perceptions, and prior experiences of the participants may have provided data that would not be indicative of a comparable school district and would not allow generalization.

This study was also delimited to the participants and did not address specific programs, applications, or devices and therefore could not be generalized to similar school districts. Since the study was limited to analysis of the responses of students at one specific grade level, the data collected would be a delimitation in that they cannot be generalized to other grade levels.

Implications for Practice

Today's educators are preparing students for emerging careers (Freidman, 2005 snd striving to reach a balance as their profession experiences rapid change and ongoing challenges. Administrators, educators, and students are faced with the concern of how to incorporate effective programming into the curriculum while increasing the overall value of education. This

study of BYOD programming seeks to provide useful information to those individuals responsible for policies and procedures in the educational system. The researcher hopes that the information provided will help today's teachers to continue to provide training to students who are preparing for emerging careers.

Many of the classrooms of the 21st Century are populated by digital natives being led by digital immigrants (Prensky, 2010) with policies that continue to support the ban on cell phone and mobile technology use by students. Opposition to personal digital technology in schools persists. In a national survey, more than 112 administrators indicated that 84% of school districts have written policies addressing the use of cell phones. Of that 84%, 76% prohibited cell phone/mobile technology use (Obringer & Coffeey, 2007), and students caught using them often suffered consequences. Based on the research conducted, the implications for practice are many for both the target school presented in the study as well as for the multiple school districts contemplating a BYOD initiative. When looking at the target school, the following implications may be noteworthy:

1. Targeted professional development aimed at increasing knowledge and use of applications and mobile devices. This will provide the teachers with a stronger understanding and provide them with essential tools to utilize in the BYOD program.
2. Building level committees to review, revise, and discuss programming. By providing the committees with a sense of ownership, support for the program will increase. Committee-level decisions avoid the "top-down" approach to leadership and allows for shared leadership to emerge.

3. Department-level team meetings to review content-appropriate applications and delivery. When developing department-level learning communities, the members of the team are working toward a shared goal and will strive to improve the department as a whole.

4. Professional learning communities (PLCs) based on Vygotsky's ZPD: master/novice. In accordance with Vygosky's theories, the More Knowledgeable Other (MKO) assists others to reach a higher ability level based on scaffolding (Geonnotti, n.d.). This will allow teachers to build on their prior knowledge to gain additional skills in the area of BYOD programming.

The implications for practice, when looking toward program implementation in a school setting, may include:

- Investigate/visit programs that are currently implemented. It is extremely important to meet and discuss programming with those that have already undergone the process. Teams should explore both successes and failures to assist in developing an appropriate plan for their building/district.

- Develop a "roll-out" by incorporating input from all of the stakeholders: teachers, support staff, students, parents, school board, and community. To ensure "buy-in," all voices should be heard and considered when developing a program. A well-planned "roll-out" should be presented in phases with adequate research and reasoning to support each phase.

- Pre-implementation training to increase knowledge and use of applications and mobile devices. Teachers in this study reported being unprepared for what was happening. With appropriate training, teachers and students will be more receptive and cooperative. The

standards presented by ISTE and digital citizenship instruction may be areas of consideration.

- Suitable infrastructure to support the multitude of devices, along with increased bandwidth. Prior to any attempt at BYOD programming, collaboration and program development must be discussed with the appropriate members of the district's technology team to ensure appropriate regulations and technology are in place.

- A structured policy with specific protocol developed by a committee with input from all of the stakeholders. A policy must be developed that encompasses COPPA and CIPA as well as addressing the needs of the school district to ensure the safety of the program participants.

- PLCs based on Vygotsky's ZPD: master/novice with the consideration of implementing a program where the students are the masters – demonstrating and sharing information with their teachers (novices). The idea of "flipping" instruction may provide a much-needed respect for teachers and students. As one student said during the interview process, *"Maybe this will help the teachers adjust to this generation."*

- Develop an appropriate evaluation cycle of "Review – Revise – Implement – Evaluate" to ensure that the program is implemented with fidelity and validity. Every successful program is often a recreation of itself – it builds upon what has been successful and revises what hasn't, allowing for continued growth of both the program and its participants.

Implications for Future Research

The implications for future research based upon this study are as varied as the types of devices and programs currently offered. Future research may include:

1. The most obvious area would be to increase the target population. While this study examined the perceptions and use of a BYOD program, it focused exclusively on 10th-grade students and 10th-grade cross-curricular teachers. By increasing the target populations, additional information can be gathered that would address the overall perceptions and use of programming of a larger audience. For example, the study can be broadened to increase additional grades or to follow the progress of students as they move through the high-school curriculum (9^{th} through 12^{th} grade) and increase their knowledge and use of technology and how it relates to the world they live in.

2. This study could also be repeated on a lower grade level and used as a comparison of the instructional strategies of high-school and elementary teachers. While the focus of elementary school is "learning to read" and of high school is "reading to learn," the differences in perceptions and uses of technology may provide additional information in the area of reading development. By shifting the focus of learning as the child emerges from elementary school to high school, teachers may be better equipped in preparing today's students for tomorrow's world.

3. An additional study may also incorporate the perceptions of parents about the use of technology in their children's classrooms. A longitudinal study could involve the tracking of students as they progress academically through the educational system in combination with how the perceptions of any combination of teachers, students, and parents develop and change. By including the perceptions of all stakeholders, a broader view of BYOD programming may emerge.

4. An additional area of study may involve the primary focus being shifted to teachers only and the importance of utilizing a Professional Learning Community (PLC) in providing

teachers with the tools and knowledge to introduce technology in their content areas. By

incorporating the use of a PLC, research would be able to determine the effectiveness of a

train-the-trainer model, where teachers would be provided with the knowledge to return

to their classrooms to try and evaluate the effective use of specific programs, devices, and

strategies. This area of research would focus on the professional development

component of implementing a BYOD program.

