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# Teachers' Perceptions and Experiences in Implementing Mobile Devices Into Their Teaching

Joy Erin Winterhalder  
*Walden University*

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# Walden University

College of Education

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Joy Winterhalder

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2017

Abstract

Teachers' Perceptions and Experiences in Implementing Mobile Devices Into Their  
Teaching

by

Joy Winterhalder

MPH, Southern Connecticut State University, 1996

BS, University of New Haven, 1981

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Educational Technology

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## Abstract

This phenomenological study addressed the lack of understanding of how teachers implement personal devices in the classroom and whether the instruction is constructivist in nature. Although mobile technology is convenient, it is not yet understood if Bring Your Own Device/Technology (BYOD/BYOT) programs encourage a teacher pedagogy shift. The purpose of this qualitative study was to explore the perceptions and lived experiences of 10 teachers in Grades 6 to 12 who had been part of a BYOD/BYOT program for more than 2 years. Data from interviews and lesson demonstrations were analyzed via a constructivist framework first identifying themes and then categories. Teachers perceived that using mobile technology provided the replacement of old tools, instructional planning changes, and the shifting of learning to the students from the traditional design of the teacher as the lecturer to the teacher as the facilitator. Teachers experienced more student engagement and collaboration although they needed to monitor students more carefully to avoid students' being off task and to ensure safety usage of the mobile devices in the classroom. There are implications for social change both on the local and organizational level. Teachers can better understand how their pedagogy aligns with constructivist teaching and learning, and therefore can see where they still need to grow. On the organizational level, school districts may better understand that using technology at first will be used to replace previous pedagogy practices directly and that it will take support and time for technology implementation to impact changes in teachers' philosophy of teaching.

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## Dedication

This study is lovingly dedicated to my family who have supported me on this lifelong journey to obtain a doctorate degree in education. I would like to acknowledge my companion Peter Marino, who encouraged me to follow my dreams and accompanied me to all of my residencies. I am eternally grateful for your support during my growing times on this journey.

This study is also dedicated to my amazing four children Bryan, Meghan, Kelly, and Carly and my daughter and son in-laws Megan and Ray, who have made this journey so meaningful. This study is also dedicated to my amazing five grandchildren who inspire me to move on each day, Bryan, Mikayla, Eli, Jaxon, and Vivian Rae. I will pray you will follow your dreams and listen to your heart when planning your lives. I would also like to dedicate this to my parents, Jim and Joyce, who have always supported my decisions and encouraged me to be the best I could be. With all of you, I would not have been able to accomplish this feat without both your prayers and words of encouragement. Finally, this research study is dedicated to the teachers at Walden University who strive to make their instruction both valuable and inspiring.

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## Chapter 1: Introduction to the Study

Recent advancements in technology have turned the world into a place where events can occur in one corner of the globe that can affect the lives of others in another corner of the world. Advancements in technology and the Internet have caused rapid changes in society that affect social, economic, and educational changes. With this, attention has turned to the use of technology in education to meet the needs of today's ever-changing society. The use of technology has become a priority for educators all over the world, particularly the interest for improving the quality of learning and teaching, leading towards an educational opportunity for all of those who are seeking to implement technology in their instruction.

Educational technology is part of the process of modernizing and improving education by providing students with technology tools to enable students to access curriculum that is digital in nature (Joseph, 2011). Technology plays a role in developing teaching styles that respond to changes in society and knowledge. Technology has also given rise to the concept of educational technology becoming a placement in an organized process of designing, implementing, and evaluating the process of both learning and teaching.

Facilitating communication with others can help students communicate with others by representing their knowledge with a variety of computer programs. The use of technology can function as a mind tool to help students communicate with themselves (Jonassen, 2000). When students represent their knowledge, graphically they are led to examine how they think and how they can arrange what they know. This is the process

of critical thinking about what they know, how they know it, and how they can process the information to communicating what they know to others (Mulnix, 2012).

The process of critical thinking is partially dependent upon the students' ability to engage computers effectively (Coleman, King, Ruth, & Sary, 2001). This is where the teachers have the opportunity to help students develop technology literacy to enable them to enjoy the benefits that technology has to offer in their educational learning environment. In effort to achieve this, teachers have to become the facilitators of operating computer devices as they play an essential role in educational instruction (Coleman et al., 2001). Computers, therefore, need to be available as a learning tool at every level of education. It is essential that students learn to use their own mobile devices effectively for educational purposes. In promoting the use of mobile technology in instruction, teachers as the facilitators are employing an effective method of self-based learning (Al-Yousif, 2001).

### **Background of the Study**

As early as the 1980s to the 1990s, mobile technology was introduced into schools in the form of pagers. The implementation of pagers paved the way for the making of policies that would govern the use of mobile-communication devices in the classroom. The banning of such devices as pagers and cell phones for educational use was initiated to prevent issues such as selling drugs or organizing groups or gangs (Katz, 2006). According to Katz (2006), policies then carried through to the banning of other devices such as smartphones, personal digital assistants, and MP3 players. Mobile technology was growing more rapidly in society. As the rapid growth was becoming

every day, school policies began to emerge (Thomas & McGee, 2012). Charles (2012) and Purcell et al. (2012) found that teachers were opposed to the use of mobile technology in schools as they viewed them as a distraction. Valdez et al. (2000) explained the evolution of educational technology as having occurred in three phases. These phases include print automation, expansion of learning opportunities, and data-driven virtual learning. In the first phase, print automation was the practice of sending students to a computer lab where they would practice using tutorials on the principles of behavioral learning (Valdez et al., 2000). In the second phase, technology shifted to being learner based. In this phase, the quality of learning depended upon the basis of the learner (Valdez et al., 2000). In the third phase, the Internet was introduced, making virtual learning possible. In this phase, multimedia presentations made it possible for teachers to begin exploiting the many prospects of data-driven teachings (Valdez et al., 2000).

Albion (1999) wrote about the connection between technology use and teachers' confidence. Albion suggested that

teachers' beliefs are a significant factor in their success when integrating technology; that self-efficacy beliefs are important as well as a measurable component of the beliefs that influence technology integration; and that particular instructional strategies might be effective for increasing self-efficacy beliefs relevant to technology integration. (p. 10)

Albion further suggested that educators should understand the usage of technology in their lessons by claiming that "for teachers to use technology, they need to develop knowledge that enables them to translate technological potentials into solutions

to pedagogical problems, which are very local and deeply situated in their own contexts” (p. 4). Teachers need to be abreast of the potential of technology to enhance their instruction since today’s students are growing up in 21st century of technology.

Owens (2009) stated that for teachers to successfully integrate technology into instruction, it is essential that teachers are assisted as they obtain the knowledge, skills, and the confidence needed in their success in their endeavor to obtain their success. Owens (2009) further stated that “technology integration happens when we remove the barriers, incorporate appropriate pedagogy and instructional strategies, and support students and teachers in the classroom.” (p. 14). The obligation to provide a rich learning environment and extend emerging pedagogies is pertinent to the success of technology integration. Technology becomes the avenue for making the transformation in an experiential learning environment as students today are growing up with technology such as video and computer games (Chambers, Carbonaro, & Rex, 2007). This is where the teacher is transformed from the authority expert to the facilitator and where students are transformed from passive recipients of knowledge to active participants seeking knowledge and knowledge construction (Harris & Hofer, 2011).

The nature of education is forever changing in the digital age. The role of the teacher both within the community and in the school is shaped by available technology for both instructional and non-instructional purposes (Brooks-Young, 2007; Gu, Zhu, & Guo, 2012; Loveless, 2008). Over the past several decades, schools have benefited from the digital revolution. Bebell, Russell, and O’Dwyer (2004) suggested that further

research needs to be done on how teachers are using technology for both imparting instruction and facilitating student learning.

In general, educational research has no clear definition in terms of what is meant by technology use by both teachers and students (Moeller & Reitzes, 2011). Defining and measuring the use of instructional technology has increased with the variation and advances of available technology to teachers. There is a need to contextualize how teachers are using technology as it relates to student learning before there can be a full understanding of how technology is used in school by both teachers and students. Friedrich and Hron (2011) reported how the use of technology by teachers varies widely in the classroom, particularly how it applies to instructional delivery.

Harris and Hofer (2011) suggested that more studies are needed to how teachers perceive technology use in the classroom. Understanding the relationship between instructional strategies and the use of technology requires additional research for both teacher instruction and student learning. The following studies touch upon a few pros and cons of implementing mobile technology in teachings. A qualitative case study by Jones (2014) found that 12 high school teachers showed assurance in using technology for personal technology use. However, the experience did not have an impact on the willingness to implement mobile technology. The unwillingness to implement mobile technology was a result of teachers' perceptions of behavior management in a BYOD/BYOT classroom.

The use of mobile technology has been viewed as meaningful by higher-education students. Davison and Lazaros (2015) compared preferences among a higher-

education student population's use of mobile technology to a population of higher-education students. Results showed that students believe mobile learning to be meaningful to their course work as they felt comfortable using their own devices. The students felt that mobile learning or mLearning was important in their learning experience and preferred using laptops over other mobile devices such as smartphones. Davidson and Lazaros also suggested that future mobile learning research remains to be done since their research targeted only one U.S. school in Indiana. The suggestion for future research would be in effort to reveal any new trends related to mobile technology implementation and learning.

The use of mobile technology can both advance and promote ownership of learning. Song, Sun, and Jong (2016) conducted a 1-year study in a BYOD/BYOT science inquiry-based classroom in Hong Kong. They found that when using mobile technology, coupled with integrating various applications through the use of mobile technology, both students' science knowledge and ownership of learning advanced. This study indicated how mobile technology can have an impact on inquiry-based learning and a paradigm shift from teacher as a lecturer to teacher as a facilitator promoting student-centered learning.

### **Introduction of Bring Your Own Device or Bring Your Own Technology**

In this section, I explore the practical integration of the BYOD phenomenon into education. BYOD or BYOT programs challenge educators in finding ways to integrate mobile technology into their classroom lessons (Pascopella, 2009). These programs were introduced into school systems as a safeguard against student misuse of mobile devices,

allowing teachers to implement the use of personal mobile devices into their teachings. BYOD/BYOT is becoming a common occurrence in the educational setting that permits teachers to allow students to use their own device in combination with using the Internet as part of their lesson (DiFilipo & Kondrach, 2012). The opportunity to use individual mobile devices imparts variation to the way teachers instruct in their teachings (Singh, 2013). Using this technology allows teachers to give feedback to students so they can adjust their thinking to develop their connections. The teacher can then provide approaches to a student's understanding in a manner that suits their style of learning (Collins & Halverson, 2010).

Both the BYOD and BYOT program initiatives provide a solution to school districts that face budget constraints for implementing technology into the classroom teachings (Intel Corporation, 2012). Singh (2013) discovered that a gap exists between technology use and the availability of technology in classroom instruction. The teacher is critical in the actual conversion of the educational system to include technology integration in their teachings, (Singh, 2013). Both programs provide the opportunity for students to bring in personal devices such as smartphones, laptops, tablets, notebooks, or eReaders for educational purposes. Some schools believe that BYOD or BYOT programs are beneficial since students are provided the opportunity to use their own devices for educational purposes while others believe the use of personal devices can hinder both teaching and learning in the classroom (Intel Corporation, 2012).

In an effort to understand what effects technology has on learning, there has to be an understanding of how teachers and students are using technology in schools. The use

of technology in the classroom varies widely, especially in the application of technology in instruction (Fredrich & Hron, 2011). Students use technology to both enhance their learning experience and to produce work whereas teachers need to apply technology for instructional delivery.

Styles of instruction are developed to address the various ways in which students learn. Gardner (2006) introduced the multiple intelligence theory in the 1980s. The multiple intelligence theory can be used to group abilities into categories that can enable students to comprehend core ideas by presenting various themes that are associated with each other (Gardner, 2000). Gardner's intelligences can provide students with a variety of learning opportunities when applied to classroom instruction.

The diverse needs of students can be met through differentiated instruction when the multiple intelligence theory is applied (Beam, Brownlee, Voakes, & Wilhoit, 2009; Tomlinson, 2001; Tomlinson & Allan, 2000). This can influence student success because learning styles and preferences are considered while immersing a student into an educational experience (Tomlinson, 2001). Tomlinson (2001) defined differentiated instruction as student-centered instructional design that meets the diverse academic needs of learners. As an instructional strategy for teachers, differentiation provides a variety of ways to meet students' needs to process content and complete a task (King-Shaver, 2008; Tobin & McInnes, 2008; Tomlinson, 2001). With differentiated instruction, a teacher can provide effective classroom practices to maximize student learning (Tomlinson & Allen, 2000). Differentiated instruction can also enhance student learning through the students'

point of view (Rock, Gregg, Ellis, & Gable, 2008). The instructional philosophy also suggests accommodating instruction through modification or through adjusting instructions to strengthen student needs (Brown, 2004). Teaching methods in diverse disciplines emphasize the importance of student-centered learning classrooms (Association of Advancement in Science, 1993; National Council of Teachers of English; 2000; National Council of Teachers of Mathematics, 2000). The idea of moving away from linear direct instruction toward constructivist classrooms has been supported by educational leaders. The International Society for Technology in Education (2000) supports technology integration that is student-centered where the teacher is the facilitator. Evans (2008) studied the relationship between cognition and style of teaching, emphasizing a need to study teaching style as it relates to components of the classroom which contribute to learning. Furthermore, Evans emphasized the connection between learning and student-centered instruction and how both teacher characteristics and instructional style have an impact on learning outcomes. Evans (2008) noted that further research between these relationships needs to be looked at.

Increasing the integration of technology in the curriculum improves both the teaching and learning for both the teacher and students. According to Gu et al. (2012) and Zhao (2012), the skills of the 21<sup>st</sup> century students and teachers include the ability to employ large quantities of information, to process this large amount of information, and to share conclusions as both self-directed and collaborative learners. The digital age challenges both teachers and students to have a clear understanding of appropriate ways of interacting with media. Accessing information in a world that is informational

divergent will allow students to develop skills needed in a modern world in reference to communicating through various media. Leonidis et al. (2012) stated that both students and teachers who use technology collaboratively experience a greater motivation for learning. Widger and Schofield (2012) viewed this to be a result of a shift in classrooms from teacher-centered instruction to a learner-centered modality. The effective integration of technology in the classroom lessons improves creativity and collaboration among students, teachers, and other schools (Gu et al., 2012). Cavanaugh, Repetto, Wayer, and Spitler (2013) noted that student satisfaction with classroom experiences increases for all students, particularly for students with special needs, when technology is implemented effectively in teachings.

### **Problem Statement**

Technology is evolving at a rapid pace today, and as a result, many students have technology readily available for their use. These devices are referred to as mobile devices and include iPads, smart phones, notepads, and laptop computers. These devices have also shown substantial growth over the past 10 years (Sharples, Sanchez, Milrad, & Vavoula, 2008). According to Fox and Duggan (2013) in the Pew Internet and American Life Project (2013), the percentage use of personal mobile devices has risen substantively over the past decade; for example, 66% of young adults have and use a smartphone for accessing the Internet, text messaging, social networking, sharing photos, and reading.

Since the growth of mobile device use, students today rely on these devices for everyday social interactions including learning cultures such as Blackboard and Schoology. Mobile devices have become more popular as learning tools as they have

become a part of their daily wardrobe and have shaped their culture and social life (Duncan-Howell & Lee, 2007). Sharples et al. (2008) suggested that researchers should investigate how personal mobile devices can lead to gaining knowledge. Purcell et al. (2012) asserted that almost 70% of teachers saw the Internet and digital searching as a positive attribute to help students increase their skills in research and overall learning. Furthermore, within the past 10 years, the use of personal mobile devices as educational tools has increased the number of schools exploring the use of these devices in the classroom (Engel & Green, 2011). The concept of students bringing their own devices into the classroom setting has, therefore, been looked at to deploy the use of personal mobile devices for learning purposes within the school setting. One way to enhance and improve the use of mobile technology in a positive manner is to implement BYOD programs in school districts (Johnson, Smith, Willis, Levine, & Haywood, 2011). Implementation would allow for student engagement to interact with their peers, to improve communication skills, and to extend learning outside the parameters of the school setting. Prior researchers (Purcell et al., 2012) have suggested that there is a positive impact for most students when technology is implemented to improve learning. There are many resources available for providing adequate reasons for implementing the use of personal mobile devices in the classroom; however, there are few studies regarding the teachers' perceptions and experiences of implementing mobile devices into teaching. Therefore, determining teachers' perceptions and experiences of implementing various mobile technologies in their teaching would assist in understanding the value of these technology devices in education.

### **Purpose of the Study**

The purpose of this study was to understand the lived perceptions and experiences of teachers who have adopted the use of mobile devices in their teachings for student knowledge for 2 or more years. The study was a qualitative study gathering data from in-depth interviews. A phenomenology framework approach allowed me to explore how teachers perceive the adoption of personal mobile devices in their teachings and in their experiences of adopting mobile devices in knowledge.

### **Research Questions**

The purpose of this qualitative phenomenological study was to understand the lived perceptions and experiences of teachers who have adopted the use of mobile devices in their teachings for student knowledge for a period of 2 or more years. I used interviews and classroom observations to explore how teachers both perceive and support the use of mobile technology. During the interview, open-ended questions were designed to elicit detailed responses from teacher participants. As noted by both Yin (2011) and Creswell (2009), the questions of a qualitative research study should guide the study, capturing the heart of the phenomenon.

Three research questions were pertinent to this study. The research questions that guided the investigation of this study were as follows:

1. What are both the perceptions and shared perceptions of teachers in using mobile devices to provide knowledge to their students?
2. How do teachers describe their experiences when using mobile devices to provide knowledge?

3. What are positive and negative factors that teachers indicate when using in their exercise of using mobile devices in the classrooms?

### **Conceptual Framework**

The phenomenon being explored in this study is that of the use of mobile technology in BYOD/BYOT classrooms. This study is based on a conceptual framework that has two parts. The first is on the theory of constructivism, and the second is on Honebein's (1996) seven goals for design of constructivist classrooms. First, the framework is based on the theory of constructivism. Constructivism can offer a valuable theoretical perspective for understanding a phenomenon. Some aspects of constructivism have been developed that propose different views on the construction of knowledge. Vygotsky (1978) proposed constructivism perspective, Piaget (1969) proposed cognitive constructivism, and von Glasersfeld (1984) proposed radical constructivism. Constructivism supports active investigation diverging from rote learning that is supported by Dewey (1938) where he emphasized that "all genuine education comes about through experience" (p. 13). Each of the perspectives of constructivism views that learners actively construct meanings based on their prior individual knowledge and their experiences. The phenomenon being reconnoitered in this study is the use of mobile technology in BYOD/BYOT classrooms. Connecting new knowledge to prior knowledge and the application of understanding to real-world situations is emphasized by constructivism (Loucks-Horseley & Masumorto, 1999). Brooks (1990) asserted that constructivists believe their knowledge is a result of individual constructs of reality, and from their perspective, learning arises through recurrent formation of new guidelines and

new theories to explain what they observe. Brooks (1990) emphasized that when individuals feel “the need to create new rules and formulate new hypothesis, their present conceptions of reality are out of balance by those conceptions and new observations” (p. 68). Brooks asserted that constructivists believe their knowledge is a result of individual constructs of reality, and from their perspective, learning arises through recurrent formation of new guidelines and new theories to explain what they observe. Brooks emphasized that when individuals feel “the need to create new rules and formulate new hypothesis, their present conceptions of reality are out of balance by those conceptions and new observations” (p. 68).

The second element of this study’s conceptual framework was Honebein’s (1996) seven goals for the design of constructivist learning environments. Honebein offered teachers a way to move the constructivist theory into practice by the use of a framework for creating constructivist classrooms. Honebein’s pedagogical framework was designed so that teachers as instructional designers could use his ideas for instructional methods and strategies. The instructional framework includes seven design elements that should be present classrooms with constructivist learning (pp. 11-12). They are as follows:

1. Provide experience with the knowledge construction process.
2. Provide experience in and appreciation for multiple perspectives.
3. Embed learning in realistic and relevant context.
4. Encourage ownership and voice in the learning process.
5. Embed learning in social experience.
6. Encourage the use of multiple modes of representation.

7. Encourage self-awareness of the knowledge construction process.

A more extended explanation of each of the seven dimensions of Honebein's (1996) framework is discussed in Chapter 2.