5. An additional form of a PLC study would be to incorporate the students as the masters.

In accordance with Vygotsky's theories associated with ZPD and MKO, data can be

obtained to measure the significance of the students providing knowledge to the teachers

through small-group interactions. The PLC would engage in the discussion of Digital

Natives and Digital Immigrants and how information is conveyed from one group to the

other in the educational setting.

6. Finally, it would be of great importance to continue studying the various BYOD

programs being implemented in other school districts. A comparison study of a veteran

BYOD program with a novice BYOD program may yield information useful to both

programs. A researcher may be interested in describing how programming differs from

one district to another based on any combination of variables - grade level, gender,

content area, general education, special education, socioeconomics, as well as a multitude

of others.

7. In 2003, Plant found that teenagers developed an increased level of dependency on their

mobile devices. Additional research would be beneficial to determine whether the

increased use of mobile technology in the educational setting would increase the

dependency noted by Plant or whether it would increase the level of collaboration as

predicted by Vygotsky. By taking a further look at the dependency – collaboration connection, the research may be beneficial in developing policy that promotes the importance of digital citizenship as outlined in the ISTE standards.

8. A researcher may focus additional research on the cost factors associated with BYOD programming. While many school districts are facing financial concerns, does the BYOD initiative provide a relief to budgets that are already strained? By researching the cost effectiveness of a BYOD program, a researcher may be able to assist in the development of programming that is cost effective and efficient to the stakeholders.

9. Another area of further research may include the effectiveness of a digital citizenship curriculum on the overall use of mobile devices in the classroom setting. By taking a direct look at the instruction and use of a digital citizenship curriculum, may be helpful in determining a reduction in the number of discipline referrals associated with inappropriate materials in the form of pictures, texts, and instant messages.

10. Finally, a controversial area of research associated with BYOD programming may be for a researcher to ask "Does it really work?" This area may be two-fold in that a researcher may review data associated with direct classroom instruction and also review data collected from state mandated standardized testing. A researcher may want to provide an in-depth look as to whether a correlation exists between the use of BYOD programming within the classroom and the grade level results of state level testing.

<div align="center">**Connection to the Literature**</div>

In a review of the data presented in Chapter 4 which was explained in Chapter 5, connections can be made to the literature that was reviewed in Chapter 2. Information gathered

during the three phases of data collection - survey, interviews, and observations - can all be directly linked to the discussion of the literature in each of the sections of Chapter 2. These sections would include the Educational Theory of Lev Vygotsky, Social Media in a BYOD Program, Educators and Their Use of Mobile Technology, Students and Their Use of Mobile Technology, and BYOD programming in general.

In looking at the literature reviewed in Chapter 2, Gardner and Davis (2013) referred to today's students as the "App Generation" or "digital natives." This referred to those individuals who have been immersed in technology since birth. In a review of the data collected and analyzed from both sample groups (students and teachers), the reader can easily distinguish which group would be considered the "digital natives" and which would be considered the "digital immigrants" (Prentsky, 2010). The data presented can be related to the literature reviewed and may be utilized as an indication that our educational system needs to look at the impact mobile technology and BYOD programming are having on the development of students and perhaps use that data to initiate educational change.

Educational Theory of Lev Vygotsky

The literature review looked at several of Vygotsky's theories, including the Theory of Value, the Theory of Knowledge, the Theory of Human Nature, the Theory of Learning, the Theory of Transmission, and the Theory of Society (Vygotsky, 1934). Vygosky's theories stressed the idea of learning through interactions and communications with others along with the importance of strengthening the student's Zone of Proximal Development (ZPD) and receiving knowledge from the More Knowledgeable Other (MKO). Vygotsky stated that by increasing the opportunity for the novice and the expert to interact in the process of learning, knowledge is passed along from the MKO (expert) to the novice by scaffolding information and moving from

the known to the unknown (Allahyar & Nazari, 2012). This point was emphasized in Table 17 (Interview Results), Table 18 (Observation Results), and Table 27 (ISTE – Students). By reviewing these tables, the importance of collaboration was noted by both target groups. The collaboration on real-world problems or tasks that build on each person's language, skills, and experiences shapes the individual's culture (Vygotsky, 1934).

Donato (2000) coined the word "situatedness" to describe Vygotsky's belief that "learning unfolds in different ways under different circumstances." By reviewing the tables (Table 27, 28, and 29) in response to Research Question (RQ) 3 (How are 10th-grade students utilizing BYOD programming in their classes?), one is able to see the types of programs/tools used in classes and where there is an apparent disconnect in practice between the sample groups. Vygotsky contended that through social interaction, humans have the capacity to alter their environment for their own purposes (1934). By reviewing Table 24 in response to survey questions 1, 2, 3, and 5 of the students' survey and questions 1, 2, 3, and 4 of the teachers' survey, the researcher was able to see how BYOD programming is affecting the perceptions of the 92 students and teachers who responded to the survey.

Vygotsky's Theory of Transmission (1978) defined those who teach as being the "More Knowledgeable Other (MKO)." Galloway (2007) related this to today's classrooms by indicating that the MKO may no longer be the teacher but a peer, sibling, or even a computer. Upon reviewing the data presented in Chapter 4, it may also be considered that the student may be the MKO and that the teachers may themselves become the students. With this role reversal, both sample groups may demonstrate a higher level of individual performance (Leong & Bedrova, 2001) thus increasing the overall performance.

Social Media in Education

The role of social media in education continues to grow, with a 47% increase in the number of schools initiating the practice in one year as reported by Project Tomorrow (2013). Davis (2010) stated that social media helps teachers to reach and engage students who would perhaps not participate in the typical classroom. The teachers, who volunteered to the personal interviews, supported that statement by saying *"Better student engagement"* (A2) and *"Increased teacher/student interaction"* (T1) were reported as a result of the BYOD programming. They also reported that a lack of training had an impact on their acceptance of the policy. This is a direct reflection on a comment by Couros (2011) that related the effectiveness of social media to Professional Learning Communities (PLCs) as a tool to reflect and provide additional learning opportunities.

A number of the students and teachers who participated in the interview component of the study indicated that policy was an issue (Table 17) and that the inappropriate use of mobile devices was still a concern. The target district created a policy along with classroom procedures to reduce the opportunity for inappropriate Internet/social media connection through the regulated use of the district's server and bandwidth. The movement of the district relates to a statement from Lepi (2014) that suggests that if people were to be held accountable for their actions/posts, they would more likely behave well and treat each other with respect. The target district is inadvertently emphasizing the importance of digital citizenship without directly providing related instruction.

Tim Clark (2013), stated that "kids already know how to use their devices, but they don't know how to learn with their devices." A number of the responses indicated, *"We've grown up with technology – we should use it,"* (S3) *"Students are more tech savvy,"* (T1, *"It's 2015, we*

use our phones 24/7 – it makes our lives easier," (S5) and *"I'm so used to using my phone – I don't remember what it was like to not use it"* (S6). These statements support Clark's (2013) and emphasize the importance of social media in the classroom.

In an extension of social media to the general use of mobile technology in the 21st Century classroom, Husbye and Elsener (2013) looked at the use of mobile devices in their own literacy education course for pre-service teachers. The end result was that "we must prepare our candidates to teach even the youngest learners with technologies that have not yet been developed." In Chapter 4, a number of applications, devices, and programs were presented to determine frequencies of use in today's classrooms, and along with the responses in the student and teacher interviews, the movement toward improvement and wanting to do more, is evident.

Educators and Their Use of Mobile Technology

The use of mobile technology, in general, continues to increase with each introduction of a new device. In 2012, it was estimated that by 2015, 80% of the population would be able to access the Internet through cell phones (Johnson, 2012). In a review of the data collected during three classroom observations, 84.7% of the students (Classroom Observation 1: 71%, Classroom Observation 2: 83%, and Classroom Observation 3: 100%) were in possession of a device that had Internet capability, allowing classroom teachers to move away from "talk and chalk" (Berkowicz & Myers, 2014).

Table 30 presented data that indicated that 99% of the teachers who participated in the survey (13) possessed either an iPhone or an Android smartphone. In addition, 77% (10) of the teachers surveyed responded that they have either an iPad or an Android tablet. In sharp contrast, only 46% of the responders indicated that they utilize an iPhone or Android phone

professionally (in school) and that only 27% utilize an iPad or Android tablet in the classroom. Chen and Theilemann (2008) stated that educators needed to accumulate a knowledge of technology to assist in the classrooms of the 21[st] Century and that there is a need to replace the "I teach philosophy" to a "we learn together" pedagogy (Norris & Soloway, 2011). The data indicate that in order to move in that direction, additional training and policies are needed to provide the teachers with the tools they need. A possible solution may be the implementation of additional professional development sessions or the creation of meaningful PLCs.

Students and Their Use of Mobile Technology

Students today are familiar with mobile devices, social media, and technology and they possess the knowledge to utilize them to their advantage. The data in Table 24 indicates that they have altered their learning styles (66%) and are concerned about being prepared to compete in a global setting (51%). In a Project Tomorrow survey (2012), students indicated that they have a vision of where they wanted to see their schools move in the use of mobile devices/technology/social media and that they are looking for a classroom environment that more closely resembles their use of mobile devices outside school (Edwards, 2014). The students who participated in both the survey component and the interview component of this study expressed the same needs. Table 24 presented data that strongly supported the use of a BYOD program (89%) and indicated that 90% of the students surveyed perceived the program as beneficial to them. One of the students interviewed stated that she purposely elected a course based on the teacher's increased use of technology.

In a 2014 Blackboard Report (Table 9 – Chapter 2), students identified how mobile devices would make schoolwork more effective. In comparison to the data collected in Table 17 of Chapter 4, students who participated in the interview process made the same comments. The

interest expressed by students was similar to the results of a 2014 study completed by Benham, Carvalho, and Cassens (Figure 5 – Chapter 2). Students in both the survey and the interviews of this study responded that the use of a BYOD program altered their learning style (75%) by utilizing programing more than six times per month. The ease of implementation (62%) and the efficiency of the program (70%) were also similar to the information presented in Table 9 of Chapter 2.

Bring Your Own Device (BYOD)

Kolb and Tonner (2012) said that mobile technology is dramatically changing how we communicate, share content, and retrieve information, especially for a generation of youth who are used to the immediate and collaborative nature of the informal learning they engage in outside of the constraints of formalized learning in school.

The data presented in Chapter 4 indicate that students and teachers who participated in this research project see the importance of change but are at different stages. The students expressed a sense of urgency through their statements in the interviews and in their responses to survey questions presented in Table 24. The teachers' responses to the interview questions indicate a need to change though statements like *"I continue to grow,"* (T1) *"More daring,"* (T1) *"...interested in changing,"* (T2) and *"Teachers are taking more risks"* (A1). But they do not express a sense of urgency as depicted in question 2 of the survey (How concerned are you that you will be unable to keep up curricula and instructional changes essential to a BYOD program?). Only 38% (3) respondents indicated that they were either slightly concerned or extremely concerned about being able to keep up with curricular changes as a result of BYOD programming.

Research presented in Chapter 2 indicated that school districts thoughout the United States were either implementing or moving toward implementation of a BYOD program, while 69% (9) of the teachers surveyed indicated that they were either somewhat unsupportive (23%) or extremely unsupportive (46%) of the program implemented at the target district. The teachers found that the program was disorganized (85%), ineffective (77%), and not beneficial to students (62%). The data are in sharp contrast to data collected from 2010-11 surveys conducted in the West Shore School District in Pennsylvania, where 38% of the teachers surveyed stated that they were uncomfortable but were willing to try to utilize mobile technology in their classes.