The conceptual framework supported the study in its methodological approach, the analysis of the answers to the research questions, and in the data collection and analysis. The frame allowed me to view teachers' perceptions and experiences of their mobile technology use with students, compared to that of an ideal constructivist classroom. In a phenomenological study, attention should rest on teachers' thinking and decision-making, beliefs, and perceptions as well as repertoires of understanding (Munby, 1982). Collectively, the use of theory along with a framework is an appropriate phenomenological study and provides a construct on which to organize and analyze research results relating to teacher perceptions and experiences. The research questions, written in the phenomenological study approach, align with the conceptual framework as the focus was on teacher perceptions and experiences of implementing BYOD. Interview questions were aligned with the constructivist lens, and codes were analyzed in light of Honebein's (1996) framework.

### **Nature of the Study**

The purpose of this study was to understand the lived perceptions and experiences of teachers who have adopted the use of mobile devices in their teachings for student knowledge for 2 or more years. In this phenomenological study, I explored teachers' perceptions of implementing mobile technology into their instruction for student knowledge. The participants of this study included teachers of various grade levels in

both the middle and high schools (grades 6 to 12). The qualitative approach was appropriate for this study as it is the researchers' attempt to capture data to find existing themes to produce generalizations (Neuman, 2009). A phenomenological framework approach allowed me to explore how teachers perceive the adoption of personal mobile devices in both their teachings and in their experiences. The study included open-ended interviews to explore the perceptions of teachers who work in schools where a BYOD/BYOT program has been employed for more than 2 years. An observational component was also used to ensure the connection of real-life applications.

### **Definitions**

The terms below are both defined and cited to provide a clear and comprehensive lens for the forthcoming reading of this research project.

*Bring Your Own Device:* A strategy that uses student-owned devices (Norris & Soloway, 2011), called mobile communication devices or information and communication technologies (Anderson, 2005; Robinson, Brown, & Green, 2010) to enhance the instruction in the classroom. These types of programs are also referred to as *Bring Your Own Technology* (Project Tomorrow, 2012).

*Educational technology:* A selection of “electronic resources, tools, or applications that assist in the delivery of learning content while supporting the learning process” (Cheung & Slavin, 2013, p. 279).

*Epoche:* A term used in phenomenology that means to suspend judgment as to what is real and examine a phenomenon through the experiences of others (Giorgi, 2009).

*Essence:* A phenomenological concept that refers to shared experiences across participants.

*Scaffolding:* Synonymous with work of Vygotsky and social constructivism theory, scaffolding refers to the level of support given a child during instruction (Vygotsky, 2012).

*Technology integration:* To incorporate various technologies into all facets of learning including lesson objectives, practices, and learning assessment outcomes (Wachira & Keengwe, 2011).

### **Assumptions**

According to Neuman (2003), assumptions are “parts of social theories that are not tested, but act as starting points or fundamental beliefs about the world” (p. 529). New ideas and new concepts for research are both built on assumptions. There are a few assumptions included in this study.

The first assumption was that the administration of an educational institution must make the decision to adopt a BYOD/BYOT program. Second, the administration was qualified to make the decision to implement such program. Third, there are no outside influences that affect the decision to adopt a BYOD/BYOT program. Fourth, the target sample was representative of a population regarding their perceptions and experiences toward the adoption of a BYOD/BYOT program. Fifth, the interviewing participants gave their answers honestly, and they did not fear personal identifiable information to be insecure. The sixth and last assumption was that the students are allowed to bring their

personally owned mobile device(s) (i.e., laptops, smartphones, and tablets) to the classroom to operation on the school network.

### **Scope and Delimitations**

For the scope of this study, I focused on factors influencing the adoption of a BYOD/BYOT program in their classroom, which was seen as an area that lacked attention in both previous and recent studies on the perceptions and experiences of mobile technology use in instruction for student knowledge.

For this study, only a small number of teachers of two medium-sized school districts were interviewed. These participants represented different disciplines and different grade levels (6-12).

### **Limitations**

There were a number of limitations to this study. The first is in relation to the interviews. The interviews were expressly limited to professionals who are teachers of the educational establishment I chose. This study was also specifically restricted to an educational establishment which has adopted the BYOD/BYOT program for more than 2 years. Another limitation was in relation to time. Time constraints involved in the willingness of participants to take the necessary time warranted for the interview were considered a limitation. The target group was not limited by age or gender, but only by the requirement that they have adopted the use of mobile technology in their instruction.

Limitations also included any participant having concerns regarding both privacy and confidentiality as participating interviewees. This study initially focused only on one school district identified by the adoption of a BYOD/BYOT policy for more than 2 years.

A key limitation was the extent to which the results from the sample could be generalized to the larger population of educators. It is possible that the perceptions and experiences of the participating teachers were unique and that the results of this research could not be generalized to the population of other educators.

### **Significance of the Study**

There needs to be more research in the area of student experience in learning through the use of mobile technologies (Avraamidou, 2008; Pegrum, Oakley, & Faulkner, 2013; Shohel & Power, 2010). Understanding the perceptions and experiences of teachers who use mobile technologies in their teachings can contribute to the adoption of these devices by other teachers who are considering the use of mobile devices in their teachings to improve their students' experience of learning. With the advancement of mobile devices, opportunities for ways to implement learning technologies for teachers to provide instruction and students to learn outside of the traditional educational environment are available. The collaboration of teachers' perceptions and experiences of teachers can help clarify what teachers are doing to leverage the high levels of mobile technologies that their students are using. In addition, this study is necessary to help understand the challenges that teachers might harbor about the use of new technology and why some teachers have embraced this technology. If research can demonstrate a practical, research-based use with mobile devices in educational settings, then the viewing of these devices as social toys may move forward to viewing them as powerful mobile computers by educational stakeholders. Research has shown the positive effects of using mobile devices on student engagement in academic content and activities

(Franklin, Sexton, Lu & Ma, 2007; Pegrum et al., 2013). The issues with personal mobile devices have to do with perception: fear of stakeholders about what might happen if students are allowed to bring their own devices to school. Concerns are for the negative aspects of distractibility, security, increased ability for cheating, and equity among students (Traxler, 2007). Often these issues of protection from pernicious use outweigh the benefits. In this research, therefore, I explore the perceptions and experiences of teachers introducing mobile devices into their teaching.

### **Significance to Theory**

This study is also significant to theory. Social constructivism is a means of understanding and interpreting information from participants of a research study as individual learning experiences, processes, and meaning making are involved (Creswell, 2007). Social constructivism theory rests on the idea that individuals seek and apply meaning through subjective experiences (Yilmaz, 2008). Meaning evolves from both personal experiences and social interaction. Therefore, constructivism research attempts to understand the perceptions or meanings that participants have given to these experiences.

The phenomenology research design has two approaches: hermeneutic and psychological (Hatch, 2002). The hermeneutical approach, also called interpretive, was designed to research lived experiences and interpreting life to reveal “the essence of human experience by asking, what is the nature of this phenomenon” (Hatch, 2002, p. 30). The psychological or transcendental phenomenology approach focuses less on the interpretation of the researcher and more on a description of the experiences of the

participants. In this research study, I sought to understand, describe, and interpret the phenomenon of the experiences and perceptions of the participants by using a hermeneutic phenomenology design. To accomplish this, the phenomenon was examined through 10 teachers to reveal common experiences as they related to the implementation of mobile technology in their lessons for more than 2 years.

Understanding the perceptions and experiences of using mobile technology in teachings can be understood by using the principles of hermeneutic phenomenology. A dialectical relationship between a theoretical framework and research methodology of this study provided the window to understanding the connection between the participants' experiences and perceptions in their field experiences, lesson designs, and their prior experiences. Moreover, the exploration of the importance of mobile technology usage in education can change teachers' understandings through both dialogue and performance.

Husserl (2002) suggested that the phenomenological reduction holds wisdom that is unique to the individual. In essence, phenomenology studies constructions of consciousness from the experiences of a person's point of view. The phenomenological reduction also allows freedom from supposition and bias of common knowledge as the researcher challenges the interpretation of lived experiences of the participants of the study (Moustakas, 1994). The researcher focuses on understanding an experience from pure consciousness and then incorporates past knowledge without permitting that knowledge to affect judgment (Giorgi, 2009).

In this phenomenological study, I explored teachers' perceptions of implementing mobile technology into their instruction for student knowledge. The qualitative approach

was appropriate for this study as it is the researchers' attempt to capture data to find existing themes in this endeavor to produce generalizations (Neuman, 2009). The study included open-ended interviews to explore the perceptions of teachers who work in schools where a BYOD/BYOT program has been employed for more than 2 years. An observational component was also used to ensure the connection of real-life applications. Data gathered regarding live-experiences of teachers integrating mobile technology into their instruction shed light on their perceptions relating to the use of technology as well as their perceptions of the part they play in forming this context. The interpretation of data suggested the part they play in developing this framework.

### **Significance to Practice**

In addition to theory, this study is significant to teacher practices in the classroom as well administrators' support of teachers in the classroom. Lecklider, Bitten, and Clausen (2009) stated, "There is a critical need to educate school leaders in how technology can support school improvement, change instructional practice, and improve learning" (p. 31). When preparing students for the 21st-century learning, the use of mobile technology by teachers in their instruction needs to be implemented for various applications including research, efficiency of output of work, and improving knowledge. Some researchers have confidence that if mobile devices are leveraged adequately, they can both balance and bring value to the models and learning styles that currently exist. (Liaw, Hatala, & Huang, 2010). Schools do not have the ability to simply purchase new technologies as like the general population does, so it becomes beneficial for teachers to

incorporate mobile devices that students currently possess into their instruction. Norris and Soloway (2011) described this phenomenon as BYOD.

### **Significance to Social Change**

The significance of theory and practice tie into the significance the study has for larger social change. Both educational institutes and teachers play a purposeful role in the development of young students into members of our society, and this role is continually changing with time. Today, schools are preparing children for a world of economic opportunity and flexibility where everyone will work more flexibly and value working creatively and collaboratively (Hargreaves, 2003). Schools need to focus on the varied learning styles of individual students including new ways for teachers to teach to make a change promoting student-centered learning (Hargreaves, 2003). Archambault, Wetzel, Foulger, and Williams (2010) concentrated on the faculty in a university who integrated both Web 2.0 tools and social media in effort to promote a student-centered classroom. Archambault et al., (2010) discovered that the teachers' role became that of a facilitator, increasing both the feedback and the communication of students and educators. In essence, this promoted new teaching practices to compete with the developing world where students learn.

The educational focus is entering a new age of instruction, an "Age of Mobilism" categorized by connectedness, affordability, and globalness (Norris & Soloway, 2011). Selwyn (2005) suggested that "learning to use new information technologies such as computers, is considered to be a fundamental aspect—even an obligation—of citizenship and employment in contemporary society" (p. 122). It is, therefore, important for schools

to teach students how to use technology and for teachers to teach its responsible use. Understanding the perceptions and lived experiences of teachers who implemented mobile technology use in their instruction may foster how technology can be used appropriately and further promote the innovation.

### **Summary**

BYOD/BYOT is a comparatively new theme in education. It is a subject that has been increasing in importance each year, as schools manage the admission of devices that students bring to their schools. When attempting to integrate these devices into lessons, schools face challenges both logistically and with educators who are the change agents or implementers. Schools should embrace this new era of learning by researchers, BYOD/BYOT learning advocates, and the United States Department of Education (Project Tomorrow, 2012).

In Chapter 2 of this study, I report the appropriate research literature for implementing personal mobile technology, including the role that schools play in the 21st century, implementation of mobile learning programs, and teachers' responses to implementing technology in their classroom. In Chapter 3, I describe the research questions and research methodology used to answer the questions was reported. In Chapter 4, findings are presented, and in Chapter 5, the importance and implications of this study are discussed.

## Chapter 2: Literature Review

The purpose of this study was to understand the lived perceptions and experiences of teachers who have adopted the use of mobile devices in their teachings for student knowledge for 2 or more years. In this qualitative study, I focused on a town in Connecticut where purposeful samplings of teachers in the sixth through 12th grade were examined to determine what their perceptions and experiences are towards mobile technology in their teachings. Pertinent information was sought from a variety of areas to compute the technology already in place in a variety of schools and teachers' perceptions of its usage.

Many factors influence technology use in both the middle school and high-school environments (grades 6 to12), including perceptions about both its purpose and value. The technology was introduced into educational settings with the hope of increasing teachers' ability to promote learning through their teachings that would-be life-long including workforce preparedness. Roschelle, Pea, Hoadley, Gordin, and Means (2000) reinforced this by stating, "not only can technology help children learn things better, but it can also assist them to learn better things" (p. 78).

Gathering perceptions of those individuals who are responsible for implementing technology into their teachings offers new insights for understanding existing technologies being used. Examining how technology is used in instructional strategies can provide evidence of how technology fits into educational improvement, how it is used when delivering a lesson, and how it materializes as a skill desirable for future purposes.

In examining educational perceptions and experiences of integrating technology into teaching and learning, it is important to consider the factors that may influence the beliefs of teachers as it relates to BYOD/BYOT programs. In this chapter, I review findings from the literature, carried out on the phenomenon that today's teachers can include the use of personal mobile technologies for their teachings in schools and districts where programs such as BYOD have been adopted. Some of these technologies include laptops, smartphones or cell phones, tablets, and notepads. Sections of the review include using technology in instruction, the formation of perceptions and experiences of technology use in teachings, and factors that both inhibit and encourage the use of mobile technology in teachings.

### **Literature Search Strategy**

The research in the four sections of the literature review was drawn from peer-reviewed journals, articles, books, and primary sources. These four sections included using technology in instruction, the formation of experiences and perceptions of technology in teachings, teacher perceptions and technology integration, and factors that both encourage and inhibit teachers' use of technology. The literature search process began with a collection of books throughout the dissertation program, by experts in the field of theory as it applies to conducting research studies that were both purchased and borrowed. The process continued with articles with the title or keywords *implementing technology*, *teacher perceptions*, *technology in instruction*, *technology in education*, *adopting technology*, *experiences with technology in education*, and *bring your own technology or devices*. The articles were primarily drawn from the ProQuest and

EBSCOhost databases located in the Walden University online library. The organization of the materials involved placement into electronic folders specific to each topic or related field used, for example, teacher perceptions and teacher experiences and using technology in instruction.

### **Conceptual Framework**

The phenomenon that was explored in this study was the implementation of BYOD/BYOT programs in middle and high school classrooms. The conceptual framework was based on the theory of constructionism and structure by Honebein (1996). Constructivism has been a theory of learning dating back to Dewey (1859 – 1952), Piaget (1896-1980), and Vygotsky (1896 – 1934). Dewey (1897) believed that new learning should be situated in the world of the child as the student. Dewey stated, “I believe that education must be conceived as a continuing reconstruction of experience; and that the process and the goal of education are one and the same thing” (p. 41). Constructivism proposes that learners construct their knowledge and meaning of that knowledge from their experiences (Honebein, 1996). Teachers applying constructivist theory encourage and accept student autonomy and initiative (Brooks-Young, 2007). Constructivist teachers consider the way they both frame and structure the assignments for their students. The tasks provide opportunities for students to experience both independent and individual initiatives. Brooks-Young (2007) pointed out that students who take responsibility for their learning become problem solvers who lead by their ideas, explore issues, and can then encounter new information. Fosnot (1996) viewed teachers as facilitators, allowing students to generate their questions and hypotheses, modeling the

possibilities, and testing for student accuracy. The constructivist theory was used as the lens through which teachers' perceptions of their implementation of BYOD were analyzed.

Constructivist teaching and learning is an important element of studying technology implementation. Gilakjani, Lai-Mei, and Ismail (2013) suggested that when studying technology use in constructivist classrooms, learning can be categorized into four categories (p. 53). The first is the lowest level, is not really constructivist learning, and is called hypermedia learning, or *tell me*. The next category is observational learning or *show me*, where students learn from an expert via technology. However, the student is still passive in this phase. The next category is called self-explanation-based learning or *let me explain*. This type of learning via technology takes a lot of time so it may not be efficient, but it is effective (Gilakjani et al., 2013). The last category is what technology-based constructivist classrooms should strive for. This is called inquiry learning, or *let me investigate* (Gilakjani et al. 2013). Technology, including BYOD/BYOT, can be implemented at any of the levels described above. Often, technology tools integrated in teaching and learning are not student-centered or constructivist in nature (Mills, Wakefield, & Knezek, 2015). The use of traditional media of school work limits the students' view of the world, so curricula should include tools such as video, computer, photographs, and sound to provide richer experiences (Honebein, 1996, p. 12). Therefore, the constructivist theory was used as a lens through which teachers' perceptions of their implementation of mobile technology in a BYOD/BYOT program were analyzed.

The second element of this study's conceptual framework is Honebein's (1996)

seven pedagogical goals for the design of constructivist learning environments Honebein offered teachers a way to move the constructivist theory into practice by offering a framework for creating constructivist classrooms. Honebein's pedagogical framework was designed so that teachers as instructional designers could use his ideas for instructional methods and strategies. The instructional framework includes seven design elements that should be part of the design of a constructivist learning environment (pp. 11-12). They are as follows:

1. Provide experience with the knowledge construction process.
2. Provide experience in and appreciation for multiple perspectives.
3. Embed learning in realistic and relevant context.
4. Encourage ownership and voice in the learning process.
5. Embed learning in social experience.
6. Encourage the use of multiple modes of representation.
7. Encourage self-awareness of the knowledge construction process.

The first design element is to “provide experience with the knowledge construction process” (Honebein, 1996, p. 11). Teachers applying constructivist theory in classrooms not only allow students to choose topics to study but also the methods and strategies they want to use in their learning pursuit. Applied to a BYOD/BYOT classroom, teachers would allow students to make decisions on how to use their devices to identify problems they want to solve, to use their devices to research, and then to choose finally how to share what they have learned.

The second is to “provide experience in and appreciation for multiple perspectives”

(Honebein, 1996, p. 11). This constructivist characteristic implies that in the real world, people often have the multiple methods and ideas on how to approach problem solving. Students in a constructivist classroom, therefore, should be given practice with how to navigate varying perspectives and seeing multiple ways to solve a problem. Educators can help students to understand how to improve the skills and take a more active role in the responsibility for problem solving. The design element can be applied to a BYOD/BYOT classroom when teachers encourage students to use technology to find and then share multiple solutions to problems connected to the real world.

Honebein's (1996) third design element is to "embed learning in realistic and relevant context" (p. 11). Honebein stated that learning should bring in real-life context to learning. For instance, Honebein gave the example of "math textbooks rarely relate to types of problems in real life" (p. 11). A teacher using mobile technology showing elements of this design principle in the classroom would develop problem-based activities that require students to connect live applications from the real world. Students in this environment would use their devices to research problems, collaborate, and design potential solutions in a BYOD/BYOT classroom.

Another design element or the fourth design of constructivist classrooms is one that "encourage[s] ownership and voice in the learning process" (Honebein, 1996, p. 12). Honebein gave application to student-centered learning in the constructivist theory. Students take charge of determining what they will learn and apply the direction that they will learn, rather than the teacher determining these aspects for them. The implementation of mobile technology through a BYOD/BYOT program can give teachers the opportunity

to design lessons where students construct ideas and then offer their opinions upon completion. The implementation can also encourage students to extrapolate meaning throughout the learning process, not just the product. The fifth design element is to “embed learning in social experience” (Honebein, 1996, p. 12). In this dimension, Honebein focused on how students and students and teachers and students need to collaborate. Honebein explained that through social interactions, intellectual development can be greatly influenced. The use of mobile technology through a BYOD/BYOT program can allow for collaboration among students and students and teachers and students through web-based collaboration tools and lessons that require collaboration using their mobile devices to complete the project.

The sixth element is to “encourage the use of multiple modes of representation” (Honebein, 1996, p. 12). Curricula in a constructivist classroom should not only be confined to oral and written communication. Curricula should include various technologies in effort to “provide a richer experience” (Honebein, 1996, p. 12). Multiple modes of representation were presented in this study as it pertains to BYOD/BYOT programs. The use of mobile technologies provides students an opportunity to use a variety of multimedia, video, audio, and mixed media.

Honebein’s (1996) last design element for constructivist classrooms is to “encourage self-awareness of the knowledge construction process” (Honebein, 1996, p. 12). In a constructivist learning environment, the educator or “designer” needs to create an environment with activities that encourage students to show their work and explain solutions while defending their positions. The learning environment can become

metacognitive by implementing a BYOD/BYOT program that would enable students to not only show what they have learned but also highlight the process of their thinking and learning journey.