Summary

Chapter 5 reviewed a discussion of the results of the study *Bring Your Own Device: A Case Study of a 10th-Grade BYOD Program in a Rural Pennsylvania School District*. This case study looked at the perceptions of students and teachers currently participating in a BYOD program as well as the frequency and utilization of the program along with the types of devices currently being used by teachers and students. Three components of the study were developed and utilized to answer the research questions (RQ) presented in Chapter 1: an online survey that resulted in 79 (66%) student responses and 13 (54%) teacher responses; individual interviews conducted with seven teachers/administrators and six students; and classroom observations that included three different content-area classes with no repeat students. The data in response to each RQ were presented in Chapter 4 and further discussed in Chapter 5.

While this study focused on four related research questions, Research Question 1 provided the most useful information. It focused on the perceptions of teachers and students regarding BYOD programming in their educational setting. The study participants included only 10th-grade students and teachers of 10th graders, based on the recommendation of the district

superintendent of schools. Tenth graders were primarily chosen because they would have completed nearly two years in the program by the time of the survey, as would their teachers. The simple question of "What do you think of BYOD programming?" was received with mixed emotions by both target groups.

When reviewing the comments by the students, the data was not surprising. Today, communication is instantaneous and the world is at our fingertips. We can find the answer to a question in seconds without ever leaving our seats, a far cry from when we had to travel to a library, research the topic in the card catalog, and then search through stacks of books and encyclopedias in hopes of finding an answer. Today's students are not familiar with that task, nor should they be. Students of the 21 Century are considered to be part of the App Generation (Gardner & Davis, 2013) and have been referred to as Digital Natives (Prensky, 2001) because they have grown up with technology immediately available to them. They have the technology, they know how to use it, and they're good at it. One student summarized all of the student interview comments best: *"It's 2015; we should be using what we grew up with"* (S5). Why are we stopping them from being successful in a world they are familiar with?

The responses received from the teachers reflected both positive and negative comments ranging from *"I'm excited – I want them to take the lead to demonstrate what they know in ways they never used before"* (CO2) to the teacher who stated that she wanted *"the control of what they do"* (CO3). Comments that emphasis that there is a need to change accompanied by a the desire to not want to change or the confusion as to how we change. Would the comments have been different if the teachers simply asked their students?

The teachers' generation has been dubbed the generation of the Digital Immigrants (Prensky, 2001) because many of them were introduced to technology as teenagers or young

adults and have gone through a school system that focused on "chalk and talk" or "drill and kill." For many of them, an overhead projector or a VHS was considered technology. They may struggle with mobile technology and they learn as they go along, learning about and using technology as they need it. How can that digital gap close and who needs to make the first move to do so?

As a member of that generation, I found it surprisingly easy to relate to many of the comments provided by the teachers: we don't want to give up control; we want to make sure our students are getting the information the way we present it; and we cherish the role of master, of being the More Knowledgeable other (MKO). As a parent of two children born and raised as Digital Natives (Prensky, 2001) in the App Generation (Gardner & Davis, 2013), I could also relate to the comments of the students: they now have the information at their fingertips and they know how to use it; they're getting the information in their own way and on their own terms; and they're using it appropriately. Would it be wrong to say that sometimes, it's all right to be the novice, to learn something new from an unexpected source, our children?

Today's students are eager to change and have demonstrated that they have changed. The data show that a majority of the student respondents altered their learning styles in response to the BYOD programming. We, as educators and members of the Digital Immigrants generation, have not changed – according to the study results. Both the student target group and the teacher target group responded similarly, indicating that the teachers had not altered or minimally altered their instructional strategies in response to the BYOD programming. This leads to the questions of why and how do we change?

This study has provided similar results to the limited literature reviewed. Students are much more open to utilizing technology in the educational setting, while teachers continue to

feel that there is a place and time for technology but are not sure that the educational setting is that place or that time. Both groups responded that they use mobile devices in their personal lives but are still hesitant to do so in their professional lives in the classroom. Students and teachers realize the importance of mobile devices but are unsure as to how to incorporate them in daily instruction. Is there an answer and how do we spread that knowledge?

It was also quite obvious that a working definition of BYOD programming was interpreted differently in each of the classrooms observed. Classroom Observation 1 fully embraced the concept of BYOD program by allowing students to navigate their own devices while also providing guidelines to be followed. The teacher accepted the role of master and novice as she allowed collaboration and conversation to take place. In the role of master, she provided her students with assistance and guided several students toward appropriate sites to locate information while in the role of the novice, she allowed students to demonstrate to her how they located the desired information and on occasion, showed her how to navigate a new site.

Classroom Observation 2 welcomed the varied devices and provided for collaboration among students but did not provide parameters or guidelines – students were left to decide on their own the structure and presentation of their final projects. Ironically, by allowing so much freedom and no direction, it appears as if she hindered the creativity of her students. Instead of taking a risk and producing something new, all of the groups opted to present with a PowerPoint. All except one group, they went the route of something comfortable – a poster.

Classroom Observation 3 appeared to confuse BYOD with the use of technology. Personal devices were not allowed the classroom but the use of technology was encouraged through the use of school district laptops. For a true BYOD program to be successful, a working

definition needs to be accepted and reviewed by all (Clarke, 2013), not by a few. In the case of this study, it appeared that the teachers weren't really sure what they were getting into and that BYOD programming wasn't really understood by everyone (A2). In reviewing all of the data presented in Chapter 4, how could have that been changed?

When considering the implications for practice, this study provides a large quantity of information to be considered prior to a district/building level "roll-out". School districts should consider the technological needs of their systems (Intel, 2012) and provide ongoing technological support to ensure success. As the mobile devices on the market continue to grow and change, today's students are facing a plethora of devices, systems, and applications – all of which will require some form of technical support. Teachers of this generation may not be adequately equipped to meet the ever growing needs of student and devices. By developing an appropriate "roll-out," school districts will need to address these needs by providing adequate access and support.

The "roll-out" should also include adequate professional development, either in the form of direct instruction or perhaps, through the use of Professional Learning Communities (PLCs). By first reviewing and planning for the needs of the stakeholders, a possible interest survey may beneficial to assess the needs and skill levels of the participants. This may allow the district to address specific needs while avoiding unnecessary training of little or no true value. As mentioned in earlier in Chapter 5, a school district may chose to explore the possibility of conducting a PLC with multiple stakeholders that may include not only teachers, but also students and perhaps parents. The greater the initial "buy-in" the more beneficial the results for all involved and by incorporating various stakeholders, it will allow the More Knowledgeable Other (MKO) to be someone other than the teacher. Many of today's teachers have traditionally

been referred to as the MKO, that individual to take the lead and to share information they have. What would happen if the teacher became the student or the novice and took in information from their students or the new MKOs? Would it offend, would it hinder the process or would it be an new and unique way to share information that may be unknown to others?

The study also presented additional data representative of the stakeholders and the utilization of the program. When reviewing the data collected regarding the types of programming utilized within the class and for student assignments, it is quite obvious that neither students nor teachers are taking advantage of the tools available to them. It appeared that both target groups were comfortable with the now traditional types of applications such as word processing and the newer Googledocs. The common theme of the data may be that neither group has been afforded the opportunity to explore or use the applications. Whether through lack of time, lack of training, or simply not being familiar with the applications, today's students and teachers are missing out on a higher level of creativity and additional ways to express themselves. Perhaps a way to confront this unfamiliarity or fear would to once again engage it through training and practice. The use of tutorials perhaps in small group sessions would prove to be beneficial. In a reference to Vygotsky (1934), the concept of scaffolding – building from what is already known may be a technique of use or perhaps employing the Zone of Proximal Development (ZPD) would prove beneficial. By have new information structured in a way to meet the needs of the learner has been both beneficial and successful.

Finally, when reviewing the data presented and the implications of its use, it may be wise to reflect and practice the words of Bidder (2013), "Put a plan in place, get senior managers on board, and be prepared to listen." As with the implementation of any new program, whether it be in the world of business or in education, proper planning, adequate buy-in, and the fine art of

listening are important. The teachers of today no longer teach in isolation, we are living in a world we never dreamed of and we are preparing students for a world that can be as great as their imaginations. In order for everyone to experience success, we must be willing to take a chance and to listen to the parties involved. I applaud the Superintendent of the Target SD for taking the chance on BYOD programming and for his attempts in obtaining buy-in from his faculty and staff, but now is the time to sit back and listen to what the students are saying. This is their education – they should have a voice in it and they may be able to provided much needed training to the teachers on topics they are either fearful of or unfamiliar with.

The data provided in this case study should be viewed as a small sampling of what is happening in the world of education. The demand to prepare students for a world that has not yet been defined is a daunting one. We need to continue to review, evaluate, revise, and implement what is currently happening in our schools and how our students are being prepared for their futures. This researcher hopes that this study will contribute to the ongoing educational dialogue needed to maximize the effectiveness of BYOD programs.

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APPENDIX A

SURVEY – EDUCATORS

Section I: Perceptions

Complete each question in regards to the BYOD program within your school district.

1. Do you believe that you have altered your instructional strategies as a direct result of the implementation of a BYOD program within your school district?
   a. Definitely did not alter
   b. Altered minimally
   c. Unsure
   d. Somewhat altered
   e. Altered greatly

2. How concerned are you that you will be unable to keep up with curricular and instructional changes essential to a successful BYOD program?
   a. Extremely unconcerned
   b. Slightly unconcerned
   c. Unsure
   d. Slightly concerned
   e. Extremely concerned

3. How supportive are you of the BYOD program?
   a. Extremely unsupportive
   b. Somewhat unsupportive
   c. Unsure
   d. Somewhat supportive
   e. Extremely supportive

4. How strongly do you identify with the following statements: BYOD programming within my district is:

Disorganized 1	Somewhat Disorganized 2	Unsure 3	Somewhat Organized 4	Organized 5
Ineffective 1	Somewhat Ineffective 2	Unsure 3	Somewhat Effective 4	Effective 5
Inefficient 1	Somewhat Inefficient 2	Unsure 3	Somewhat Efficient 4	Efficient 5

Difficult to implement	Somewhat Difficult	Unsure	Somewhat Easy	Easy to implement
1	2	3	4	5
Costly	Somewhat Costly	Unsure	Somewhat Cost Efficient	Cost efficient
1	2	3	4	5
Not beneficial to students	Somewhat Not Beneficial	Unsure	Somewhat Beneficial	Beneficial to students
1	2	3	4	5

Section II: Frequency

5. In your classroom, how often do you utilize mobile devices?
   a. Never
   b. < 5 x/month
   c. 6 – 15 x/month
   d. 16 – 25 x/month
   e. Daily

6. How often do you utilize mobile devices to enhance the curriculum within your classes?
   a. Never
   b. < 5 x/month
   c. 6 – 15 x/month
   d. 16 – 25 x/month
   e. Daily

7. How frequently have you altered your educational strategies as a result of the implementation of BYOD programming within your school district?
   a. Never
   b. < 5 x/month
   c. 6 – 15 x/month
   d. 16 – 25 x/month
   e. Daily

Section III: Utilization

8. Through the use of your school district's BYOD program, how often to you:

	Never	< 5 x/month	5 – 15 x/month	16-25 x/month	Daily
Facilitate/inspire student learning and creativity?					

Design/develop digital learning experiences and assessments?					
Model digital age work and learning?					
Promote/model digital citizenship and responsibility?					
Engage in professional growth and leadership?					