BYOD programs have been studied in many ways. Some BYOD/BYOT researchers choose to use the technology acceptance model (TAM). Allathakani (2013) used the TAM as a framework to understand the information technology acceptance from the user's perspective from students in Jordan (The Hashemite Kingdom of Jordan) and looked into what hindered the acceptance of mobile technology-learning or m-learning. Navariz (2015), in a mixed method study, used TAM to examine teachers' acceptance and use of mobile applications and iPads. TAM was used in affordances and challenges of students and teachers through various uses of technology devices. The TAM model only addresses the understanding of the technology implementation from an acceptance perspective looking at outcomes, task-technology fit, social influence, and personal factors (Gu et al., 2013), with no connection to how any individual pedagogy the teacher might use it. Therefore, the theory constructivism and Honebein's (1996) framework were the best choices for this study because it provides a connection to the particular constructivist pedagogy.

There is a national initiative (Future Ready Schools) that was organized between two partnerships (Dobo, 2015). These partnerships are the Department of Education and the Alliance for Excellent Education. They are designed to address the challenges that teachers face in training, student privacy using data, and instruction (Dobo 2015). The organizers of this initiative want to inspire school leaders to create clear designs for how

technology will improve student outcomes (Dobo, 2015). Looking through the lens of Honebein's (1996) seven goals for designers of constructivist learning environments created categories of themes that represent essential qualities of effective constructivist learning environments.

In a constructivist environment, the focus is knowledge distributed through connections between different regions of the brain and in the networks that are formed (technological and social). Dewey (1938) outlined that in a social dimension of learning community, citizenship and democracy need to be present. Dewey asserted that schools are a small scaled version of a larger community. Dewey's described his constructivist approach to education that learning is constructed in a social environment. If a school system is to be successful, it needs to include students as a part of the greater community. According to Dewey, the process of inquiry is the best pedagogy. Students become informed citizens who can communicate their opinions, interests, and decisions to create a public choice. The students use inquiry-based methods to construct knowledge themselves. The role of the teacher is to become the facilitator who guides his or her students to become student-centered learners. Students are actively attempting to create meaning and often select and pursue their learning.

Vygotsky (1978) alleged that children learn when they were presented with constructs that they were acquainted with and some that are slightly beyond reach. He described these as "the zone of proximal development" (as cited in Kirova & Bhargava, 2002, p. 6). Children learn in social situations where they discuss what they already know. As they construct knowledge and guesswork on what they are soon to discover,

learning takes place in an engaging, active, and naturalistic learning environment where they can be challenged to go beyond what they currently are thinking.

### **Using Technology in Instruction**

The goal of this section is to examine the practical integration of the BYOD phenomenon into education. BYOD or BYOT programs challenge educators in finding ways to integrate mobile technology into their classroom lessons (Pascopella, 2009). These programs were introduced into school systems as a protection for teachers to implement the use of personal mobile devices into their teachings. BYOD/BYOT is becoming a common happening in the educational setting that certifies teachers to allow students to use their internet-connected devices as part of their learning (DiFilipo & Kondrach, 2012). The opportunity to utilize personal mobile devices gives rise to the way teachers instruct in their teachings (Singh, 2013). Using this technology allows teachers to give feedback to students so they can adjust their thinking to develop their connections. The teacher can then provide approaches to a student's understanding in a manner that suits their learning style (Collins & Halverson, 2010).

Both the BYOD and BYOT program initiatives provide a solution to school districts that face budget constraints for implementing technology into the classroom teachings (Intel Corporation, 2012). Singh (2013) discovered that a gap exists between how technology can be obtainable and its use in classroom instruction. The teacher is critical in the efficient conversion of our educational systems to include technology integration in their teachings (U.S. Department of Education, 2013). Both programs provide the opportunity for students to bring in personal devices, such as smartphones,

laptops, tablets, notebooks, or eReaders for educational purposes. Some schools believe that BYOD or BYOT programs are beneficial since students are provided the opportunity to use their own devices for educational purposes while others think the use of personal devices can hinder both teachings and what students learn in the classroom (Intel Corporation, 2012).

As far back to the 1960's, instructional computing was piloted on gigantic-main-frame text-based computers. The use of these computers was seen primarily at universities where they could be both afforded and installed. In 1981, Apple II microcomputer was phased out by IBM by the introduction of the personal computer. In 1984, Apple II became obsolete with the introduction of Apple Macintosh.

Valdez et al. (2000) explained the evolution of educational technology as having occurred in three phases. These phases include print automation, expansion of learning opportunities, and data-driven virtual learning. In the first phase, print automation was the practice sending students to a computer lab where they would practice using tutorials on the principles of behavioral learning. In the second phase, technology shifted to being learner based. In this phase, the quality of learning depended on upon the basis of the learner. In the third phase, the Internet was introduced making virtual learning possible. In this phase, multimedia presentations made it possible for teachers to begin exploiting the many prospects of data-driven teachings.

Albion (1999) wrote about the connection between technology use and teachers' confidence. This author (Albion, 1999, p. 10) suggested that what teachers believe can be a significant factor in the outcome of successful integration of technology. Albion also

stated that self-efficacy is an important factor when implementing technology and the knowledge that teachers develop has an impact on how they enable technology to work for students to solve problems. Teachers need to be well aware of the potential that technology provides to enhance their instruction, particularly since today's students are growing up in a world of technology.

Owens (2009) stated that for a teacher to successfully integrate technology into instruction, it is essential that they are assisted as they obtain the knowledge, skills, and the confidence needed to obtain their success. Owens (2009) stated that "technology integration happens when we remove the barriers, incorporate appropriate pedagogy and instructional strategies, and support students and teachers in the classroom" (p.14). The obligation to provide a rich learning environment and extend emerging pedagogies is pertinent to the success of technology integration. The possibility of a reduced perception of technology or the fear of using technology can cause teachers to employ lessons that do not implement a technology. A student-centered classroom may be jeopardized by the beliefs or attitudes toward technology and its use in quality of instruction (Owens, 2009). Technology becomes the avenue for making the transformation in an experiential learning environment as students today are growing up with technology such as video games and computer games (Chambers et al., 2007). Teachers possess the authority to implement and adopt classroom reforms at their discretion. The power to implement innovations is not limited to educational technology. Teachers cannot deny the existence of technology in education. However, they can determine how and when technology is used. This is where the teacher is or is not responsible for transforming from the authority

expert to the facilitator and where students are transformed from a passive recipient of knowledge to an active participant seeking knowledge and knowledge construction (Harris & Hofer, 2011).

### **The Formation of Perceptions and Experiences of Technology in Teaching**

Pegrum et al., (2013) reported on the integration of mobile technologies in 10 Western Australian Schools. At that time, using mobile devices in the classroom was still in an experimental stage. A common theme that developed was the need to adopt mobile devices in education. The use of mobile technology was viewed as enhancing students desire to learn and even showed improvement in their learning. Mobile devices were seen as enhancing student motivation and showed improvement in student learning. It was noted that there was a need to manage the use of technology carefully in their deployment. All of the 10 schools that were surveyed planned to extend how mobile technology would be used in the future. The surveys outcome revealed that they wanted to set up what was called a “professional community of practice.” The survey also revealed how all schools have future plans to continue and extend their use of a mobile technology program. Nielsen (2011), through a case study, described how music teachers define student development and creativity through music technology. Nielsen suggested that lesson strategies need to incorporate technology. This would enable teachers to provide opportunities to expand music curriculum that fosters creativity of all students. Using technology in teaching would not only enhance music education, but would support 21<sup>st</sup> century skill development for students (Nielsen, 2011).

Evans and Forbes (2012) investigated what educational moves would be needed to meet the needs of the technology based learners in the 21<sup>st</sup> century. It was suggested that teachers should re-think the way they design teaching strategies, as the desktop stage moves directly to wireless mobile devices. Rossing (2012) supported the need for meaningful understanding of the use of mobile technologies in teaching. Teachers need to direct the use of mobile technologies to their desired outcome of their teachings. Problem solving and innovative application need to be fostered by the teacher in teachings of their discipline to what they want as the outcome of learning for their students.

Almekhlafi and Almeqdadi (2010) recommended the following to enhance teachers' competency in integrating technology: workshops for effective technology integration; provide teachers with up-to-date technology; provide incentives for outstanding integration in their classrooms; provide release time for planning effectively; explore technology use in all schools, private or public; investigate student achievement and attitudes; and investigate integration in relation to curriculum goals and outcomes.

Shohel and Power (2010) found use of iPods in classrooms are beginning to emerge with endless possibilities. It was suggested that more research needs to be done on the actual consequences of using portable technology. It is to be seen how portable technologies like iPods can be used to support teachers' professional development in teachings, using portable technology.

Avraamidou (2008) contended that future research should focus on use of mobile technologies to address deficiencies in curriculum and instruction to develop a contemporary vision of technology in both teachings and society. Given the

advancements in technology over the past ten years, Avraamidou (2008) suggested that rapid advancements in mobile technology has transformed society. The use of mobile phones has yet to see their impact on technology-enhanced curriculum. Mobile technologies need to “scale-up” by implementing innovations in teachings.

Franklin et al. (2007) suggested mobile devices are useful in many pedagogical and technological applications for teaching. Mobility of the device allows for continuous work on both projects and assignments when away from a desktop computer. It was found that students were selective in software downloads specific to their discipline or personal needs. Students would arrive in class prepared with questions and ideas that they shared with other students outside of the classroom setting. It was in hope that new technologies would be available to help students learn in classrooms without boundaries, therefore, moving from environment to environment with personal learning devices.

Teachers have a powerful influence on students’ ability to achieve. The influence is presented when the teacher designs their instruction or lesson plans. Marzano, Marzano and Pickering (2003) stated that “many researchers agree that the impact of decisions made by individual teachers is by far greater than the impact of decisions made at the school level” (p. 71). The effectiveness of teachers extends to the use of technology strategies they can employ in their instruction. Knowing how and when to use technology for student academic success in their lesson design can “help children learn things better, it also can help them learn better things” (Roschelle et al., 2000, p. 78). Examples of the better things would relate to the many applications technology has to offer such as Internet research; various databases such as SIRS Discoverer; and grammar, plagiarism,

and spellcheck programs such as Grammarly and Turnitin. Gathering perceptions by teachers who are responsible for instructional design including learning opportunities can help to understand the existing ways to integrate or diffuse technology use.

The idea, of integrating subject areas such as science, mathematics, and technology, was presented by Conte and Weber (1999). It was found that the integration of technology showed a higher level of motivation for students designing applications for problem-solving. It was believed that when technology was integrated with subject areas, the curriculum was enhanced by its use significantly. Technology can be for this reason used as a tool to teach many concepts and principles of other content or subject areas. Many other curriculums standards are tied to technology and technology education (Foster, 2005). Lovedahl (2001) previously proposed the involvement of technology education in curriculum such as science so that experiences needed to promote active learning, group problem solving, and interdisciplinary use of a variety of both technologies related tools and products in teaching strategies would be employed.

Wicklein (2005) proposed that teachers could instill values in our youth through technology education. Appropriate technology concepts taught in schools would substantiate and support the ability to understand and operate technological systems for the benefit of students rather than the detriment of students (Wicklein, 2005). Wicklein (2005) also believed that students will solve problems with more responsibility as technology becomes more integral part of their lives. For this reason, the importance of teaching responsible use of various technology tools through programs relevant to and including teacher's perceptions and experiences when using technology in their teachings

is important.

The philosophy of teachers' teachings is reflected in the types of technology experiences their students receive (Marzano et al., 2003). Teachers who avoid computers are usually the ones who appear to be most traditional in their philosophy of teaching. Traditional in their philosophy of teaching implicating the teacher as giving information to students rather than acting as facilitators and guiding students to exploring and finding information. Dewey (1916) formed the basis of the constructivist theory where prior knowledge forms the foundation by which new learning occurs (Cakir, 2008; Gordon, 2009; Higgins, Miller, & Wegmann, 2006; Marlowe & Page, 2005; McInerney, 2005; Piaget, 1969; Piaget & Inhelder, 1969). Learning is mastered through new approaches and interacting with others (Vygotsky, 1978, 1986). It is a theory of knowing as well as a theory of coming to know (Lambert et al., 2002). Constructivism is a theory where "learners construct meaning based upon previous knowledge, beliefs, and experiences" (Lambert et al., 2002, p. 1). The teacher encourages students to discover concepts on their own rather than given the information at hand. Individual students perceive and process information in a variety of ways as a result of their upbringing, heredity factors, and environmental demands. According to Marion (2001) how much a person learns depends on whether or not the educational practice is structured to their particular learning style.

Those teachers who value a group work approach as well as working on topics of interest are more compatible with the constructivists beliefs and are the ones who are using computers more frequently in their teachings (Becker & Ravitz, 2001). The level of comfort, confidence and competency relates to the teachers' ability and willingness to use

technology. Ivers (2002) pointed out that “testimonials and teacher vignettes also indicate that the more confident teachers feel about using technology, the more likely they will apply what they have learned in the classroom, as well as pursue additional learning opportunities” (p. 4). The connection between teacher perception and technology use is also supported by Albion (1999) where it is noted that teachers’ beliefs are viewed as a significant factor in their success of integrating technology in their teachings.

Teachers are consistently aware of their impact on student achievement through their teachings. Marzano, Marzano and Pickering (2003) stated that “researchers agree that the impact of decisions made by individual teachers is far greater than the impact of decisions made at the school level” (p. 71). There are many factors that contribute to the effectiveness of learning including the various instructional strategies that a teacher employs. Knowing how and when to use mobile technology in teachings is an essential part of instructional design. Understanding a teachers’ comfort, competence, and ability relates to a teachers’ desire to use technology in their teachings. The more confident teachers’ perceptions of technology use in their teachings, the more likely they will use it in their teachings as well as seeking out new opportunities to apply technology to their teachings (Ivers, 2002). Understanding the basics of how teachers view student technology use and how their role as a teacher directing their use, has an impact on improving both the academic achievement and preparation of a students’ future endeavors (Ivers, 2002).

Park (2009) defined a persons’ belief system as a set of beliefs regarding what he or she perceives to be right or wrong, true or false. Belief systems determine what people

consider to be acceptable in organizations and social settings. In the educational setting, some teachers' perceptions, attitudes, and experiences have a negative sense of the use of technology in teachings. These negative feelings towards technology use are shaped by a negative belief system. Eventually, these attitudes produce teachers who are technophobic and inhibit some from adopting new technology devices in their teachings (Park, 2009).

All educators hold a particular perception, attitude, and experience about the use of technology in the classroom. When a person enters the field of education as a teacher, most have already developed principles or beliefs (Bai & Ertmer, 2008). These principles can be based on cultural or personal beliefs that can be in existence for a long period and can often be difficult to change (Oxford & Yilmazel-Sahin, 2004). Individuals' perceptions form attitudes that can influence the way a person performs in their environment (Deemera, 2006). The way a person perceives success or failure often arises from their thoughts (Powell & Powell, 2007). Perceptions can bring several psychological concepts that can relate to both teaching and learning. According to Meskill and Mossop (2009), these perceptions can be related to methods of teachings.

In theory, perceptions are multidimensional and can be either biologically or psychologically perceived. They are both used to understand individual differences and to predict human behavior and its changes. As Powell and Powell (2007) pointed out, perceptions of teachers can sometimes encompass the existence of entities that are outside control or influence. They can have both an evaluative and affective component and include conceptualizations that are aside from real situations. Perceptions can also

come from memories of particular experiences, resulting in attitudes that are closed to evaluation and examination in a critical manner. The characteristics of teacher perceptions then demonstrate a cognitive psychological nature.

When looking at the psychological perspective, Bem and McConnell (1970) suggested that in the theory of self-perception, human attitudes and perceptions are a consequence of a person's behavior. Our previous experiences become necessary when people evaluate perceptions and attitudes before making internal or external acknowledgments on the basis of what caused them. When new technology is introduced, our inferred perceptions and attitudes influence our behavior particularly when there is a lack of prior knowledge about or have a prior belief about a new situation (Bem & McConnell, 1970).

Bandura's (1986, 1997) social cognitive theory focused on the idea that actions are either facilitated or impeded in one's beliefs or perceptions and experiences. Cognitive dissonance suggests that teachers should engage in activities that arouse differences of opinion so that perceptions can be changed. With cognitive dissonance, a person's perception of the incompatibility between two cognitions can be a conflict between perceptions and emotions. The primary source of dissonance is a past experience that collides with a new cognition (Harmon-Jones, Amodio, & Harmon-Jones, 2009). What is psychologically outside the comfort zone will hold contradictory perceptions. The dissonance being very uncomfortable psychologically can motivate a person to change his perception or attitude or behavior. Cognitions that are contradicting can initiate a person to seek the invention of new perceptions or to modify existing

perceptions in an effort to reduce the conflict between two thoughts (Harmon-Jones, et al., 2009). This study found that motivating teachers empowered them on how to overcome prior perceptions rather than focusing on how our perceptions come to be in the first place.

Ashby, Baylor, Doerr, and Rosenberg-Kima, (2009) and Bem and McConnell (1970) explain how the psychological perspective can be used to understand how our perceptions are formed. Social comparison is used to compare opinions, ideas, and abilities of each other to evaluate and re-evaluate in effort to improve our perceptions. In essence, individuals assess and improve their perceptions when they can infer from others opinions and values that they can identify with. This explains why some teachers' attitudes are influenced by peers rather than their administrators or supervisors.

### **Teachers Perceptions and Technology Integration**

The focus areas for technology programs included raising student achievement, increasing engagement, creating student-centered learning environments, providing differentiated instruction, and positively impacting student attitude (Abell Foundation 2008; Dawson, Cavanaugh & Ritzhaupt, 2009; Penuel, 2006). For this to occur, it is the responsibility of a teacher to instruct students in a manner in which their students can achieve at a higher level of understanding. In the past, instructional practices for most teachers was characterized as traditional where instruction was "teacher centered" (Lambert et al., 2002). Typically, in this type of setting, the teacher was the demonstrator and the student took notes. Zmuda (2009) indicated that today's instruction shifted from the traditional setting where the teacher was the giver of information to the teacher

becoming the facilitator of information. With all the various learning styles of students, teachers must continue to find ways to teach concepts to a diverse audience so each individual can become successful (Zmuda, 2009). The instruction of today's students also includes the exposure of electronic devices. Students today are in a world where electronic devices provide a quick fix at the push of a button. Students are fascinated by electronics such as smart phones, iPads, and chrome books which have become a way of life for them.

With all the various technologies, teachers are expected to implement their use to support their instruction and improve student learning (Wright & Wilson, 2007).

Technology education, as stated by Moye (2009), is an outstanding way to integrate concepts by employing real life applications. The integration of technology into the classroom teaching has become a major focus of federal, state, and local, including both private and public educational organizations (Harris, Mishra, & Koehler, 2009). Since technology is forever changing, society and educational organizations need to be competitive with the changes to advance students in the classroom.

Zhao and Frank (2003) asserted that teachers may not see the impact that technology has in the educational classroom setting. Teachers' integration of technology in their instruction is generally an individual analysis of cost versus benefits for teaching and learning. Teachers describe technology integration as unreliable or confusing as reasons for not implementing it. If students can bring their own technology, the burden of teacher management of technology would be lessened as the students are familiar with their own devices, making BYOD/BYOT a manageable way for implementation

(Pascopella, 2009).

There are teachers who are very technology savvy and can use any technology device in their teachings (Albion, 2008). The key to technology use by teachers in teachings is their satisfaction, understanding, and comfort ability in computer use (Casey, 2008). Beyerbach (2007) found that policymakers believed that the more time a teacher spends using technology, the more comfortable they become on how to implement technology into teachings. Ertmer (2008) made the observation that previous research showed that teachers' beliefs about classroom instruction can be influential although little research has been done to establish links to teachers' beliefs about technology in teachings. Ertmer (2008) suggested that in an effort to adopt technology use in the classroom, research needs to be done on teacher's beliefs about the use of technology in their teachings. When teachers' perceptions or beliefs are defined, these perceptions or beliefs can then have an impact on future use of teachers' classroom teachings.

Hew (2008) showed that technology use in the curriculum helps students in their learning process, particularly in grades K-12. However, in his study it was noted that there are barriers to the use of technology in the curriculum and that one major obstacle was integration. Hew (2008) identified the problems to include resources, attitudes, beliefs, culture, assessments and knowledge skills, in strategies for implementing technology into teachings, accordingly it is these barriers that need to be addressed.

According to Judson (2006) those teachers who integrate technology into their teachings are likely to have a constructivist approach to their teaching. The connection between constructivist pedagogy and technology is another area that research needs to

focus upon. Judson (2006) viewed direct observations as a good tool since the observations can evaluate the constructivist approach used to integrate technology.