9. What types of assignments/activities have you assigned to your class? (Check all that apply.)

Assignment/activity	Assigned to class.
Internet Research	
Access to Library Research Databases	
Word Processing	
Presentations	
Spreadsheets	
Wikis	
Blogs	
GoogleDocs	
Moodle	
PowerSchool	
Email to teachers	
Email to peers	
Text to teachers	
Text to peers	
Other (please list):	

10. What applications have you allowed for projects and/or assignments in your class? (Check all that apply.)

Application	Used in your class.
PowerPoint	
Prezi	
GoogleDocs	
Keynote	
iMovies	

iPhoto	
GarageBand	
OpenOffice	
Pages	
Photoshop	
Adobe Creative Suite	
Glogster	
Other (please list):	

11. Which of the following applications have you used **in** your classes this year? (Check all that apply.)

Web 2.0 Tool	Used in your class.
Voicethread	
Wikispaces	
CoverItLive	
Blabberize	
Glogster	
Mixbook	
Storybird	
Moodle	
Vocaroo	
Prezi	
Animoto	
GoogleDocs	
Other (please list):	

Section III: Types of Devices

12. Which device do you currently use? (Check all that apply.)

Device	Currently Use - Personally	Currently Use – Professionally (in school)
iPod Touch		
iPhone		
Android Smartphone		

Windows Phone		
iPad		
Android Tablet (ex: Samsung Galaxy, Motorola Xoom, etc)		
Kindle Fire		
Barnes & Noble Nook		
Other (please list):		

Section IV: Demographics

13. Please indicate your gender.
   a. Male
   b. Female

14. How many years have you been teaching?
   a. < 4 years
   b. 4-10 years
   c. 11-20 years
   d. 21-30 years
   e. 30+ years

15. What position do you currently hold?
   a. Teacher
   b. Administration

16. What sector of education do you primarily serve:
   a. General Education
   b. Specialty classes (i.e.: Art/Family & Consumer Science/Technology/etc.)

17. What is your current educational level?
   a. Bachelors
   b. Bachelors +24
   c. Masters/Masters equivalent
   d. Masters +30
   e. Doctoral

APPENDIX B

SURVEY – STUDENTS

Section I: Perceptions

Complete each question in regards to the BYOD program within your school district.

1. Do you believe that you have altered your learning strategies as a direct result of the implementation of a BYOD program within your school district?
   a. Definitely did not alter
   b. Altered minimally
   c. Unsure
   d. Somewhat altered
   e. Altered greatly

2. How concerned are you that you would be unable to compete on a global level academically if BYOD programming was eliminated in your school district?
   a. Extremely unconcerned
   b. Slightly unconcerned
   c. Unsure
   d. Slightly concerned
   e. Extremely concerned

3. How supportive are you of the BYOD program?
   a. Extremely unsupportive
   b. Somewhat unsupportive
   c. Unsure
   d. Somewhat supportive
   e. Extremely supportive

4. Which class(es) do you believe you use a mobile device more often:
   a. General Education
   b. Specialty classes (i.e.: Art/Family & Consumer Science/Technology/etc.)

5. How strongly do you identify with the following statements: BYOD programming within my district is:

Disorganized 1	Somewhat Disorganized 2	Unsure 3	Somewhat Organized 4	Organized 5
Ineffective 1	Somewhat Ineffective	Unsure 3	Somewhat Effective	Effective 5

	2		4	
Inefficient 1	Somewhat Inefficient 2	Unsure 3	Somewhat Efficient 4	Efficient 5
Difficult to implement 1	Somewhat Difficult 2	Unsure 3	Somewhat Easy 4	Easy to implement 5
Costly 1	Somewhat Costly 2	Unsure 3	Somewhat Cost efficient 4	Cost efficient 5
Not beneficial to me 1	Somewhat Not Beneficial 2	Unsure 3	Somewhat Beneficial 4	Beneficial to me 5

Section II: Frequency

6. In your classroom, how often do you utilize mobile devices?
    a. Never
    b. < 5 x/month
    c. 6 – 15 x/month
    d. 16 – 25 x/month
    e. Daily

7. How often have your teachers altered the way they teach within your classes as a result of the BYOD program?
    a. Never
    b. < 5 x/month
    c. 6 – 15 x/month
    d. 16 – 25 x/month
    e. Daily

8. How frequently have you altered your learning strategies as a result of the implementation of BYOD programming within your school district?
    a. Never
    b. < 5 x/month
    c. 6 – 15 x/month
    d. 16 – 25 x/month
    e. Daily

Section III: Utilization

9. Through the use of your school district's BYOD program, how often have you demonstrated:

	Never	< 5 x/month	5 – 15 x/month	16-25 x/month	Daily
Creativity and innovation?					
Communication and collaboration?					
Research and information fluency?					
Critical thinking/problem solving/decision making?					
Digital citizenship?					
Technology operations and concepts?					

10. What types of assignments/activities have you assigned to your class? (Check all that apply.)

Assignment/activity	Assigned to class.
Internet Research	
Access to Library Research Databases	
Word Processing	
Presentations	
Spreadsheets	
Wikis	
Blogs	
GoogleDocs	
Moodle	
PowerSchool	
Email to teachers	
Email to peers	
Text to teachers	
Text to peers	
Other (please list):	

11. What applications have you used for projects and/or presentations in your class? (Check all that apply.)

Application	Used in your class.
PowerPoint	

Prezi	
GoogleDocs	
Keynote	
iMovies	
iPhoto	
GarageBand	
OpenOffice	
Pages	
Photoshop	
Adobe Creative Suite	
Glogster	
Other (please list):	

12. Which of the following application have been used **in** your classes this year? (Check all that apply.)

Application	Used in your class.
Voicethread	
Wikispaces	
CoverItLive	
Blabberize	
Glogster	
Mixbook	
Storybird	
Moodle	
Vocaroo	
Prezi	
Animoto	
GoogleDocs	
Other (please list):	

Section III: Types of Devices
13. Which device do you currently use? (Check all that apply.)

Device	Currently Use – Personally	Currently Use – Professionally (in school)
iPod Touch		
iPhone		
Android Smartphone		
Windows Phone		
iPad		
Android Tablet (ex: Samsung Galaxy, Motorola Xoom, etc)		
Kindle Fire		
Barnes & Noble Nook		
Other (please list):		
I don't own/use any devices.		

Section IV: Demographics

14. Please indicate your gender.
    a. Male
    b. Female

APPENDIX C

INTERVIEW PROTOCOLS: TEACHERS/STUDENTS

Interview Protocol: Educators

Hello (name),

Thank you very much for agreeing to talk to me today and for your participation in my doctoral research. I know that you are very busy so, I promise to keep this as short as possible.

I am hoping to gain insight regarding your use of BYOD programming within your district.

To make the process easier and to keep the interview moving, I would like to record our conversation.

Do I have your permission to record this conversation?

Before we begin, do you have any questions for me?

1. **What was your initial reaction to BYOD programming?**
2. **How are you using mobile devices within your class? What type(s)?**
3. **What do you feel the benefits of BYOD programming are?**
4. **Describe the challenges you have encountered integrating BYOD programming?**
5. **How have your teaching style/strategies changed since implementing BYOD?**
6. **What impact do you think BYOD programming has had on your student's educational experience?**
7. **How has BYOD programming affected of your teaching functions?**
8. **What are your beliefs regarding "equality" amongst your students?**
9. **How do you respond to "inappropriate" on-line behavior?**
10. **How have you changed following the implementation of BYOD programming?**
11. **How do you think your students have changed following the implementation of BYOD programming?**
12. **What is your overall perception of BYOD programming today?**

Is there anything else you would like to share with me regarding your experiences with the BYOD programming within Lakeland School District?

Thank you for participating in this interview. I greatly appreciate your time and cooperation. After I review the transcripts of our conversation, I will include your responses in my study.

If you have any questions or if you would like to provide any additional follow-up information, I can be reached at **dcarey.study@gmail.com**

Interview Protocol: Students

Hello (name),

Thank you very much for agreeing to talk to me today and for your participation in my doctoral research. I know that you are very busy so, I promise to keep this as short as possible.

I am hoping to gain insight regarding your use of BYOD programming within your district.

To make the process easier and to keep the interview moving, I would like to record our conversation.

Do I have your permission to record this conversation?

Before we begin, do you have any questions for me?

1. **What was your initial reaction to BYOD programming?**

2. **How are you using mobile devices within your class? What type(s)?**

3. **What do you feel the benefits of BYOD programming are?**

4. **Describe the challenges you have encountered integrating BYOD programming?**

5. **How has your learning style changed since implementing BYOD?**

6. **What impact do you think BYOD programming has had on your educational experience?**

7. **How do you think BYOD programming has affected of your teachers?**

8. **What is your perception regarding "equality" amongst your peers?**

9. **How do your teachers respond to "inappropriate" on-line behavior?**

10. **How have you changed following the implementation of BYOD programming?**

11. **How do you think your teachers have changed following the implementation of BYOD programming?**

12. **What is your overall perception of BYOD programming today ?**

Is there anything else you would like to share with me regarding your experiences with the BYOD programming within Lakeland School District?

Thank you for participating in this interview. I greatly appreciate your time and cooperation. After I review the transcripts of our conversation, I will include your responses in my study.

If you have any questions or if you would like to provide any additional follow-up information, I can be reached at **dcarey.study@gmail.com**

APPENDIX D

INFORMED CONSENT DOCUMENTS: STUDY/PILOT STUDY

Educators/Students/Parents of Students
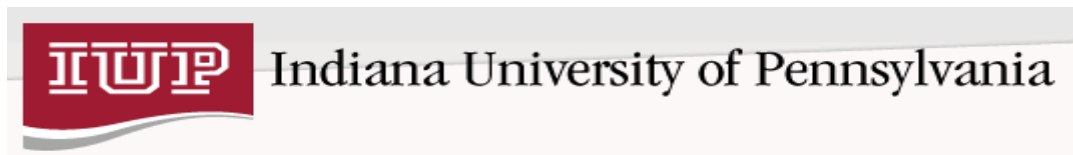
IUP Indiana University of Pennsylvania

Title: *Bring Your Own Device: A Case Study of a 10th Grade BYOD Program in a Rural Pennsylvania School District*

Researcher: *Donna M. Carey, doctoral candidate at Indiana University of Pennsylvania/East Stroudsburg University*

This is a research study that will involve the completion of an online survey and/or a recorded telephone interview. The online survey will consist of approximately 18(students) – 21 (educators) questions. Please note that none of the questions are open-ended nor do they require a narrative response. I encourage you to complete the survey and/or interview to completion and please feel free to ask questions at any time.

Introduction

The purpose of this research study is to learn more about the use of mobile devices in a Bring Your Own Device (BYOD) program. It will also look at the knowledge and perceptions of 10th grade educators and 10th grade students as they relate to mobile devices in general.

You are being invited to participate in this research study because your school district has taken on multiple initiatives in regards to BYOD programming and your first-hand knowledge and experience is valuable to the world of education.

Description of Procedures

If you agree to participate in this research study, you participation will consist of an online survey and/or a taped interview. The survey will take approximately 10 minutes while the interview will take approximately 15 minutes depending upon your responses.

The survey will be analyzed to determine perceptions, similarities, and differences of the targeted groups participating in the study. The targeted groups will be divided into: 10th grade educators and 10th grade students. The interviews will be recorded and later transcribed for analysis.

A copy of the completed research project will be available upon your request.

Risks

There are no known or foreseeable risks involved for participation in the survey, nor in the interview process and all responses will remain confidential.

Benefits

If you should decide to participate in the study, there may be a direct benefit to you. It is hoped that the information garnished in this study will add to the body of knowledge of how mobile devices and BYOD programming affects the secondary educational setting.

Costs and Compensation

There will be no cost to you for your participation in this research project except for the time you need to complete the survey and/or the interview.