According to Grainger (2006), the contexts in which teachers operate can affect the degree to which they use informational technologies to achieve the best teachings. In this study, Grainger (2006) focused on the influence of organizational factors on the way teachers perceive new technologies such as learning management systems. This study was based on a survey of both high-school teachers and personnel. Grainger (2006) unlike Judson (2006) emphasized what was occurring outside of the classroom within the school organization. Grainger (2006) was focusing on what factors affected the perception of technology use in education, specifically within the classroom. One of the three top factors included perceptions of management. How a teacher effectively manages the use of technology by students for educational purposes rather than for personal use such as texting, picture taking, or surfing the internet for other than a content purpose.

Pascopella (2009) conducted a study on issues present when implementing the BYOD program. This study found that teachers are reluctant to implement the program for the following reasons: fear of appearing less intelligent and knowledgeable than their students; and classroom management issues with regards to technology such as smart phones distracting from learning; losing control or attention of students who may be texting or surfing the internet. The comfort level may make teachers reluctant to change their current teaching methods. Helping to encourage change and overcome limitations can be successful however, with effective management (Harvard Business School, 2011).

Thomas, and O'Bannon (2014) studied over one thousand teachers in both Kentucky and Tennessee in an effort to determine their support for mobile phone use in the classroom, the perceptions of the mobile phone benefiting school work, as well as the barriers to its use. It was found that more teachers were not in support of mobile phone use in the classroom as those who were. They identified educational apps, the Internet, and podcasting as beneficial features and believed that the possibility of cheating, accessing inappropriate information and cyberbullying as primary barriers to not using mobile phones in teachings.

If teachers view current teaching methods as working, then they probably will not see a reason to try something new or can become reluctant to change. Teachers need to embrace implementing technology into their lessons because students are using technology tools all the time at home and therefore, should be available in the classroom for use as well (Pascopella, 2009). The steps from the Harvard Business Review (2011) can be followed and can place emphasis on the importance of changes in education to include technology use in the classroom (Mishra & Kereluik, 2011). The evaluation should be effectively conducted at the end of the change process by conducting a risk versus reward assessment. Teaching practices can then be changed to include a BYOD program to benefit learning opportunities for students.

### **Factors That Both Inhibit and Encourage Teachers Use of Technology**

Technologies for mobile communication are shifting the way individuals live, work, and learn. With mobile communication and smart phone usage today, mobile learning or ubiquitous on-demand mobile e-learning has expanded the learning

environment beyond the confines of the classroom walls (Robinson et al., 2010). The benefits of learning at your fingertips in an anytime, anywhere, environment enables the learner to access information, interact with both materials and other learners without being location dependent (Kolb & Tonner, 2012). No longer is access to information tied to a desktop computer which is stationed. Access to information is brought into the classrooms in the hands of both students and teachers.

The trend for mobile device usage has been escalating since the laptop was invented. Tablets, smartphones and laptops have been effectively meeting the demands for everyday life communications. As of 2012, nearly two-thirds of all Americans have smartphones (Bohyun, 2013). Mobile devices can be used for healthcare, keeping track of records; a persons' well-being, keeping track of physical fitness and nutrition; payment method, as a part of a sale; and educational purposes, such as research and applications. It was only a matter of time before educational institutions would see the benefits of mobile devices in the classroom.

The National Center for Education Statistics (2012) defines technology integration as “what comes next after making the technology available and accessible as a goal in process, not an end state” (Defining Technology Integration section p. 2). This means that technology can include using various emerging technologies such as smartphones, computers, tablets, laptops, whiteboards, etc., to teach content and deliver instruction to students. Technology integration may also refer to teacher preparation of lessons such as creating assignments on programs such as Schoology as well as composing discussions or e-mails. O’Dwyer, Russel, and Bebell (2005) identified four

categories for classroom technology that included: teacher use of technology in instruction; teacher-directed student use of technology during class time; teachers directing students to produce research or presentations; and teachers' use of technology in their preparation of lessons. This study indicated that teachers were less likely to integrate the use of technology to deliver lessons if the access to technology was limited and/or if professional development was not provided to assist in technology use in their lessons preparations, design or delivery. Many past studies investigated reasons why computers were not used by teachers in their teachings (Rosen & Weil, 1995; Dupagne & Krendl, 1992; Hadley & Sheingold, 1993). Reasons included such things as the lack of experience, lack of support for using technology, lack of supervisions for student use, lack of availability of devices, and lack of time given to integrate technology into teachings. Evans-Andris (1995) studied elementary schools in a large metropolitan area for a period of eight years. In this study it was found that teachers generally avoided computers and distanced themselves from their use and more specifically, in their use in computer-related activities. However, those that did embrace the use of technology saw using technology in their teachings as challenging. These teachers also demonstrated more insightful teaching methods in both the preparation and delivery of lesson plans that involved computer use versus those teaching methods that did not use technology in their instructional planning.

A case study by Veen (1993) examined the daily practices of four teachers implementing technology in a secondary school. The teachers had both a computer at home and a computer in their classrooms. The schools supported the teachers with

technical support and positive reinforcement from administration. Teacher factors, however, outweighed school support. The factors were grouped into two categories that included beliefs and skills. Beliefs became the more important of the two when regarding curriculum and the way the curriculum would be taught. Skills that were important were competence in classroom management of activities as well as their computer literacy skills. If the software being used matched the teachers' pedagogy, they were most likely to use it.

Cox, Preston, and Cox (1999) revealed factors relating to the acceptance of technology in teaching. In this study, a questionnaire was used to collect evidence of teachers' experiences and use as well as the value of technology for use in teachings and learning. The sample consisted of 44 males and 28 females who use computers in their teachings. The study proposed that teachers who were regular users of technology had confidence in its use and perceived it to be useful for their personal work, for their teaching and also planned for continuing technology use in their teachings. The most important factors for these particular teachers were making lessons interesting; more fun for both themselves and their students; allowed for diversity; and more motivating.

Many other studies (Becker, 1994; Hadley & Sheingold, 1993; Shengold & Hadley, 1990) used surveys to determine teachers' use of computers in their teachings. In 1990, Shengold and Hadley's nationwide survey of 4th to 12th grade teachers revealed that teachers' success with computer integration in their teachings was attributed to their motivation and commitment to their students learning and to their own professional development, to their support from their peers, and their access to a good amount of

technology. The teachers' perceived that when implementing technology into their teachings, their style of teaching was more student-centered.

Presently some schools are behind in technology because of the absence of plans for both implementation and integration. Researchers emphasized that teachers need to create environments where students use technology in their educational tasks to solve problems, communicate, research, and make meaning of the digital world that currently exists (Davidson & Stone, 2009; National Educational Technology Plan, 2010; Rotherham & Willingham, 2009). Teachers are called upon to facilitate a learning environment that both requires and challenges students to become actively engaged as learners. Moreover, teachers face challenges that may impede the process of both implementing and integrating technologies. These challenges can often prohibit teachers from using technologies in their teachings. To successfully integrate technology, knowledge and use of effective strategies need to be present to prepare teachers to both initiate and sustain effective technology integration practices (Ertmer, 1999).

The way in which adults learn may impact teacher perceptions related to the acceptance of new teaching initiatives such as technology in instruction. It is important to consider factors that impact a teacher's change in their teaching practices in effort to incorporate emerging technologies into their instruction. This should include ways in which teachers both understand and develop new practices.

Perceptions regarding technology implementation into instruction include how adults learn and develop. According to Weiner (2010) his adult learning attribution theory is based on an individual's self-concept or confidence in his or her ability to

succeed. This theory includes four main components: ability, effort, difficulty of the task, and luck. In essence, if an adult believes that they have the ability to be successful then they will dedicate more time to the task. If an adult learner believes they lack the ability to be successful they will devote less time to the task. If teachers believe they can successfully integrate technology into instruction they may both willingly and fully make the effort to complete the task.

In 2010, the effects of technology on organizational and occupational changes that may occur were re-examined. Prior to this time Levinson (1978, 1996) had discussed the impact of technology in the workplace which was very different from the technology used today. Levinson's theory examined the adult development of teaching with technology in reference to a teachers' willingness or unwillingness, and ability to adapt to new initiatives as it relates to developmental stages. Levinson (1978, 1996) described this particular phenomenon as psychological retirement (an experience occurring during a mid-life transition).

Christensen Teacher Career Cycle model by Lynn and Woods (2010) looked at the how teachers adjusted to organizational changes such as new mandates and regulations of their teaching career. This model outlined various stages of one's teaching career and included: pre-service induction, competency building, enthusiasm and growth, frustrations, stability, career wind-down, and career exit phases. The model outlined how organizational factors can impact whether a teacher will continue teaching for the purpose of keeping a job or if a teacher experiences a continued growth including enthusiasm of working as a teacher. When technology becomes a requirement of use by

district goals, teachers may feel burned out or overwhelmed as well as uncomfortable with the use of technology. Implementing new technology can make some teachers burn out or become psychologically retired rather than adapting to the change.

Additional studies have been conducted in reference to teachers' instructional practices that include technology. Findings from these studies showed the use of technology for class instruction was advantageous for teaching concepts as well as improving the students' understanding of these concepts (Bebell et al., 2004; Hu, Clark, & Ma, 2003). In a few studies it was reported that when computers were used to solve problems such as in mathematics, students' confidence and attitudes about the concepts improved as well as their persistence in problem solving (Barron, Kemker, Harmes, & Kalaydjian, 2003; ChanLin, 2007; Clements & Sarama, 2007). Even though studies have shown the constructive points of technology in the classroom, some teachers may or may not make the choice to use technology as much as they would use other teaching strategies that they are used to using in their lessons (ChanLin, Hong, Horng, Chang, & Chu, 2006).

Lambert et al. (2002) stated that in the United States, schools have done little to change their approach in an effort to help students reach higher standards. Even though research shows the effectiveness of integrating technology in instructional strategies, teachers are not consistently using technologies (Meyer, Abrami, Wade, & Scherzer, 2011). A study survey by Cuban, Kirkpatrick, & Peck, (2001) showed fewer than twenty percent of teachers used technology on a consistent basis and that more than half of the teachers did not use technology at all. Ocak (2005) found that even when teachers were

using technology they were not using the tools in ways that would improve teaching and learning.

When teachers employ technology in their teachings, technology should not be taught in isolation. Technology should be used as a tool to deliver regular course content (Koc & Bakir, 2010). Koc's and Bakirs' (2010) research examined the social-constructivist paradigm of teaching and learning. It was found that teachers will best learn how to implement technology into their teachings when they are given the opportunity to view ways in which other teachers are teaching with technology.

Kopcha (2010) examined teachers who were members of a professional development network who were concentrating on teachers learning how to implement technology into teachings in their classroom. It was determined by Kopcha (2010) that teachers who had mentors regarding the use of technology in the classroom experienced a greater success when implementing technology into their instruction. It could therefore be implied that teachers best learn how to effectively implement technology into their lesson design when sharing other teachers' experiences. Chikasha, Ntuli, Sundarjee, and Chikasha (2014) suggested that professional development or "training programs" would ease the adoption of mobile technology integration in the classroom to enhance both teaching and learning. This study proposed that if the teachers had the opportunity to experience technology usage in professional development, they would develop a positive attitude towards the implementation. In a qualitative case study by Jones (2014), 12 high school teachers were observed to find what experiences encouraged the implementation of mobile technology in a BYOD/BYOT program. The study recommended that that

professional development stimulated the application of mobile device programs when customized to relate to a particular content area. The study also found that perceived problems with both equity and behavior management had an adverse effect on the adoption of mobile technology. Ottsot (2015) found that collaboration among elementary teachers was effective when considering implementing mobile technology through a BYOD/BYOT program. This study supported that professional development and peer mentorship was beneficial and supported the adoption of mobile technology in teachings. Though many aspects related to the use of technology have been studied, the aspect of teachers' perceptions and live experiences using mobile technology in their instructional design needs further attention.

### **Summary and Conclusions**

Teachers' willingness, perceptions, and beliefs are at the core of effective integration of technology in their instructional designs. The literature on both the active and negative attributes of technology integration suggests that teachers are one of the essential requisites for successful implementation. Teachers, as noted by Dawson (2012), are those who determine how technology is implemented in instruction for student knowledge. A fundamental challenge to the effective integration of technology is the unwillingness and inability to integrate technology in both efficiently and meaningful ways. Literature presented on the efficient use of technology highlights that schools need to address the attitudes, beliefs, experiences and perceptions of teachers' impact on technology integration practices. Laying the foundation for this research study included examining both positive and negative experiences and perceptions that affect teachers'

use of mobile technology in their instruction. Some of the barriers in the literature included inadequate preparation, insufficient time for planning, and lack of knowledge or professional training. In chapter 3 I address the methodology, framework, design and rationale, data collection methods, and procedures for teachers' perceptions and live experiences when integrating mobile technology into their instructional practices for student knowledge. In chapter 4 I present results and in chapter 5 I discuss the results.

### Chapter 3: Research Method

The purpose of this study was to understand the lived perceptions and experiences of teachers who have adopted the use of mobile devices in their teaching for student knowledge for a period of 2 or more years. Identifying common themes in teachers' efforts to implement mobile technology in their instruction may yield valuable information for practices among middle-school and secondary-school teachers. Chapter 3 contains a discussion of the methodology that was used to conduct this phenomenological study. This section also includes a discussion of why the phenomenological model is most appropriate for this study. Data analysis procedures and maintaining reliability are discussed, followed by both the validity and the reliability of this research. I conclude this chapter with a summary of the method.

#### **Research Design and Rationale**

A research study generating data that reflected an educator's beliefs pertaining to the benefits of technology in teaching and learning served as the foundation for addressing the research questions that guided this qualitative study. According to Merriam (2011), qualitative research exposes an understanding of how experiences are interpreted by individuals who have lived those experiences. The concept that qualitative research is an appropriate platform for capturing key elements of the human experience is also supported by Lodico, Spaulding, and Voegtler (2010). Therefore, a qualitative phenomenology research framework was most suited for this research study that focused on capturing the essence of 10 teachers in Grades 6 through 12 and their perceptions and lived experiences relating to the use of mobile technology to improve teaching and

learning practices for their students. In addition, constructivism provided support for the framework of this study by addressing the manner through which individuals acquire and process information (Hipsher, 2014).

The qualitative phenomenology approach chosen was designed to “explore the meaning of several peoples lived experiences around a particular issue or phenomenon” (Algozzine & Hancock, 2006, p. 8). In this case, the collective shared experience was teachers in Grades 6 to 12. This method was chosen to tell the story of those teachers and their prospective and lived experiences as viewed by them. I used open-ended questions where participants of the study freely responded. The participants were asked to share general themes and introspective ideas based on the themes (Creswell, 2012).

A quantitative design or framework for this study would have been appropriate if I had focused primarily on uncovering the number of teachers using technology in their classrooms rather than determining how perceptions and lived experiences of 10 teachers in Grades 6 to 12 impact their integration of technology in their instruction. A qualitative research design is a process where the researcher makes inquiries in an attempt to understand human behavior (Baytek, Tarman, & Ayay, 2011). Qualitative research questions determine the scope and depth of understanding obtained from the research study rather than being preemptive in nature as in a quantitative study (Richards, 2005). Researchers propose the type of approach by matching their research questions and the goals and products of the study (Creswell, 2009). The following types of studies were examined to determine the research design: Grounded theory develops explanatory theories of social processes that are reviewed in context; case studies involve the

collection of data over a period, exploring events, activities, or processes bounded by time and activity; and phenomenology research is a strategy of inquiry that can identify the essence of human experiences as described by participants of the study (Creswell, 2009). This study involved how people make meaning of their lived experiences. Therefore, the questions suggested a qualitative hermeneutical phenomenological study. The study was investigated through interviews and observations how teachers both perceive and support the use of mobile technology in their teachings. Open-ended interview questions were designed (see Appendix B) to stimulate responses from the participants. Three research questions helped to guide this study:

1. What are both the perceptions and shared perceptions of teachers in using mobile devices to provide knowledge to their students?
2. How do teachers describe their experiences when using mobile devices to provide knowledge?
3. What are positive and negative factors that teachers indicate when using in their exercise of using mobile devices in the classrooms?

The key to a good research design is to have meaningful research questions (Creswell & Creswell, 2005). The overarching research questions to guide this study were designed to understand the perceptions and lived experiences of teachers who implement mobile technology in their instruction. Qualitative research is appropriate when variables are unknown (Creswell & Creswell, 2005). The qualitative design allows the researcher to seek to uncover the variables through in-depth, contextualized information that is collected from the participants' understanding of the phenomena

(Cheek, Onslow, & Cream, 2004). Shank (2006) proposed that qualitative research involves the researcher as an inquirer seeking meaning through understanding and encourages alternatives to the way the world is viewed. A qualitative phenomenological study design will gain a better understanding of perceptions and experiences in an effort to understand and give meaning to mobile technology implementation in instruction.

### **Methodology**

The purpose of a phenomenology approach is to highlight the specific, in an effort to identify phenomena on how the participants are perceived by others involved in the situation. Husserl, as cited in Moustakas (1994), believed that human experiences of events appear in the consciousness and can be examined by setting aside bias, prejudgments, values, and personal presuppositions through which experiences are channeled to make human meaning. According to Moustakas (1994), a phenomenological study “is illuminated through careful, comprehensive, descriptions, vivid, and accurate renderings of the experience, rather than measurements, ratings, or scores” (p. 105).

Phenomenology researchers gather broad information and perceptions through inductive, qualitative methods such as interviews, discussions, and participant observation that are represented from the perspective of the participants in the research (Lester, 1999). This type of analysis essentially describes rather than explains from the starting point of a view that is free of both the hypothesis or preconception.

The purpose of this study was to understand the lived perceptions and experiences of teachers who have adopted the use of mobile devices in their teaching for student knowledge for a period of 2 or more years. The study is based on a qualitative approach.

Creswell (1998) renowned that qualitative research is a method of inquiry that explores a human or social problem and asserted that the approach is beneficial when seeking to interpret the lived experiences of individuals. Qualitative research operates on the premise that the best approach to reducing skills is when they are applicable to the research study and examined in the setting where they occur. Merriam (2002) claimed that “qualitative researchers are interested in understanding the meaning people have constructed, that is, how they make sense of their world and the experiences they have in the world” (p. 6). Qualitative researchers place an emphasis on multidimensional, comprehensive, existence that seeks meaning instead of weight (Moustakas, 1994). I as the researcher intended to comprehend certain situations and how the cases are managed (Willig, 2008). The research data collection is collective between the researcher and the participants (Creswell, 2007) and falls in the researchers’ scope to be both exploratory and adjustable (Merriam, 2002).

Phenomenology was selected as the methodological approach for examining the experiences and perceptions of teachers who integrate mobile technology in their instruction. According to Creswell (1998) “Human experience makes sense to those who live it, prior to all interpretations and theorizing” (p. 86). Creswell (1997) theorized that phenomenological research illustrates the lived existence of individuals. Phenomenology was developed by Husserl (1964), who recognized that truth is uncovered through direct experiences. The framework of Bursch (1989) assumed that phenomenology understands lived experiences in its truth and that phenomenology which is suggested to strive to uncover important insights that will lead to information that gives insights to our

everyday experiences as well as our participation in those experiences. In addition, employing a phenomenological approach to this study allowed for the resistance of predetermined methods whose standing procedures could limit the distinctive events examined (Yin, 2011). Finally, the phenomenological approach attempts to discard anything that appears as a prejudgment order to reach openness (Moustakas, 1994).

In this phenomenological study, I explored teachers' perceptions of implementing mobile technology into their instruction for student knowledge; this study was approved by Walden University IRB # 12-16-15-0196828. The qualitative approach was appropriate for this study as it is the researcher's attempt to capture the data in an effort to find existing themes to produce generalizations (Neuman, 2009). The study included open-ended interviews to explore the perceptions of teachers who work in schools where a BYOD/BYOT program has been employed for more than 2 years. In addition, an observational component was used to ensure connection of real-life applications. Data gathered regarding lived experiences of teachers integrating mobile technology into their instruction gave insight to their perceptions regarding the use of technology as well as their perceptions of the part they play in forming this context. The interpretation of data suggested the part they play in forming this framework.

### **Population**

The access issue was limited to finding individuals or participants who had experienced the phenomenon. A phenomenological study is designed for in-depth, extensive interviews with participants and, therefore, must be convenient for the researcher to obtain individuals who are easily accessible (Creswell, 1998). The school

district of a school system within a 30-mile radius to where I work was contacted by phone, letter, and e-mail to explain the study and to seek the names of teachers to participate in the study. I examined a school system that had adopted a BYOD/BYOT program for a period of 2 or more years. Two or more years was chosen as the amount of time for the participants to have worked in education and have implemented mobile technology in their instruction so that they had a sufficient amount of time to experience the benefits of the phenomenon.

Upon identifying a list of potential participants for the research study, letters or e-mails were sent to 20 to 30 experienced teachers explaining the study's purpose and asking them to volunteer to participate in the study. When a response had been received via letters or e-mail, the participants were contacted by phone so that additional information about the study could be provided to determine if those participants met the purposeful sampling criteria to continue as part of the study. The participants were chosen from two schools since it is typical to separate schools as middle school Grades 6 to 8 and high school Grades 9 to 12.

Purposeful sampling was employed in an effort to secure participants who were deliberately identified in order to access valuable data that could not be obtained from other sources. Participants in this study comprised of teachers who have implemented mobile technology in their instruction for a period of 2 or more years in a middle school and high school setting in a public-school system.

### **Sampling and Sampling Procedures**

Creswell (2009) referred to Patton's (2002) "snowball" or "chain sampling" method for sampling for a phenomenological study. This process helps to identify "cases of interest from people who know people who know what cases are information-rich" (Creswell, 1998, p. 119). As defined by Johnson (2012), only those teachers who embodied the characteristics specified by the study and agreed to participate in the study were asked to participate.

A list of possible participants was generated for who currently employs the BYOD program into the classroom. To narrow down the sampling, consideration was given to those who had taught in the school system for 5 or more years, had evolved with the idea of a BYOD program, and were also available to do a mini-project sampling. From this, an original list was narrowed down to 10 who agreed to be part of the mini-study.

The sampling of school teachers as participants for this study was purposive. Each school teacher was given a participation request letter in which the phenomenological study, purposive sampling method, and interview technique was outlined. The sample remained small and purposive and was nonrandom.

The research design was centered on the transcription of two semi structured interviews with 10 participants (see Appendix B), and the analysis of the text was derived from these. With Seidman's (1998) guidelines, three interviews were correlated with three interview questions with sub questions of each. As an example, "please describe as a teacher, your experiences using mobile devices in your classroom lessons," was

addressed by asking participants what their perception or view of teachers using mobile devices to provide knowledge to their students was, what devices they have used with their students in the classroom for instructional purposes, what applications have they used on the devices with their students, and how technology has affected their classroom teaching. These questions contextualized the information gathered in the remaining interviews and helped participants feel comfortable discussing their perceptions and experiences in their classroom practices (see Appendix B).

Interview time frames ranged from 45 minutes to 1 hour. Participants were interviewed at their schools. I audio-taped the interviews digitally and then transcribed them. The text was then returned to the participants to check the reliability, and subsequent discussions took place.

### **Procedures for Recruitment, Participation, and Data Collection (Primary Data)**

The purpose of this qualitative research study was to understand the phenomenon from the point of view of the participants. More specifically, the purpose of this study was to understand the lived perceptions and experiences of teachers who have adopted the use of mobile devices in their teachings for student knowledge for a period of 2 or more years. Individuals possess perceptions of a particular phenomenon, and the heuristic phenomenology process, as described by Moustakas (1994), was best used to present an understanding of phenomena (as cited in Budd, 2005). Within the perceptions of phenomena, realities of that particular group's experiences are found. It is these experiences that broaden the benefits of observing live experiences (Walker, Cooke, & McAllister, 2008). Phenomenology is most appropriate when examining both teachers'

experiences and perceptions as the realities of a phenomenon lie in an individual's perception. Interviewing individuals provide with the opportunity to seek in-depth information about people and about how people understand the world in which they live (Shank, 2006). Creswell and Creswell (2005) described open-ended questions as giving open responses and that open-ended questions have limitless possibilities of answering. Quantitative research relies on deduction more than induction (Cheek et al., 2004), and as a result, I can reach a goal of gaining an understanding of teacher perceptions of implementing mobile technology in their instruction through the phenomenological approach.

The access issue was limited to finding individuals or participants who have experienced the phenomenon. A phenomenological study is designed for in-depth, extensive interviews with members and, therefore, must be convenient for the researcher to obtain individuals who are easily accessible (Creswell, 1998). Prior to the data collection, I contacted, both by phone and e-mail, a school district within a 30-mile radius to where I work, seeking the names of teachers to participate in the study. I looked at a suburban school in Connecticut where a BYOD/BYOT program had been adopted by the school system for a period of 2 or more years. Two or more years was chosen as the amount of time for the participants to have worked in education and to have implemented mobile technology in their instruction so that they have had a sufficient amount of time to experience the benefits of phenomenon.

Upon identifying a list of participants for the research study, letters or e-mails were sent to 8 to 12 experienced teachers explaining the study's purpose and asking them

to volunteer to participate in the study. When a response had been received via letters or e-mail, the participants were contacted by phone so that additional information about the study could be provided to determine if those participants met the purposeful sampling criteria to continue as part of the study. The participants were chosen from two schools since it is typical to separate schools as middle school Grades 6 to 8 and high school Grades 9 to 12.

A purposeful sampling of 8 to 10 teachers was employed to secure participants who were able to provide valuable data that could not be obtained efficiently from other sources. Participants in this study, therefore, was comprised of teachers who have implemented mobile technology in their instruction for two or more years in a middle and high school setting in a public-school system.

### **Instrumentation**

In order to understand the essence of both perceptions and experiences of teachers, a qualitative design with a phenomenological approach was chosen for this study. According to Yin, (2011), the foundation for a qualitative study design is exploring a real-world situation through both questions and observations. Open-ended interviews and classroom observations constitute data collection using phenomenology (Colaizzi, 1978). Creswell (2009) stressed that a holistic approach to understanding the issue is undertaken by a qualitative approach. Employing a phenomenological approach allows for the resistance of predetermined methods whose stationary procedures could limit the distinctive events examined (Yin, 2011).

Creswell and Creswell (2005) presented various ways to attain an instrument.

These included fashioning an original way, adjusting an existing, or choosing one that was currently existing. The use of interview questions serves as a tool as they are suitable way to examine both the live experiences and the perceptions of implementing mobile technology in instruction. This study will consist of a variety of questions derived from the three primary research questions. Creswell and Creswell (2005) explained that questions need to be constructed to in effort to offer answers to the pioneering research questions that were originally proposed by the researcher. DiCicco-Bloom and Crabtree (2006) irradiated the importance of crossover that begin with the research questions and then follow to the proposed questions where the primary question can serve as the initial interview question. However, 5 or 10 more explicit questions will be developed to probe deeper into diverse facets of the research topic (see Appendix B).

### **Data Analysis Plan**

There are four standard components of a phenomenological study design: horizontalization, phenomenological reduction, epoche, and imaginative variation (Merriam, 2002). These are both the philosophical and practical guidelines for the analysis of themes and patterns in this study. Each of these elements utilized in this analysis are subsequently described.

Horizontilization places the interview text in a layout that gives weight to all of the statements made equally so that the phenomenon will be free of the researchers' bias. This will be done by carefully reviewing the text, considering the multiple meaning assigned to particular descriptions and then posting additional questions to participants for any clarification. Interview data will be divided into statements using the trial

program MAXQDA for horizontalization. The categories will then be transformed into clusters of meanings, expressed in phenomenological principles. Memos will be used to keep track of decisions made for text reduction.

The phenomenological reduction is “continually returning to the essence of the experience in order to derive the inner structure or meaning in and out of itself” (Merriam et al., 2002 p. 94). The data will be condensed and then structured systematically where significant statements and cross-case synthesis will be established. This is what will form the basis of the initial profiles and meanings of the participants’ accounts.

Epoche is where “bracketing” occurs. This is where the researcher brings their own beliefs, assumptions, and suppositions about the phenomenon so inner structures of meaning can emerge. This process helps in examining the phenomenon in an unbiased manner (as much as possible). This process also helps the researcher to stay focused on the participants’ views. In an effort to obtain this, entries were made in a separate journal to separate the researchers’ experiences from the participants’.

Imaginative variation (Merriam, 2002) focuses on viewing the data from varying perspectives so that the “what and the how” of the phenomenon could be constructed in the final analysis. To accomplish this, the conceptual framework was used to examine the data analysis of the teachers’ perceptions and experiences from multiple viewpoints.

According to Creswell (2014) and Seidman (1998), the two most common ways to analyze data in a phenomenological study are to craft individual profiles to analyze text for patterns across cases. This in essence would help to capture both richness and common and contrasting experiences of the individual interviews. Methods used would

be creating taxonomy; crafting profiles, creating meaning statements; developing portraits; making cross-case comparisons; identifying standard dimensions and approaches, and revisiting the research question for perceptions and experiences.

The analysis of both perceptions and experiences by participants is an intricate phenomenon. A multi-faceted approach allowed both the interviewees' collective and individual perceptions of the experience to be portrayed.

Creating taxonomy reduced the text to a manageable size, making the initial analysis of characteristics and relational contexts of each participant. The transcripts were reviewed many times, writing notes in margins about the essential characteristics. The taxonomy of categories then emerges. Each section of the text was labeled with corresponding placement, placing them into the taxonomy and removing any insignificant text. Upon completion, the document was examined for omissions. The categories that emerged included what experiences arrived from using mobile devices in instruction; what perceptions arose from implementing mobile technology into teachings; what devices were employed; what applications were employed using mobile devices; and what recommendations were made for implementation of mobile technology in instructional design. These documents expressed what participants described in their interactions with implementing technology into their instruction, including context and activities.

Crafting profiles involved making cuts and adding words for coherence. This step involved tying ideas together between participants' perceptions within the context of ideas. In doing this, the responses to each section were read and re-read so that when

crafting, the answers were still valid from each participant's statements. These profiles were then being compared with the original text to ensure the accuracy of the information reduced.

When creating meaningful statements, the patterns were reduced even more to represent the participants' perceptions. Meaningful statements were kept to the first person point of view. Once again, care was taken to ensure the statements represented what was initially expressed during the interviews. The participants were then given a chance to re-read the condensed passages for accuracy and permission to be placed in the final analysis.

Individual portraits emerged when the profiles were completed. An introductory and concluding commentary were added to the meaning statement for each participant. These portraits then provided biographical information, personal descriptions of participants as they viewed themselves as teachers and how they perceived and experienced implementing mobile technology in their instructional design.

Making cross-case analysis began with the first interviews. The participant reports were reviewed and condensed, and comparisons were documented with memos. The process of recording within memos or the margins is ongoing when new interview data became available. Profiles and individual meaning statements were then drafted. The interview text was once again compared to the implementation of technology as seen from the experiences and perspectives of the participants. Descriptions were looked at for commonality among all the participants of the study who explained how they viewed mobile technology use in their teachings.

Identifying common dimensions for coding was the next stage of the analysis. This was done by comparing descriptions across the cases: perceptions of mobile technology use in classroom instruction; experiences in mobile technology use including barriers or obstacles; mobile devices that were being used in instruction; and applications used with the mobile devices. The dimensions were developed using the original text profiles, looking for meaningful statements and common perceptions. All of the above then lead to defining mobile technology use in a teachers' instructional design for student knowledge. This involved integrating the data from the participants' descriptions of use.

### **Threats to Validity**

There are a number of potential threats to Validity. Next, I will address issues of trustworthiness, transferability, reproducibility, and confirmability. To ensure reliable, replicable, and valuable results of qualitative research, it is essential to consider the principles of trustworthiness and ethics. Establishing trustworthiness can be both a complicated and challenging process as many components must be considered in the implementation and design of the study. Trustworthiness of a research study is important to evaluating its worth. Trustworthiness involves establishing the four principles of qualitative research used to guide the analytical process for this qualitative study. These four principles or evaluative criteria, were laid out by Lincoln and Guba (1985) and included credibility, transferability, dependability, and confirmability (Shenton, 2004). The following represented the guidelines that were used in this study to accomplish the components of trustworthiness and ethical considerations.

To ensure the truth and value of the findings and establish proper examining of

the phenomenon, credibility has to be established. Lincoln and Guba (1985) in Shenton (2004), consider member checks as the single most important provision that can strengthen a study's credibility. To achieve this, analysis of each participants' perspective was done to be sure that all competing viewpoints were portrayed as the participant actually intended. Each participant was interviewed two to three times referencing a particular initiative within the interviews. In addition, member checks were conducted to ensure the findings represent the perceptions of the participants with as much accuracy as possible.

Another element to consider for member checking involves verification of the researchers' emerging theories and inferences that are molded during the dialogue interactions. Van Manen (1990) emphasized that the researcher brings forth both analysis and verification from the field and is not something attended to after the data collection. When making sense of field data, each piece of information should represent the contextual meaning of the participant as viewed by both the participant and the researcher.

Transferability allows for the application of findings to the literature studied to be transferred to other studies. In-depth interviews included rich examples of participants' experiences and perceptions of integrating mobile technology into their instruction. The descriptions were both analyzed and interpreted so they can be understood and applied by other educators practicing the use of mobile technology in their teaching.

The documentation of the process should be dependable so it can be reproduced in other studies. The details derived from other participants and their practices should be

compared with similar situations. Direct quotations and meaning statements obtained from the interviews were presented so that other readers of the study could reinterpret them.

The confirmability of the study resulted from member checks after each interview to eliminate bias. Participants were reviewed and approved their meaning statements to ensure that the data presented will accurately portray their perceptions.

### **Limitations**

The measures taken for trustworthiness, and ethical considerations seek to ensure principles of credibility, transferability, dependability, and confirmability. However, when performing a pilot study some limitations were noted. These limitations can be derived from previous acquaintances with participants of the study, self-biases about implementing mobile technology in instruction and inexperience as a researcher. Some limitations can be mitigated by various strategies.

Trustworthiness of a research study is important to evaluating its credibility or to ensure a study measures what is actually intended. According to Van Manen (1990), qualitative studies illuminate small numbers of participants that have practical applications to the larger population, and phenomenology is based on the idea that human experiences are valid sources for data. Using a small number of participants for a study cannot represent the larger population of teachers who implement technology in their teachings. However, their perspectives can be used to initiate the process of understanding and to bring about various avenues of future research and practice. The interview process should solicit rich data regarding the practices of the participants of the

study. To generate precious data, contextual information needs to be sought, and follow-up questions should be given to prove for concrete examples of how technology integration is both experienced and perceived. As a researcher, the phenomenon needs to be explored in as much detail as possible to increase transferability to other studies. Upon the onset of interviewing, participants will be should be contacted and asked if they would willingly participate with the researcher regarding their experiences and perceptions. Participants were also informed of the measures made to protect confidentiality, the opportunity to remove anything from the data retrieved from the interview, and the chance to withdraw from the study at any given time.

A researcher needs to limit bias by allowing the phenomenon to emerge from the participants' descriptions, examining the data for confirming or contrasting viewpoints, and uncovering unique personal characteristics and details of perceptions and experiences. As an inexperienced researcher, numerous conversations with committee members and reflective writing should be employed to avoid bias. Also, conducting member checks and returning transcriptions of texts for examination of participants can improve the study's credibility and confirmability.

### **Internal and External Validity**

Validity is primarily characterized in two forms, internal and external (Creswell 2007). Internal validity is the ability of the instrument to measure the research variables and external validity generalizes the findings of the study to other populations (Marshall & Rossman, 2006). For this phenomenological study, validity was achieved when the

knowledge that the researcher was seeking was attained through descriptions that make the understanding of the meanings and essences of the experience (Moustakas, 1994).

Validity concerns the accuracy of the data. According to Creswell and Creswell (2005) and Neuman (2006), both the procedure and the participants of the research study can impact validity. To ensure validity, the participant should adhere to the scheduled interviews and respond to all interview questions. The interview questions were designed with thoughtful consideration to the phenomenon of the study and sensitivity to the interviewees. Questions can be reviewed and refined to progress from general to specific (Creswell & Creswell). Interview questions that are not carefully constructed can contribute to decreasing the validity of the study (Creswell & Creswell).

External validity is where the application and generalization of the research results refer to other populations or other surroundings (Neuman, 2006). For various reasons, this study may have limited generalization as a consequence of a small population size in a specific school district, in a particular geographic location of Connecticut. If the participants were demographically different to an extent, the results might not be generalizable. The participants may not be reflective of the larger population of teachers who employ mobile technology in their instruction. The findings derived from this study may not apply to other regions or districts who do not use mobile technology programs.

### **Summary**

Mobile technologies are available today to enhance teachers' instructional practices for student knowledge. About twenty years ago, these technologies did not exist

(Stansbury, 2012). Significant investments are made by school districts across the United States to increase teacher technology skills for integrating technology into instruction (Devaney, 2011). Technology itself does not guarantee implementation of educational instruction (Waterhouse, 2005) and is making it imperative for teachers to transform their classroom practices to include the use of technology (Fallon, 2010).

The purpose of this study was to understand the lived perceptions and experiences of teachers who have adopted the use of mobile devices in their teachings for student knowledge, for two or more years. The research explored how this phenomenon supported and what barriers impacted teachers' perceptions of the use of mobile technology in their instruction for student knowledge. The data collected further developed and supported implementation by teachers' and added to the body of knowledge through identification of supports and barriers perceived and experienced that both encourage and discourage the adoption of mobile technology use in instruction. In Chapter 4 I describe the results of the study and in chapter 5 I discuss the meaning of those results.

## Chapter 4: Results

The purpose of this study was to understand the lived perceptions and experiences of teachers who have adopted the use of mobile devices in their teachings for student knowledge for 2 or more years. Understanding both the perceptions and lived experiences of professional teachers upon implementing mobile technology in their teachings for student knowledge can signify the importance of the influence of technology on the education of today's students. The participant selection was based on the number of years that teachers have implemented mobile technology in their teachings. The time frame given was 2 or more years. The implementation also included the BYOD/BYOT programs. These programs have guidelines that school systems provide to both teachers and students to follow when using personal mobile technology in the educational setting. For purposes of this study, mobile technology referred to any device that is mobile such as smartphones, iPads, notebook computer, laptops, and e-readers.

In this chapter I will first describe how the perceptions of the participants were addressed, individual textural-structural descriptions were used as well as composite structural descriptions to address the participants' perceptions about the subsequent themes disclosed in the analysis. The results for each research question are then presented, and data to support each finding such as quotes from transcripts and documents from the interview are included. In addition to interviews, observations of mock lessons were used to support the interview data. The review of the literature established the need for the following qualitative research questions that guided this study:

1. What are both the perceptions and shared perceptions of teachers using mobile devices in their instructional design for their students?
2. How do teachers describe their experiences when using mobile devices to provide knowledge?
3. What are the positive and negative factors that teachers indicate in their exercise of using mobile devices in their instruction within their classrooms?

In addition, tables and figures to illustrate the results as appropriate are included. Finally, I conclude Chapter 4 with a summary of the main points of the research data.

### **Setting**

The setting for this study included two suburban educational sites located in Connecticut, on the East Coast, and of the United States. The mission of both sites strives to be creative in instructional practices to ensure that students become inquisitive, life-long learners with 21st century skills. The communities were both considered to be upper-middle class. The population age range of students in the middle school was 10 to 14 years and of the high school 14 to 19 years.

Site 1 was Starling District (pseudonym), which included two teachers from a public middle school (grades 6 to 8) and one teacher from the public high school (grades 9 to 12). This school is located in a town with a population around about 22,000. Starling District has had a 1:1 or BYOD/BYOT program for 5 years. The BYOD program is a program that allows students to bring their personal device. The students sign a contract that gives them the opportunity to use their own devices at the discretion of how they are to be used within the school setting. The purpose explains that the students are only

allowed to use their mobile devices for educational purposes. Site 2 was Horizon (pseudonym) and is a school that combines two towns into one district. The participants of this site included three teachers from a middle school (grades 6 to 8) and four teachers from a high school (grades 9 to 12). One of the towns has a population of 9,405 and the other has a population of 6,049. In combination, the total population is 15,454. This district has implemented a BYOD/BYOT program for 3 years. This program allows students to use their mobile devices at the discretion of the teacher and for educational purposes only.

### **Demographics**

Participant demographics were collected during the interviews based on the school district where the participant was employed. The study was designed to include participants who have implemented mobile technology in their instruction for student knowledge for 2 or more years. All participants who participated in this study were teaching in public schools. Since the requirements for this study were to include participants who have implemented mobile technology in their teachings for more than 2 years, school districts were sought to comply with the research protocol. The protocol was met by seeking information from colleagues who knew districts who have implemented a BYOD/BYOT program for more than 2 years. The superintendents of the two school systems were then contacted for permission, and the following participants were contacted and secured for this study, via e-mail and by phone.

Table 1

*Participant Demographics*

Pseudo-nym	Grade taught	Subject	Number of years teaching	District	Number of years implementing mobile technology
Andy	8	Language Arts/Reading	20	Starling	3.5
Benjamin	8	History	16	Starling	3.5
Malcolm	10-11	History	16	Starling	3.5
Carol	10-12	Art	12	Horizon	2.5
Carrie	7-8	English/Science	11	Horizon	2.5
Clara	6	English/Reading	11	Horizon	2.5
James	12	Business/Technology	15	Horizon	3.0
Mary	7-8	Social Studies	22	Horizon	2.5
Mona	10	History/ Spec. Ed.	13	Horizon	2.0
Tess	9	Media Specialist/History	10	Horizon	2.5

The demographics of each participant are described in Table 1. There were 3 teachers from the Starling School District who participated in the study. Each of these teachers has been working in this school system for more than 5 years. In addition, all of these teachers have implemented mobile technology in a BYOD/BYOT program for more than 2 years. There were 7 teachers from the Horizon School District who participated in the study. Like the Starling teachers, each teacher from Horizon has been a part of the mobile technology programs for more than 2 years.

### **Data Collection**

The data collected for this qualitative research included three types of recordings. First, data were collected via 10 interviews of middle and high school teachers, completing the requirements of Grades 6 to 12. Second, data were collected by observing

a demonstration of how each teacher implements mobile devices in a lesson. Finally, follow-up interviews were conducted with the same teachers to clarify any questionable recordings.

The data collection began with identifying a research location and securing participants from the locations. I contacted the superintendents from school districts that I knew had a BYOD program in place. I then waited on superintendents to obtain lists of potential teacher participants. This was a difficult task at one location. Therefore, a second location was sought, and the IRB was contacted for permission. Once I had email addresses of potential participants, I sent the letter of invitation and consent in an email (Appendix A). For those who consented, I then followed up with both a telephone call and e-mail to set up both a time and a location for the interview.

Both the interview and the lesson demonstration were collected at the same face-to-face meeting. First, data were collected with semi structured, open-ended interview questions to yield narrative responses of descriptions and authentic experiences that comprised the data from participants (Creswell & Creswell 2005; Moustakas, 1994). I followed the interview protocol that is presented in Appendix B. During phenomenological interviews conducted in this study, I established a safe and comfortable setting for participants to openly describe their experiences (Moustakas, 1994). Nine of the 10 interviews were conducted in the classrooms of the participants at the end of their school day. One of the 10 interviews were conducted in a teachers' lounge area at the end of the school day. Each interview lasted between 45 to 90 minutes and included a demonstration that was completed within 10 to 15 minutes. The

demonstration was of a mock lesson, without students present, to better understand which apps and how teachers integrate BYOD technology into their instruction. Data were collected during the interview by digital audio recording and by note taking. I incorporated a demonstration in effort to collect visual data, which was recorded by taking notes on a note pad. The demonstration provided visual data that both enriched and supported the understanding of the participants' responses to the research questions.

Once the first interview and mock lesson observation were over, the participant and I worked out a time and location for the second interview. Once the data from the interviews were collected, the interviews were transcribed and the data were organized into categories and then coded into themes. Data from the follow-up interviews were used to support or clarify any of the data from the initial interviews. This process was done by first transcribing the interviews using Microsoft Word, then grouping statements that were similar in response to creating themes. When I did not clearly understand a statement, I noted the statement to be clarified in the follow-up interview. Lastly, the data were stored in a secure password-protected computer in a password-protected file.

The last data I collected were the follow-up interviews with the same study participants. I conducted 10, each lasting between 20 and 30 minutes. I used the follow-up interviews to clarify any aspects from the first interview transcripts to ensure that not only I was interpreting their answers correctly but also that all my research questions were answered. The follow-up interviews were conducted by phone, video chat, or e-mail responses to prompts and were carried out at the convenience of the participant.

The purpose of the demonstrations helped to clarify the actual usage of mobile technology in the participants' classroom lessons. For the demonstrations, I reported them as demonstrations and included a chart of what mobile technology was used as well as how it was used and what programs were used. Another consideration for the quality of this study was acknowledging the possibility of discrepant information. The discrepant information was information that was not relevant to questions during the interviews and was included in the transcription notes as part of the response. Therefore, this information was neither ignored nor eliminated. Participants had the opportunity to provide additional comments, and no changes were made to this kind of response. All data collected were analyzed accordingly.

The participants were given an email letter that briefly described their participation in the study that included an attachment of their transcription. This follow-up email letter allowed for any correction, clarification, extension, or removal of information for their approval that did not represent their experiences of implementing mobile technology in their teachings for student knowledge. Participants were then asked to use a different colored font to establish any corrections that I needed to make or any additional information they would like to add. Transcript reviews by the participants gave the opportunity for the participants to determine both accuracy and feedback. No feedback changes were noted.

### **Data Analysis**

The data were analyzed using Moussakas' (1994) method for analysis. According to Merriam (1998), phenomenology is the foundation of qualitative research. The

researcher should be able to examine experiences from “many sides and perspectives until a unified vision of the essences of a phenomenon or experience is achieved” (Moustakas, 1994 p. 58). To do this, the following process outlined by van Kaam (1994) and modified by Moustakas (1994) was adhered to. The heuristic phenomenology outlined by Moustakas (1994) described a process that included immersion, incubation, illumination, explication, and creative synthesis of data.

To be consistent with phenomenology, the interpretation of the data were filtered through my worldview lens of experience. In addition to sharing the participants’ experiences and perceptions, the data analysis was also my interpretation of these perceptions and experiences. I began the data analysis with an open-ended interview process. I then asked follow-up questions to both clarify and find a greater insight into the participants’ perspectives. The follow-up conversations assisted in viewing the participants’ experiences through their worldview lens of what their experiences of using mobile technology in their teachings meant to them.

Themes arose through a sustained engagement with the various transcripts and my scripted notes. Personal perspectives and meanings were a critical part of analyzing the use of mobile technology in teachings. The process of qualitative analysis is personal. Therefore, the analysis itself is interpretive. The steps for interpreting the data included reading and rereading, noting, developing themes, searching for connecting themes, moving to the next participants’ data, and finally looking for patterns across each of the participants’ data.

The conceptual procedure for conducting a phenomenology study include epoche, interviewing, processing the data through steps of data analysis, then extracting the heart of the lived experiences (Moustakas, 1994). According to Moustakas (1994), “epoche is a Greek word meaning to refrain from judgment, to abstain from or stay away from the everyday, ordinary way of perceiving things” (p. 33). When implementing the first step in the phenomenology process, I needed to set aside judgments of knowing and looking at the lived experience. I used Microsoft Word to help organize my codes and themes. I initially engaged before interviews and before transcribing in the epoche process where I wrote my experiences with the phenomenon of mobile device use in my teachings, then set those ideas aside to release any bias, preconceived ideas, and expectations regarding the use of mobile technology for student learning in the classroom. This method was in preparation to read through the transcripts teachers of individual experiences. Next, I transcribed the audio recordings into a script format within a word document. This process was done twice to check for accuracy.

The data analysis process began with listing and preliminarily grouping by jotting down notes from the interviews, by repeatedly reading interview transcriptions, coding data, categorizing and segmenting data, identifying themes, and finally writing down both textural and structural descriptions of the data. I employed Microsoft Word during the process of coding, phenomenological reduction and thematic analysis. I also maintained a reflective journal where I wrote analysis and interpretation memos throughout both the data collection and analysis process.

Moustakas (1994) phenomenological reduction process referred to horizontalizing the data to ensure that all data has equal value. I identified invariant horizons to include non-overlapping statements in which participants described their experiences. Moustakas's (1994) method of phenomenological reduction does not necessitate a particular process for coding data. To approach this, I used a method of coding based on identifying and labeling meaning segments that emerged by highlighting and color coding. Codes consisted of units of meaning that signified the context of the participants' perspectives and experiences. I then developed a codebook with definitions for each code. I also included inclusion and exclusion criteria to clarify the application of the code to the narrative data. This process ensured both consistency and accuracy in the coding process (Moustakas, 1994). As a result of this process, I developed codes for this study that ultimately revealed concepts, themes, categories and textural descriptions.

The next step of the phenomenological reduction was to involve clustering and identifying themes and developing textural descriptions. I used individual textural descriptions to write composite textural descriptions. This process allowed for emerging themes. I then explored alternative views of the coded units of meaning by engaging what Moustakas (1994) referred to as imaginative variation. The creative variation allowed for understanding the process of the experience by considering participants' descriptions regarding structures that were common to develop structural themes. Moustakas (1994, p. 99) described the process of imaginative variation as "systematic varying of the possible structural meanings that underlie" descriptions of participants. I considered universal structures of "student as learner, the student in control, student-centered learning" in

facilitative relationships in the process of imaginative variation to explore just how these relationships contribute to understanding descriptions of participants' responses.

The next stage of analysis was data reduction (Moustakas, 1994). Therefore, I took the interview transcript from each participant and thoroughly and repeatedly read it to gain a thorough understanding of the participants' experiences. I first took mental notes and then in subsequent readings made comments in the margins, including any details I had about body language in my notes. The transcripts were then laid to rest for a short period to allow for incubation (Moustakas, 1994). The transcripts were then read again, and text segments were color coded with the highlight option in Microsoft Word, looking for similar ideas, and assigned codes. For example, transcripts were coded for sections that aligned with the study's research questions. All statements of what were perceptions and shared perceptions of teachers in using mobile devices were highlighted in yellow. Then comments about how teachers describe their experiences when using mobile devices to provide knowledge were highlighted in green, and what were positive and negative factors that teachers indicate when using in their exercise of using mobile devices in the classrooms were highlighted in blue. When I felt, I did not understand statements or needed clarification of an answer, I contacted the participants by phone and by e-mail to be sure I had a second chance to interview or follow-up. This process was continued for each participant to be sure I had a clear understanding of their experiences with implementing mobile technology in their teachings. This data analysis process continued for each of the participants after the first interview.

Once all the transcripts were color coded, and horizons were identified, their textual meaning grouped similar horizons for each participant; for example, shifting responsibility to students were considered similar ideas, therefore, grouped together. Statements that were not representative of the phenomenon or aligned with the study's research questions or were not considered to be fundamental to the experience were eliminated. These were deemed to be statements that were not specifically connected to any of the research questions that included perceptions, experiences, positive attributes, and negative attributes specific to implementing mobile devices into the participant teachings for student knowledge. These statements included conversations about each other's future or conversations such as our students 'today including behavior, our administrators, or our personal lives. For example, discussions emerged about student behavior in districts which were irrelevant to the research question. The usual conversation that two professional teachers may have. This type of communication allowed for the easement of the actual interview questions.

When the invariant constituents were identified, themes were extracted and labeled from grouping together related invariant constituents. When more than 60% of the teachers responded in a similar way, themes were determined for the study. Within a theme, itself, if more than 50% of participants identified the same thought, the ideas were labeled as a subtheme of the central theme identified. Both the themes and subthemes as well as the constituents were validated by checking them against the transcripts of the interviews (Moustakas, 1994).

The following data collected from this research study was broken down into each theme and then compiled into the similar views from each of the 10 participants. The themes that emerged from the analysis of participants' experiences and perceptions are shown in Table 2. However, a clear understanding of the differences between perceptions and experiences needs to be clarified. Perception is a noun that is derived from the word "perceive." For purposes of understanding the data in this study, perception means "to notice or become aware of something." Experience is a noun that means "the skill or knowledge you acquire by doing something." With the clarity of differences, the body of data were categorized as shown in the following table.

Table 2

*Themes Within Posed Research Question Codes*

Research Question 1: What are the perceptions of teachers in using mobile devices to provide knowledge to their students?	Research Question 2: How do teachers describe their experiences when using mobile devices to provide knowledge?	Research Question 3: What are positive and negative factors that teachers indicate in their exercise of using mobile devices in the classrooms?
Replacement of Old Tools	Student Engagement and Collaboration.	<b>Positive:</b> Efficient Use of Class Time
Instructional Planning Changes	Monitoring students use of mobile technology	Lesson Flexibility
Shifting Learning to Students		Accessibility of Learning
		<b>Negative:</b> Student off task
		Safety issues

I used my own spreadsheet that I created in Microsoft Word, as a tool to organize participant responses. This spread sheet included the pseudo names of the participants,

the themes that were derived from the interview when coding, and the quotes that were used by each participant that generated each theme. It is indicated by Creswell (2007) that preparing for data analysis involves conducting different analysis, moving deeper and further into the understanding conclusions derived from the data. A spreadsheet was, therefore, used to organize data into general categories, bringing forth emerging themes. This process was an open coding strategy (Creswell, 2007) that allowed for chunking information so that it could be labeled into categories. Upon completion of identifying themes, responses from interviews were coded. The primary and secondary themes that arose were defined in the results in this chapter. There were no discrepant cases; however, there was some personal data that had no relevance to the interview questions. For example, commenting on the weather that day, the driving time to reach a school, and sharing personal educational experiences of my background and exchanging information about children, family, or household animals.

### **Evidence of Trustworthiness**

Evidence of trustworthiness of research relies on a study's credibility, transferability, dependability, and confirmability. In this section, I explain the consideration of each factor that influences the power of the data collected from this qualitative study. First, to establish credibility, all of the participants were treated equally. The questions all remained the same initially unless clarification of a question warranted a restatement. As the researcher, I always re-informed the participant that their identity remained with me as the interviewer as "A researcher protects the anonymity of the informants" (Creswell, 2007, p. 141), and therefore, encouraged the participants, to be

honest with their answers. I also insisted that the participant chooses the place and time that was more beneficial for them to participate in my study. The location was an effort to produce comfortability for the participant. Moustakas, (1994), stressed the importance of generalizing findings to other populations that related to other phenomena.

For transferability, in the evaluation of the data, I looked for similarities in all participants' interviews as well as different characteristics. All the interviews were transcribed to accurately and appropriately reflect the participants' response to the research questions (Creswell, 2007). The data were validated by the participants to extend, clarify, and correct anything they found that inadequately reflected their experiences. However, care must be taken when transferring the results from a phenomenological study because there is a chance that there may be a misinterpretation or a misunderstanding of what the participants' data entailed. Checking a participant's confirmation of data is a central validation strategy for the Descriptive Phenomenological approach (Creswell, 2007). The last issue of evidence of trustworthiness is confirmability. Confirmability refers to strategies for credibility specific to phenomenological studies (Creswell 2007, Moustakas, 1994).

To address confirmability in my study, throughout the process, I kept a log to ensure quality. In agreement with Moustakas' (1994) approach, I recorded experiences with the phenomenon of implementing mobile technology in my lesson planning. This practice included both thoughts and feelings concerning my assessment of mobile technology in the classroom. This method also enabled me to set aside any of my preconceived ideas or bias about mobile technology. This practice was done before each

interview with the participants of this study. Another consideration for the quality of this study was acknowledging the possibility of discrepant information. This would-be information that was not relevant to questions during the interviews, and was included in the transcription notes as part of the response. Therefore, this information was neither ignored nor eliminated. Participants had the opportunity to provide additional comments and no changes were made to this kind of response. All data collected were analyzed accordingly. Transcript reviews by the participants gave the opportunity for the participants to determine both accuracy and feedback.

## **Results**

Data findings for participants are presented according to themes that emerged from the data that were collected from participant initial interviews, mock lesson observations, and the final interviews. These results are described related to which research question it aligns.

### **Research Question 1**

The first research question was as follows: What are both the perceptions of teachers in using mobile devices to provide knowledge to their students? Perception means to notice or become aware of something (VanRullen & Koch, 2003; Efron, 1968). The themes that emerged from this research question were replacement of old tools for student learning or “going paperless”; instructional planning changes; shifting learning to students or student-centered learning. Technologies of today such as smartphones or tablets are perceived as a replacement of old tools of the past such as pencils, pens, and paper. Going paperless referred to saving the ecosystem from paper usage. Instructional

planning changes meant that planning has changed with the technology changes and use of mobile devices. Finding ways to develop learning experiences that tap into what students' value can also be a new planning change when considering implementing mobile technology. Shifting learning to students refers to the teachers' beliefs about implementing mobile technology into their teachings and how the implementation is reflected in their teachings. This concept of shifting learning to students will be viewed as student-centered learning.

**Replacement of old tools.** In this research study, one of the common themes that emerged for research question 1 from participant responses was replacement of old tools for student learning, with a majority of the participants specifically referring to “going paperless.” Replacement of old tools meant that technology tools such as pencil, pen, and paper have been replaced with technologies such as smartphones or tablets. Going paperless referred to saving the ecosystem from paper usage.

Andy, an 8<sup>th</sup> grade reading and English teacher, associated the use of mobile devices as bringing school lessons into the 21<sup>st</sup> century when he stated that

Mobile technology or the use of mobile technology in my class is bringing school lessons into the 21<sup>st</sup> century by the use of 21<sup>st</sup> century technology. Students need to embrace and learn how to use this every day technology like smartphones instead of, I don't know, pens and pencils.

In addition, Andy demonstrated how she has her students use an e-text version of their literature book to do a variety of things on their mobile devices. Andy also demonstrated

how students log and journal their independent reading in an online program called “Whooo’s Reading.”

Andy was the only participant that did not use the exact phrase “going paperless” in her response, although she indicated a replacement of technology for “pens and pencils.”

Other participants discussed how BYOD helped them in “going paperless.”

Benjamin, an 8<sup>th</sup> grade history teacher made a statement about the use of mobile devices as a replacement for pens, pencils and papers. Benjamin indicated a replacement by saying the following

We should embrace the devices and use them as educational tools. Why not use the smartphones as if they were a pen, pencil, and a ruler of the past. The result would be a reduction of paper and pencils. Smartphones were viewed as a replacement for pens, pencils, and rulers.

Benjamin also supported the replacement of old tools with technologies of today by demonstrating an example of using platforms or learning management systems (LMS) such as Schoology and Edmodo. A learning platform is basically a tool for providing information, tools, and resources to support and enhance the delivery and management of lessons in education.

Clara also commented on replacing today’s technology tools for student learning by adding

The quality is generally speaking, much improved, taking out paper. Students invest themselves when there is a computer or a device rather than a paper notebook. This year I was able to go digital with all documents and lessons. By

using Chrome Books compared to paper and/or pencils was clearly one way of going paperless in my classroom.

In Clara's demonstration, she supports the replacement of old tools by stating

I use desk top computers, chrome books, laptops, iPad, and smartphones. Oh and kindles on occasion. Productivity tools such as pages, google docs, Schoology, kid blog, notability, KeyNote, Edu cannon, and black channel. Students use Chrome books with direction from Smartboard commands/ guides links from Google docs.

The use of any technology that eliminates paper and pencils such as Schoology and Google docs is a direct way of a classroom going paperless. Students are using the Chromebook, laptops, iPads and Smartphones to do their assignments in place of the traditional method of paper, pens, and pencils. Clara made it clear that she uses mobile technology for her assignments in place of pens, pencils, and paper. Tess commented on the replacement of paper and pens by stating

My classroom is paperless as mobile technology has replaced the use of pens and paper with learning platforms. Mobile technology for students is what holding a pencil and paper was for us. Using a combination of Schoology as a learning platform...my classroom is paperless.

Tess also demonstrated how she has her students create slide presentations and documents in Google. They submit them to a platform like Schoology. She then went on to talk about the various other applications: "In addition to Schoology and Google apps, my students use QR code reader, Animoto, Prezi, Educreations, Voicethread, and

backchanneling through Today's Meet.” Tess now uses Schoology as a platform and various applications in place of using pens, pencils, and paper. Mary’s response confirmed the shared consensus about going paperless by saying: “The quality is generally speaking, much improved with today’s technology.” Mary then went on to simply state “Taking out paper.” Mary demonstrated a few icon applications on an iPad that she uses with her students. She demonstrated how she places video clips in Schoology that the students can download and view anytime, and anywhere. She also demonstrated how discussions or feedback assignments could be given using mobile technology and Schoology where she can post the follow-up assignment and/or a discussion about the video clips. Once again, the students are engaging in technology use rather than pens, pencils and paper. Carrie referred to digital notebooks as a way to remove paper notebooks which implied going paperless when she commented:

Digital notebooks are used to keep and take notes and can manage assignments from every class. This is a paperless way of keeping and organizing notebooks. I incorporate digital notebooks to keep and take notes, and manage assignments from every class. We sure use less paper than when students took notes in the traditional manner of paper use.

Carrie demonstrated how students have access to programs like Noodletools. These programs were demonstrated for student research where notes are taken within the Noodletool program rather than paper note taking.

James did not really direct any answers specifically to paper. However, James stated that:

Technology has made it easier for me to collect and correct student work. Less

bulk to carry around and I can have all their work in one place. I don't really need a brief case or a book bag to carry all that ----around." The "bulk" James referred to was the paper assignments he carried around, although he didn't use the word "paper."

James, however demonstrated by taking out his cell phone and showed how he could add a YouTube video clip to a learning platform that his students have access to. He can then as a few open ended questions that the students answered and discussed in a discussion platform within the learning platform. The responses were now paperless.

Malcolm spoke of how the mobile technology is always available as students have their cell phones with them at all times.

The best part about mobile technology is that the kids have it with them at all times. I can go paperless by telling them to take out their device and give them an assessment right then and there. This gives me a visual of how each student is doing in reference to understanding materials taught in a given lesson. No more of that paper.

Malcolm gave a demonstration of Google Maps. Malcolm has his students use this to demonstrate their understanding of geography. Malcolm also demonstrated how he uses YouTube clips and how he monitors discussions that he gives probing questions to begin his lesson. Since the discussions are entered in a text format on the students' devices, Malcom's lesson descriptions are now paperless. The students are using digital answers in place of pens, pencils, and paper.

Mona was more concerned with useless files of paper laying around. "I no longer need my file cabinets. They are just like having dead trees laying around. Most of the

papers filed in my cabinets have not been touched in years. I can now just access any class information in cyber files. Much easier today, much less bulk.” Mona demonstrated the use of Kindles and other e-readers to eliminate the use of paper files for her program.

Nine out of 10 or 90% of the participants perceived “going paperless” as an important part of the instructional design for their BYOD programs. This was expressed in many different ways, from elimination of pens and pencils, using platforms to give lessons and having the lessons submitted, to the elimination of cabinet space or lugging around papers to grade. The perception of 90% of the participants is that mobile technologies are a replacement of old educational tools. This theme, therefore, leads into both instructional planning challenges and the pedagogical shift from teacher as a lecturer to teacher as a facilitator. Table 3 includes the number of times each participant mentioned replacement of old tools as well as the percentage of times mentioned. The theme of paperless was brought up the most by Carrie and Andy who mentioned it five times in their interviews. And Carol was the only participant for whom the theme did not emerge.

Table 3

*In Place of Paper, Pens, and Pencils.*

Participant	Paperless by:	# of times mentioned	Percentage of times mentioned
Andy	Smartphone	5	14.7
Ben	Smartphone	4	11.8
Carol	N/A	0	0
Carrie	Notebooks like Chromebooks	5	14.7
Clara	Chromebook	3	8.8
James	Smartphone	4	11.8
Malcolm	Smartphone	4	11.8
Mary	Schoology Platform	4	11.8
Mona	Cyber files versus cabinet files.	2	5.9
Tess	Schoology Platform	3	8.8
		Total # = 34	

**Instructional planning changes.** Another theme that came up that relates to research question 1, of how teachers perceive instructional design of their BYOD/BYOT classrooms is related to planning changes. This theme combines references of teachers' perceptions of how technology impacts their planning, and the challenges that come with those changes.

The comments centered on simplicity and difficulty in planning after implementing mobile technology into their teachings for student understanding. This notion is reflected in the Tess talked about flipping lessons as her instructional planning change and as a challenge:

I do more flipping lessons than ever before. Even though that means they are using their devices at home, I find that the ability to use technology to flip lessons saves time in lecturing and allows more time for analyzing, discussing and applying information. Where I would previously have in-class discussions only, I now plan for online discourse as well, sometimes in isolation and other times in preparation for a larger, in class discussions. I can't assume that all students have access to technology when they go home. So, another challenge is making plans/modifications for those students.

Tess demonstrated how her instructional changes included flipping lessons and now planning for online discourse. Tess spoke about how she now must make modifications in the event that a student does not have access to technology at home. For Tess, instructional changes included a different type of planning to make sure students had equal access to technology both at home and in school.

Clara also related to a change in lesson planning by responding "Just a little more difficult as it is a different type of planning. It takes time in the beginning steps, however, once the lessons are set up lessons seem to flow easier." Clara demonstrated how her planning has changed to include smartphones, chromebooks, and tablets using apps such as Prezi, Animoto, Educreations, Voicethread, and Backchanneling through Today's Meet. Clara's lesson planning has changed because she now must think about how she will incorporate before various applications in the design of her lessons.

Benjamin stated how lesson planning can take place within a lesser time frame for him.

Now I can simply upload an assignment and the material is there to use for planning. What used to take me a week to cover, I can do in two days. I can put all new assignments on Schoology and the students can retrieve these assignments on their devices.

Benjamin demonstrated by giving an example of using platforms or learning management systems (LMS) such as Schoology and Edmodo. A learning platform is basically a tool for providing information, tools, and resources to support and enhance the delivery and management of lessons in education. Benjamin's planning challenges are within a learning platform.

Mary responded to her lesson plans as changing by stating "Mobile technology has made my planning more challenging. "While Mary said "mobile technology has made my planning more challenging," Mona thought that lesson planning became easier by stating "Lesson planning was easier. I just integrated the device into the lesson to support instruction and not let the device drive my lesson planning." Mary demonstrated how she now incorporates icon applications such as KeyNote, Edu cannon, and black-channel into her lessons. Mona supported her planning as being easier when she demonstrated how she uses interactive maps in her history classes. The students' can access these maps on their mobile devices.

Carrie found timing or preparedness became a new issue:

There is more preparation at first using BYOD, as you have to be aware of timing in the classroom for powering up, and the timing of that if you also use direct

instruction. More time dedicated to problems that may occur if the internet is down or the device has an issue.

Carrie demonstrated how her students use smartphones and tablets for internet research and online books. Her lesson design has shifted to include timing for students to power up their devices.

Andy referred to her instructional planning changes in saying that certain applications can take thought in planning how to include the applications in her lesson planning saying

I try to think of ways that the apps on the iPad can be used in lessons. Quite often the apps/technology are used in the production of a culminating activity. This takes some planning, however, if planned properly, the activities can be successful.

James thought that instructional planning was “a piece of cake” now. The planning changes for James have become easier with the implementation of mobile technology.

“There are no more excuses for students to not locate assignments and to not have them in on time. This part of my planning has become very easy.” James also gave positive feedback for the new responsibility in instructional planning changes that involves implementing mobile technology in his teachings by stating

If we allow ourselves the opportunity to do something new and using technology as the tool, we can open up a world of treasures that can hook students. Once I have the attention of the student, I can lead them to most anywhere. It is my responsibility as a teacher to do so.

James demonstrated by taking out his cell phone and showing how he could add a YouTube video clip to a learning platform that his students have access to. James can then ask a few open-ended questions that the students could answer and discussed in a discussion platform within the learning platform. With this, James could share and collaborate with his students and could also view who was actually working and who was not.

Malcolm was excited about the ways for collaborating with students in the classroom now that he is using mobile devices

I can't believe how much easier it is for student collaboration. Before, it was difficult and not easy to monitor what the kids are doing. Now I set up something similar to a blog, or a discussion, give the kids 10 minutes to answer or think about a question. The students have to write their answer and respond to one another. All the time I can be viewing their responses and understand where they are coming from and who is working.

Malcolm also demonstrated how he uses YouTube clips and how he monitors discussions that he gives probing questions to begin his lesson.

Carol stated that the only challenge she encountered was planning how much content her assignments should contain when she said

It is now too easy (in a good way) to post the class assignments and then over post the amount that you think the students can complete. For me, that has to be looked at in a little more depth.

Carol demonstrated that she now incorporates research in her lessons by having students use their own devices. This is “in place of a trip to the library.” The students now have access to online libraries such as “Britannica School” and “SIRS Discoverer” eliminating the need to move Carol’s classroom to the library or Media Center.

All study participants perceived instructional planning changes as an important part of the instructional design of their BYOD programs. Each of the participants spoke of instructional planning and changes as either saving time or adding time. In reference to adding time, three of the ten participants mentioned there was more planning for lessons initially, however, once the planning was completed, it was easier. References were also made about how planning is different because of including various applications in their teachings. The changes in planning that are brought on by the new technology tools also lead to a pedagogical shift. The shift is a result of implementing mobile technology to supplement teaching and learning and to enrich teaching and learning, which then transforms teaching and learning. The following table highlights the key planning change for each participant. Table 4 highlights the number of times each participant mentioned instructional planning changes as well as the percentage of times mentioned. Carol mentioned instructional planning changes six times while Tess and Mary mentioned instructional planning changes five times. All participants mentioned instructional changes at between three to six times indicating that planning changes are a result of implementing mobile technology in a BYOD/BYOT program.

Table 4

*Instructional Planning Changes*

Participant	Key planning change	# of times mentioned	Percentage of times mentioned
Andy	Implementing applications.	5	11.4
Ben	Planning to include learning platform and various applications.	4	9.1
Carol	Incorporating plans for instant access to library applications.	6	13.6
Carrie	Planning time for technology issues (powering-up).	3	6.8
Clara	Planning to include various technologies and applications.	4	9.1
James	Collaboration with platform and applications. “Hooking” or engaging students.	3	6.8
Malcolm	Saving time when introducing lessons using a platform	5	11.4
Mary	Planning to include various applications.	5	11.4
Mona	Planning for easier use of applications.	4	9.1
Tess	Flipping Classes and accommodations for students without technologies at home.	5	11.4
Total # = 44			

**Shifting learning to students.** Shifting learning to students is another theme related to how teachers perceived the use of mobile devices. All of the participants in this study agreed that implementing mobile technology in their teachings was a significant shift from their traditional teaching role. Teachers say that they are not lecturing as much as in the past, and the student has more time to take charge of their learning, rather than

listening to lectures. Shifting learning to students refers to the teacher becoming a participant and co-learner in lessons, correcting misconceptions but not telling students what they need to know. To support this theme, Benjamin began with students taking charge of the credibility of their research sources by stating

The student must understand the difference between credible and not credible sources. I would have to spoon feed the students with all of the content they would need. I encourage the kids to bring their devices every day, if a discussion arises that demands new information, I want my student to be actively searching for the information they need to make a wise educated decision or no longer have to worry about the students not having access to valuable information for the learning outcomes.

Benjamin felt that the use of Schoology helped learning of his classroom to be more learner-centered as students have the power to lead discussions and instantly find information that is new to them.

A great example is the use of platforms like Schoology or Edmodo. I use this so the student has access to assignments at all times I use mobile technology largely for research. The students have icons for databases that they can access from their mobile devices. I also encourage students to use their phones to create presentations on in google docs. The mobility of the device allows a student to have their work in their hand at anytime and anywhere.

Benjamin has shifted learning to the student by implementing icons on their devices in his lessons. The students use their Smartphones to access the icons that Ben has provided

for his instructional lessons. The students can access this information anytime and anywhere once the icons have been downloaded to their phones or tablets. An example would be downloading Schoology (platform) or Google docs.

Several teachers talked about how mobile technology enabled them to move from a teacher-centered class to a more learner-centered class. Tess referred to a pedagogical shift as enabling students to be independent learners. She stated “If facilitated correctly technology can teach students to be independent and inquiry driven learners. Schoology allows immediate feedback to students and online discussions/back channeling allow for students who may not normally speak in class to use their “voice.” When asked to clarify what “student voice” meant, Tess added “you know they are now taking charge like challenging the application that goes with the lesson to decide if they feel it fits the lesson objective.” Another teacher, Clare, described that her pedagogical shift came from no longer being the center of the informational tool

I have moved away from a lecture format to using a more interactive format such as PowerPoint, Google Slides. I also use educational video clips for students to watch individually on their devices. This allows for students to become more actively engaged. Myself, no longer being the center of attention or the informational tool. The central tool is now technology use to facilitate student learning.

Both Tess and Clare demonstrated how they empower their students to find their own information with research applications and presentation applications such as Google Slides to present their findings.

Mary referred to becoming more learning centered by confirming what Clare thought as “not being the center of the informational tool.” Mary said

The impact includes the teacher, myself, no longer being the center of intention or the informational tool. The central tool is now technology use to facilitate student learning. I can now get involved with discussions and questions while students are working. I feel I’m in charge of facilitating their discussions.

Mary demonstrated a few icon applications on an iPad that she uses with her students.

She demonstrated how she places video clips in Schoology that the students can download and view anytime, and anywhere. The students are now using a variety of multimedia tools that the teachers provide. But teachers are no longer the only expert in the classroom. Students access content by viewing the video clips in the teachers’ timeframe and then answering questions in Schoology.

Mona mentioned this shift of learning to the student by referring to herself as the facilitator.

I now have the ability to use new technologies for instruction which for me, shifts the responsibility more directed to the student. I am now more of the facilitator and can correct misconceptions by directing them with questions.

Mona demonstrated how her students are in charge of finding lessons on their mobile devices and are also in charge of submitting their lessons within a suitable timeframe.

Mona therefore, has shifted the responsibility of lessons to her students.

Carries’ response to shifting the responsibility of learning from teacher to student included encouraging her students to keep abreast of new technical information. The

responsibility of keeping up with new information is now the students. This is an example of transforming teaching and learning.

My students are excited to use technology and they enjoy finding information on the sites we encourage... and some they have taught us to use students keep us updated on new technical information... as well as our teaching them how to use it to their advantage. You have to be able to learn as well as to teach.

Carrie demonstrated how she encourages her students to use mobile devices for information pertaining to her lessons. Carrie emphasized how she expects her students to understand that they cannot plagiarize information by simply cutting and pasting information from the Internet. Her students are responsible for understanding how to paraphrase. Carrie demonstrated how students have access to programs like Noodletools and Grammarly.com. She has students use these for research. They can organize and properly cite their research by referencing and paraphrasing using note cards in Noodletools. Then she demonstrated how they can use a grammar check program to ensure there is no plagiarism, and then to fix it if a problem is identified.

In her demonstration, Andy has her students use an e-text version of their literature book to do a variety of things on their mobile devices. Andy also demonstrated how students log and journal their independent reading in an online program called "Whooo's Reading." Her students learning has shifted from teacher in charge of summarizing and initializing class discussions to students' in charge of summarizing and initializing discussions.

Carol felt that the students are more at ease with using their devices for collaboration, which allows for her to help her students to become more successful and independent learners

I find strength in knowing my students' feel safe and comfortable with the materials when collaborating together. Most collaboration is done together on Google docs—doc sharing. I am able to talk to them to get to the root of their problem and come up with a solution that will help them be successful in the classroom.

Carrie mentioned shifting learning to student that included input from students to implement technology in her lessons

I know my students and am able to teach their needs and to model their lesson plans. I set high expectations for all my students and I am willing to take constructive criticism and advice from other teachers who implement mobile technology. I want to learn everything and enjoy even having my teachers teaching me a few things. I feel I am bringing my students to a higher level of learning. You have to be an actor to draw the kids in, getting them to both listen and participate.

Then Carol demonstrated a thematic study she recently did on blindness. First, she showed her students read a story on their mobile devices about a partially blind girl and her brother's sudden loss of sight. The students use this story as an inquiry point for more research on the subject of blindness. Finally, they watch the movie with Patty Duke on Helen Keller's life using the Smart Board. Students take information from all three

sources and write a paper on how it is to be blind and the challenges these people face in the real world. They then have to write about how technology has changed the way people who are visually handicapped cope today. Carol has now shifted the learning to her students by facilitating the students to come to their own conclusions with their research. Carol gave a lesson where the students oversaw their findings.

Malcolm stated that “I am able to get what I want across in less time, I am able to let the students actually take part in what they are learning, managing classes has become more proficient, and the feedback for what the student can actually learn can be known or seen more easily.” Malcolm emphasizes how students are now taking part in their learning leading him to be more proficient in his teachings.

Malcolm demonstrated a shift of learning from teacher to student by demonstrating how his students are given a map application and discussion questions that the students use to create a class discussion. The students are now responsible for using their mobile devices and the map application to answer questions that were posted in a platform where they retrieve them. The assignment has become their responsibility to complete. In addition, Malcolm has become the facilitator to this lesson as the students need to create a follow-up class discussion. Malcolm has shifted the responsibility of the conclusion and discussion of what was learned to the students.

The real shift, however, is where the student has to create a class discussion. The student is given questions, given application, and is now in charge of a completed assignment accompanied by analysis. The student is now in charge of the follow-up discussion of the assignment where the teacher facilitates the procedure. The student is

given questions, given application, and is now in charge of a completed assignment accompanied by analysis. This analysis is the opening for a classroom discussion about the assignment. No longer is the teacher in charge of beginning the discussions. The teacher is now the facilitator of a learning-centered assignment.

James made one statement in his responses that said “technology has benefitted teachers shifting from the provider of information to providing applications where students can find information.” James supports the shift of learning responsibilities from a lecturer to a facilitator. Teachers are now providing applications that allow for the students to find information and make conclusions or reasoning for the lessons on their own.

Data from interviews and demonstrations support that mobile technology has helped all of the participants of this study to shift the responsibility of learning to the student, making the student learner centered. A pedagogical shift of learning from teacher to student is a common theme. Mobile technology in the participant’s teachings seemed to be an advantage for instruction and learning. Incorporating technology into lessons enhanced the ability for students to work hard and for the participants to help students’ through hard issues. When appropriate, the participants can work with both students’ and their peers to provide support. From the participants’ statements above, teachers shifted to become mediators of the learning process with a large repertoire of effective tools to share with students, no matter what curriculum or program they are using. The shift from teacher to student leads the way for the promotion of student-centered learning. The application of mobile technology in the participants’ lesson planning supports a learner-

centered classroom. Table 5 highlights the main segments of statements to support how technology has enabled a learner-centered classroom environment. Table 5 displays the number of times each participant mentioned shifting responsibility of learning from teacher to student as well as the percentage of times mentioned. Both Carrie and James mentioned shifting responsibilities of learning to the student six times. Mona had mentioned shifting responsibility the least, mentioning this three times. In all, everyone had mentioned shifting responsibility of learning to the student more than three times.

Table 5

*Shifting Responsibility of Learning to the Student*

Participant	Shifting responsibilities	# of times mentioned	Percentage of times mentioned
Andy	Students are in charge of summarizing reading rather than the teacher.	5	10.9
Ben	Students in charge of research.	5	10.9
Carol	Collaboration allows for students to help each other find information.	4	8.7
Carrie	Students are excited to find information using technology.	6	13.0
Clara	Central tool is now technology use to facilitate student learning.	5	10.9
James	Technology has enabled us to shift learning to the students, teacher is now the facilitator of learning.	6	13.0
Malcolm	Students taking charge.	5	10.9
Mary	Teacher is no longer the center of the informational tool.	4	8.7
Mona	Using new technologies for instruction shifts responsibility to the student.	3	6.5
Tess	Independent learners, inquiry driven.	4	8.7
		Total # = 46	

**Research Question 2**

Research question two was “How do teachers describe their experiences when using mobile devices to provide knowledge? Experiences refers to the skill or knowledge

you acquire by doing something. Two themes emerged from the interviews and mock lesson transcripts that appeared important to the participants. These two themes were student engagement and collaboration, and monitoring students' use of mobile technology.

The first theme was student engagement and collaborative learning which refers to students working together to solve a problem, create a presentation, or derive meaning from a given lesson. Mobile technology in promoting student engagement in collaboration can be done through activities, encouraging use of various applications, analysis and synthesis is of lesson material. The second theme was related to monitoring the use of mobile technology in the classroom can also be one of the hurdles for figuring out how to manage a technology infused classroom. Students suddenly have the Internet at their fingertips, so how can they be kept on task? Monitoring students appeared to be a concern for all participants of this study. Now the new teacher responsibility is to ensure the students are "on task" and ensuring that the use of their devices is safe.

**Student engagement and collaboration.** One of the challenges teachers face today are giving students their "choice and voice." This includes implementing ways of designing learning experiences that engage students and tap into what is important to their students. The participants' responses to the interview questions in research question 1 shared the concept of technology promoting student-centered learning through collaboration. To support student-centered learner, in research question 1, in research question 2, the participants experienced students as being engaged and collaborating more, promoting a student-centered learning environment.

Benjamin discussed student engagement and collaboration as he experiences students engaging in conversations about the lesson.

Students have 100% engagement, they see it as a productive use of their time and they are already comfortable with their own technology. As a result, I see that lessons are more student-center based rather than teacher based. Students are also collaborating more often and engaging in conversations about the subject matter.

Benjamin demonstrated that students have access to platforms on their mobile devices that provide an area for discussions. He asks his students to start out a discussion with a probing question about the assignment and will often jump in to give them other ideas about the assignment to discuss. In his demonstration, Benjamin that the availability of mobile devices allows the students to carry on conversations even after classroom time ends.

Clare's 'experiences with technology intertwines both student-centered learning and collaboration.

For students to become more actively engaged: individually they are interacting with technology: viewing and answering questions. These questions and answers will then be shared with other students collaboratively through discussions.

Technology use to facilitate student learning. Individually they are interacting with technology viewing and answering questions. These questions and answers will then be shared with other students collaboratively through discussions. Since we are engaging students' in taking charge of their own learning, technology

makes it easier for students to collaborate and share information. Such as on Google Docs.

Tess found immediate student feedback to be useful as she never really had this before implementing mobile technology. Her students now can get feedback on their assignments immediately through their own devices.

Using online assessments on Schoology allows immediate feedback to students and online discussions/backchanneling allow for students who may not normally speak in class to use their “voice.” impacts are student motivation because they get to investigate and create using technology, a tool that they see as an everyday extension of their lives, even some teachers do not. Students appreciate being able to use technology. It enables them to have a “choice” and a “voice.”

Tess demonstrated how she uses Google docs so that students can demonstrate what they have learned in their research to the class. She felt that students can assess presentation features on their mobile devices and experienced that they are more engaged an excited about showing other students what they have learned.

Mary talked about student engagement and students’ taking charge of their learning:

I absolutely find students to be more engaged. Especially when involved in Webquests. They are challenged to take charge of their learning. I as a teacher can guide them, giving hints, then watch to see if they can collaborate and come up with their own ideas or answers.

Mona thought similar to Mary about student engagement and students taking charge of their learning.

The students were more engaged and understood what a timeline was and how it could help them see historical events more easily. They seemed to be taking charge of their learning rather than watching me lecture and taking notes.

Carrie added to this theme of student engagement by saying that students were: “Excited to use technology and they enjoy finding information on the sites we encourage, and some they have taught us to use. Students actually taught me how to use some of the technology we have today.”

Andy viewed herself as the facilitator giving her students the role of the student-centered learner. However, Andy views the students as being more engaged as a result of her participation as a facilitator rather than a lecturer.

My participation is more of the facilitator than the lecturer. I give assignments and students use mobile devices to research or answer the assignments. Students can be creative and conduct their own way of learning by doing. They are engaged and even share information about what they are learning. I am more like the co-learner, correcting misconceptions and not giving students what they need to know.

This could also cross over to research question 1 for pedagogical shift that Andy viewed herself as a facilitator rather than a teacher as a lecturer.

Malcolm really likes technology use particularly when it comes observing students who seem engaged in their learning process.

I feel like I am becoming more of a supervisor of student learning. I use mobile technology mainly for student collaboration in things like discussions or researching various topics. In my class, students are given the freedom to learn from one another and work in a group setting. I am therefore, there to monitor their productivity and provide and necessary feedback.

Carol believes that student centered is when the lessons are tailored to meet both the needs and strengths of the students and can be done using mobile technology.

When I use mobile technology and applications of, I determine the overall concept but then will negotiate different pathways for students to get to where I want them to be. When asking how: I give them hints without telling them and let them try to figure it out on their own.” When there are some things I term “gottas” because students just gotta know them to carry on. Students are talking more amongst each other. They are more focused.

Eight out of ten participants spoke of the support of student-centered learning in terms of student engagement and collaboration. The use of mobile technology in teachings provided students with a chance to take charge of their activities. When students are using technology, collaborating and conducting research with applications, they are more engaged in their schoolwork. The participants who addressed this theme appeared to be unanimous in both students’ engagement and collaboration. Table 6 focuses on key points that show how 8 out of 10 participants shared points about both student engagement and collaboration. The table also includes the number of times each

participant mentioned student engagement and collaboration as well as the percentage of times mentioned.

Table 6

*Key Points for Student Engagement and Collaboration*

Participant	Student engagement and collaboration	# of times mentioned	Percentage of times mentioned.
Andy	Students are creative and more engaged.	5	17.9
Ben	Students have 100% engagement.	4	14.3
Carol	More focused and talking more with each other.	3	10.7
Carrie	Excited to use technology and enjoying finding information.	3	10.7
Clara	Facilitating student learning through collaboration.	3	10.7
James	N/A	0	0
Malcolm	Supervisor of student learning. Students are given freedom to learn from one another working in group settings.	4	14.3
Mary	N/A	0	0
Mona	Students' are more engaged, taking charge of their learning.	3	10.7
Tess	Student motivation to investigate and create.	3	10.7
		Total # = 28	

**Monitoring students' technology use.** Eight out of ten participant teachers perceived that implementing mobile technology through a BYOD/BYOT program brought with it an additional concern and responsibility that included monitoring what students are doing more closely. The participant teachers of this study experienced that

the pedagogical shift impacted not only how they plan or design their lessons to include how they monitor technology use by their students. The following responses to the interview questions from the participants appeared to be common in that monitoring what students do on their devices requires looking more closely at what the students are doing when working on lessons. Additionally, the theme came up often in the mock lessons as participants mentioned how they monitor students. For example, Andy has a passcode that she uses. She demonstrated how she uses the word “flash” and when she does this, students have to raise their devices and show the screens on their devices. This is how Andy monitors students on task.

The monitoring students’ theme encompassed various comments surrounding experiences that teachers viewed as a new teacher responsibility. Monitoring accounted for 8 of the 10 or 80% responses related to new teacher responsibilities. Eight of the ten participants viewed an additional responsibility as monitoring what student are doing in their classroom when they are using mobile technology for lessons given. These participants reflected in their dialogue that their responsibility of monitoring what students are doing have become stronger as they now need to maintain that students are on task and not using the internet for applications that do not correspond with their lesson design.

Benjamin noted supervision changes such as monitoring students more closely to ensure they are making the right choices.

They need to be monitored to ensure that they are making correct decisions and good choices. I need create a comfortable environment. Usage of mobile

technology has trained students to trust Google rather than learning how to analyze credible sources. The class dictates how the lesson will go. Credible sources, proper supervision and plagiarism.

Tess also referenced new teacher responsibilities as additional monitoring of students. She stated the following: “They need to be monitored and taught how to be digital citizens. It makes it all the more important to teach students about credible sources so that they can discern the information that they are accessing so readily.” Mary responded to responsibility as a shift in planning, then went on to say how she now has to do more monitoring.

In planning, I have moved away from a lecture format to using a more interactive format such as PowerPoint, Google Slides. My planning has shifted to a more project-based planning. I plan so students focus on increasing the acquisition of facts related to specific subjects and are more engaged in solving problems. I have a new responsibility of planning instruction, including new curriculum content and instructional materials. More monitoring has occurred in my classroom.

Mona, who wanted students to be able to read books off their own devices, felt that had to teach students how to first use the e-reader apps on their mobile devices, reminding them to keep them charged, as well as monitoring students during the use of the e-reader technology.

Initially, I had to spend time ensuring that all of the students were able to use the tools on the kindle. I did not take for granted that all of the students had used an e-Reader like kindle. Also, I had to ensure that the students plugged their kindle up,

prior to leaving class. The ability to use new technologies for instruction can be an issue when you are having students use the devices for an assignment.

Carol thought of her new responsibility as an enabler and a person of more careful watch on what her students are working on. Watching her students could more carefully can be considered monitoring more carefully.

I give assistance to my students and also advice, suggestions or pose questions in a way that enables the students to find the information that they need for the assignment. It is like I am mentoring the students in attempt to assess and improve their performance. I also find that engaging students in the use of their own technology brings about the responsibility of monitoring their devices in a clever way to make sure they are on task

Carrie responded that she now had to pay better attention in keeping track of what her students were doing. Paying more attention to her students' can also be viewed as monitoring them more closely.

I am constantly vigilant in keeping track of what the students are allowed to view, research and use in their writing/research papers during class and after the papers are turned in they need to learn to use it conscientiously and carefully. There is more preparation at first using BYOD, as you have to be aware of timing in the classroom for powering up, and the timing of that if you use direct instruction Biggest challenges are being vigilant on how the students are using their devices. keep an eye on each student every few minutes or so when they are

using devices to make sure they are on task teach classes first in plagiarism so that this can be avoided, and reinforce these lessons.

Plagiarism becomes easy when a student can simply copy from one document to another from an Internet source. Lessons for paraphrasing materials as well as referencing materials need to be taught to students who are in predominately technology run classes. The participants have mentioned in their demonstrations the use of Noodletools as well as monitoring to prevent plagiarism from occurring.

Andy mentioned how she includes monitoring in her planning as she now needs to monitor what her students are doing when using their mobile devices.

I try to think of ways that the apps on the iPad can be used in lessons. Quite often the apps/technology are used in the production of a culminating activity. So, I have the responsibility of arranging my lesson planning to suit the use of the mobile device. I need to monitor what they are doing.

In her mock lesson, Andy demonstrated how she signals the students with the word “flash.” This rule is used to help her manage students being on task with their devices.

I have established the rule of “flash.” This is when I say “flash,” the students are expected to hold up their device to show their screen to me. This allows me to do a quick check of what web sites or apps the students are on, rather than the sites or apps they are expected to be on.

If a student is not on the proper site expected, the device is taken away.

Malcolm talked about embracing the fact that most all students have technology at hand and, so now, Malcolm is using the opportunity to apply this technology in his lessons.

The best teachers I have seen including myself, use technology to aid independent learning. This is done by embracing the power that exists in the pockets of our students. We know most students have powerful devices already primed and ready to go in their coat or back pocket. My change in lesson planning is finding or liberating the experience to be a both positive one for myself and for my students which now includes a closer view of what they are doing.

In Malcolm's' mock lesson he was able to monitor who was fully participating by student collaboration. "I get so excited when I see my students collaborating with their devices. I can actually monitor who and who are not fully participating." Malcolm monitors by placing students in groups and walking around to view who is participating in the lesson. Tess's statement was more about planning in advance for how mobile technology was going to be used.

I am always doing planning on how I am going to use the technology in advance. I need to come up with ideas on how it is going to aid the learning of my students. Sometimes I try new things once or twice and then, I don't give up, however, I work it so that I can find a way it best works for me and for the students. If this doesn't work. I then try something new. It's is like my new role is to become more of an instructional designer.

Monitoring what students are doing more closely, including arranging lesson plans to comprise technology, and becoming “instructional designers” was a theme that came up in the data. The participants’ pronounced their professional experiences have changed as a result of implementing technology in their teachings. They also emphasized the increase in student performance of concepts being taught about student engagement. Table 7 shows an overview of the key thoughts about now having to monitor students more closely. The table also includes the number of times each participant mentioned having to monitor students more closely as well as the percentage of times mentioned. Ben had mentioned the responsibility of monitoring students five times. Other participants mentioned responsibilities of monitoring students at least two times or more.

Table 7

*Responsibility for Monitoring Students Closer*

Participant	Monitoring students	# of times mentioned	Percentage of total mentions
Andy	Need to plan for more monitoring.	4	14.3
Ben	Making the right choices when using the Internet.	5	17.9
Carol	Watching more closely what students are doing.	4	14.3
Carrie	Closer attention to what students are doing.	2	17.1
Clara	N/A	0	0
James	N/A	0	0
Malcolm	Closer view of what students are doing.	4	14.3
Mary	More monitoring what students are doing.	4	14.3
Mona	Correct use of devices.	2	17.1
Tess	Making students to become "digital citizens."	3	10.7
Total # = 28			

**Research Question 3**

Research Question 3 was “What are the positive and negative factors that teachers indicate in their exercise of using mobile devices in their instruction within their classrooms?” The prevalence of technology can affect many areas in both a positive and negative way. Research question three focused on these factors and thus, produced six themes. The themes included are four positive: positive – promote deeper student learning; positive – efficient use of time; positive – lesson flexibility; positive accessibility of learning; and two negative: negative – student off task; and negative-safety issues.

**Deeper Student Learning.** The first positive factor theme was student engagement. Student engagement referred to the participants' perception of the students' depth of knowledge or engagement, increasing as student reflect and synthesize what they have learned. This is also known as the role of "knowledge manager/leader." Benjamin spoke about student engagement and depth of knowledge when he pointed out having deeper conversations and deeper learning. He thought the depth of knowledge moved for different levels of learning

Use of mobile technology is paving the way for deeper conversations and deeper learning. Students become more engaged and start asking questions of one another and may change the content based on what direction they are inquisitive of for any given topic. Student engagement and better research results. You can move from depths of knowledge level 1 to depth of knowledge level, say 3 or 4, etc., faster and with more depth, more meaning.

Clare's perception about engagement was

I find students to be more engaged. Especially when involved in Webquests. Responding sooner virtually and more likely to elaborate on the response. I am finding students to be more critically thinking. I believe mobile technology helps students to use different tools from the internet to get their point across in the lesson assignment.

Tess commented on student engagement and how technology promotes creativity. "With technology implemented has engaged the students in activities far more than ever." She continued, "When students have their own technology, they can create things. They can

innovate things. They can become film makers or artists. They can make presentations or design brochure. They cannot do these things without technology.” From what Tess has indicated, students are more creative in their lessons and how they represent what they find from their activities in a more personal and creative way.

Mary added the use of Webquests in her lessons to engage students.

Lessons planned when technology is implemented, has engaged the students in activities far more than ever. This allows for students to become more actively engaged. Individually they are interacting with technology by viewing and answering questions. I absolutely find students to be more engaged. Especially when involved in Webquests.

Both Mona, Carrie, and Malcolm also commented on how BYOD helps with student engagement. Mona commented on the use of interactive maps to engage students. “The students were more engaged and understood what a timeline was and how it could help them see historical events more easily and enjoyed the interactive maps.” Carrie found reading to be more engaging to students. “I find students more comfortable reading I-pads, Kindles, and their Chrome books during silent reading times, and during study halls. They seem to be more engaged and in deeper thought.” Malcolm thought that technology may be one of the keys to increasing student engagement.

In my class I try, and often see that with allowing the students to use their own devices, instruction becomes more relevant and interesting to the students. I believe when learning is more relevant, then students become more engaged.

They have increased access to learning resources and tools, students are drawn

deeper into the topic. They seem to take ownership of what I am trying to get across. Particularly when we use the devices for discussions.

Carol commented on the increased responsibility helping students to be more actively engaged. Today students have so many resources available to them. Because technology provides multiple resources on any topic, students seem to take more responsibility for their own learning. Especially since the trend is more student-based learning. We are helping students to create their own path rather than forcing them. Using their own devices in sharing discussions can only extend and deepen their learning.

James related engagement to elaborate on blogs and discussions which he thought engaged students and deepened learning.

Technology widens the audience for students through technology. Students are collaborating through virtual labs and classrooms. They also share their experiences and learning in chat rooms, and on discussion boards, through blogging, and even texting one another. Even in their multiple texting chats.

Today, students are becoming creators of their content. I think students put more time and effort into their work when they know it will be seen by their peers.

Andy talked about some of what she does in her class saying, "I look for digital lessons that are not possible without technology. I also give opportunities for students to explore outside of class on a certain assignment, and then reward those who do.

Sometimes I will even create friendly competitions to engage students." Andy gives a point that she looks for lessons that engage students in friendly competitions that explore

the use of technology applications. These applications will involve student engagement to complete the assignments.

Table 8 summarizes the key points of student engagement from all 10 participants and also includes the number of times each participant mentioned student engagement as well as the percentage of times mentioned. For example, Andy mentioned student engagement five times and the other participants mentioned student engagement two to four times.

Table 8

*Key Thoughts for Student Engagement*

Participant	Student engagement	# of times mentioned	Percentage of times mentioned
Andy	Digital lessons, competitions to engage students.	5	14.7
Ben	Deeper conversations, deeper learning.	4	11.8
Carol	Increased responsibility, more engaged.	3	8.8
Carrie	Reading has become more engaging.	3	8.2
Clara	More engaged, critical thinking.	4	11.8
James	Engaged in discussions deepens learning.	2	5.9
Malcolm	Technology use is key to increasing student engagement.	4	11.8
Mary	Engaged far more than ever, interactive.	3	8.2
Mona	More engaged with interactive maps.	2	5.9
Tess	Creative, innovative.	4	11.8
		Total = 34	

**Positive-efficient use of time.** The next positive factor participants touched on was how BYOD helps them in efficient use of time. Positive-efficient use of time referred to the quality and quantity of time the student is engaged in classroom activities. The consensus appeared to be that the participants found more class time to engage students in both research and discussion, and in creating projects. Since the students are more engaged, the engagement evolves into a positive-efficient use of time. Nine out of ten or 90% of the participants mentioned lesson flexibility as a positive factor when planning lessons. Technology has given the opportunity to involve students of many learning levels. Lesson planning has become easier to “change up” during the class period, allowing for a flexible delivery of information.

Benjamin stated that “Thanks to technology programs like Google Docs, and students’ use of their own devices, lesson delivery has become easy and efficient.” Mary added to this by stating

Mostly in terms of instruction and in use for assessment. I have moved away from a lecture format to using a more interactive format such as PowerPoint, Google Slides. This has saved me time lecturing and given students more time being engaged in the assignments given.

Mona’s also made reference to efficient time for lessons by stating:

I was able to organize and deliver the lesson faster, as well as move around the classroom more freely while covering a concept. Using the kindle or eReader made it easier for students to find passages quicker, as well as change the font size to help them be able to read assigned chapters easier.

Andy thought that mobile devices “allows student to get information quickly.” She thought “it is much faster than even five years ago. It is much faster to retract or look up information and has definitely sped up completion of assignments.” Carrie felt that when “I have students take notes on their mobile devices, they keep up with the lesson, and in addition stay continually engaged. She then added that “the focus using their devices seems to make them, at least, complete the assignment in a timely manner.”

In addition to engagement, Tess also thought that the use of mobile technology allowed for the completion of assignments, saving time.

It keeps students engaged when technology is paired with meaningful lessons and engaging tools for research, discussion and creating products the students are focused and on task. When technology is paired with meaningful lessons and engaging tools for research, discussion and creating products the students are focused and on task and the assignments actually, well for the most part, get completed within the timeframe.

Clare in addition thought that “this year” she “was able to go digital with all documents and lessons” which “gave me more time to do other things.”

Mary had an interesting input for positive input of saving time by building what she calls a technology “toolkit.” This toolkit allows for her students to have an effective choice for given projects.

In my class, students learn to work with many apps. It’s like they are building a technology “toolkit” where they can make the choice of what will be most effective for say a project I give them. I feel that when my students have a good

use of an array of tools, it allows for less instructional time for me, and a chance to become more of a coach.

Carrie's outlook was based on time, as she related time to saving time to prepare or duplicate her lessons

Many available resources that students have today on their devices can replace traditional teaching methods and especially, as you know, the time to prepare or duplicate lessons. An immense amount of time can be saved these days with devices in hand. Kids today are familiar with technology and quick to learn with it as well.

James seemed excited when he spoke of the positive attributes of mobile technology, especially in reference to time.

On a web tool you can ask as many questions as you want of your students. You can provide instant feedback about learning. Best of all, the students' just love the instant feedback. Time is saved, students are happy. What could be better?

Malcolm added his perception and experience of time with technology use as utilizing web tools or a video to teach a concept.

It use to take a lot of time when surveying a workbook for an activity. Now I can use a video or a web tool to teach the concept. Conversations can emerge using discussions on their devices about the concept.... saves hours of tedious work in my opinion.

For Carol, I could not find anything that referred to the concept of time except a segment “With the 21<sup>st</sup> century tools kids have today, learning is at hand and an immense amount of time is saved.”

Table 9 gives an overview of how each participant thought time was saved as a result of implementing various technologies. The table also includes the number of times each participant mentioned an engagement with technology saving time as well as the percentage of times mentioned. Ben mentioned engagement with technology as saving time five times. The other nine participants mentioned student engagement with technology two to three times.

Table 9

*Engagement with Technology Saves Time*

Participant	Efficient use of time	# of times mentioned	Percentage of times mentioned
Andy	Students get information quicker.	4	13.8
Ben	Save time having to lecture. More student time.	5	17.2
Carol	Saves an immense amount of time.	2	6.9
Carrie	Saves time in preparing lessons.	3	10.3
Clara	Digital lends more time to do other things.	3	10.3
James	Instant feedback to students.	3	10.3
Malcolm	Discussions using devices saves hours of tedious work.	3	10.3
Mary	Less instructional time.	2	6.9
Mona	Organize and deliver lessons quicker.	2	6.9
Tess	Assignments completed quicker.	2	6.9
		Total = 29	

All participants made reference to positive, effective use of time. Statements referred to saving lecturing time, organizing and delivering the lessons in a more efficient manner, “quicker delivery of lessons,” and keeping students engaged.

**Positive lesson flexibility.** Teachers also mentioned that a positive factor in their BYOD program was that lessons had more flexibility. Positive-lesson flexibility referred to captivating students with various state-of-the art technologies such as Internet-ready mobile devices. This flexibility