A gift card will be presented to each of the participants as a token of appreciation for their participation.

Participant Rights

Your participation in this research study is completely voluntary and you may refuse to participate or stop participating at any time.

Confidentiality

Records identifying participants will be limited – no names or identifiable information will be gathered during any portion of this study. Email addresses provided to arrange the interview will be deleted upon completion of the interview process. The research study will have been approved by the Institutional Review Board (IRB) of Indiana University of Pennsylvania prior to the study being conducted. To ensure confidentiality, the following measures will be taken:

- Interviews will be recorded and transcribed and will be recorded as:
    - Student – Teacher
    - Number
    - Example: Student (S) #1 / Teacher (T) #1
- The data generated from the survey and the interviews will be stored on a password protected computer that is not shared with anyone other than the researcher.
- The data will be kept until the completion of the research study. Should the study result in publication, your identity will remain strictly anonymous and confidential. The name of the school district will be referred to as "Target" School District..

Questions or Concerns

You are encouraged to ask questions for clarification at any time during this study. For further information, please contact the researcher at **dcarey.study@gmail.com**

Consent
As a research participant, I have read the entire Informed Consent Document and I am in agreement to participate in the project. My signature below releases the researcher form all risks of participation.

_____

 (Printed Name of Participant)   (Signature of Participant)   (Date)

_____

 (Printed Name of Parent – student participant only)   (Signature of Parent)   (Date)

_____

 (Printed Name of Researcher)   (Signature of Researcher)   (Date)

Thank you in advance for your participation!

Indiana University of Pennsylvania

Educators/Students/Parents of Students

Title: *Bring Your Own Device: A Case Study of a 10^{th} Grade BYOD Program in a Rural Pennsylvania School District*

Researcher: *Donna M. Carey, doctoral candidate at Indiana University of Pennsylvania/East Stroudsburg University*

This is a research study that will involve the completion of a paper and pencil survey and a recorded interview, if chosen to participate. The survey will consist of approximately 18(students) – 21 (educators) questions. Please note that none of the questions are open-ended nor do they require a narrative response. I encourage you to complete the survey and/or interview to completion and please feel free to ask questions at any time.

Introduction

The purpose of this research pilot study is to learn more about the use of mobile devices in a Bring Your Own Device (BYOD) program. The study will look at the knowledge and perceptions of 10^{th} grade educators and 10^{th} grade students as they relate to mobile devices in general.

You are being invited to participate in the Pilot Study component of the research study because your school district has taken on multiple initiatives in regards to BYOD programming and your first-hand knowledge and experience is valuable to the world of education.

Description of Procedures

If you agree to participate in this research pilot study, you participation will consist of a survey and/or a taped interview. The survey will take approximately 10 minutes while the interview may take approximately 15 minutes depending upon your responses.

The survey will be analyzed to determine perceptions, similarities, and differences of the targeted groups participating in the study. The targeted groups will be divided into: educators and students. The interviews will be recorded and later transcribed for analysis. All information gathered from the Pilot Study will be reviewed and used to revise the survey/interview components of the actual research study.

A copy of the completed research project will be available upon your request.

Risks

There are no known or foreseeable risks involved for participation in the survey, nor in the interview process and all responses will remain confidential.

Benefits

If you should decide to participate in the study, there may be a direct benefit to you. It is hoped that the information garnished in this pilot study will add to the body of knowledge of how mobile devices and BYOD programming affects the secondary educational setting.

Costs and Compensation

There will be no cost to you for your participation in this research project except for the time you need to complete the survey and the interview.

Participant Rights

Your participation in this research study is completely voluntary and you may refuse to participate or stop participating at any time.

Confidentiality

Records identifying participants will be limited – no names or identifiable information will be gathered during any portion of this study. Email addresses provided to arrange the interview will be deleted upon completion of the interview process. The research study will have been approved by the Institutional Review Board (IRB) of Indiana University of Pennsylvania prior to the study being conducted

To ensure confidentiality, the following measures will be taken:

- Interviews will be recorded and transcribed and will be recorded as:
  - Student – Teacher
  - Number
  - Example: Student (S) #1 / Teacher (T) #1
- The data generated from the survey and the interviews will be stored on a password protected computer that is not shared with anyone other than the researcher.
- The data will be kept until the completion of the research study. Should the study result in publication, your identity will remain strictly anonymous and confidential. The name of the school district will be referred to as "Pilot" School District.

Questions or Concerns

You are encouraged to ask questions for clarification at any time during this study. For further information, please contact the researcher at **dcarey.study@gmail.com**

Consent

As a research participant, I have read the entire Informed Consent Document and I am in agreement to participate in the project. My signature below releases the researcher form all risks of participation.

(Printed Name of Participant)	(Signature of Participant)	(Date)

(Printed Name of Parent – student participant only)	(Signature of Parent)	(Date)

(Printed Name of Researcher)	(Signature of Researcher)	(Date)

Thank you in advance for your participation!

APPENDIX E

OBSERVATION FORM

Date:	Period:		Class:	
Class Activity			**Start time:**	**End time:**
TOT (10 min. intervals):	**Total # of students:** _____		**Total # of STUDENT**	
devices:_____				
Student 1 (M/F): _____ _____ _____ _____ _____ _____ _____ _____ _____ _____				
Device:Y/N				
Student 2 (M/F): _____ _____ _____ _____ _____ _____ _____ _____ _____ _____				
Device:Y/N				

ISTE Standards – Teacher (Check all that were observed.)	**ISTE Standards – Students** (Check all that were observed.)
o Facilitate/inspire S learning and creativity	o Creativity and innovation
o Design/develop digital learning experiences and assessments	o Communication and collaboration
o Model digital age work and learning	o Research and information fluency
o Promote/model digital citizenship and responsibility	o Critical thinking/problem solving/decision making
o Engage in professional growth and leadership	o Digital citizenship
	o Technology operations and concepts

NOTES: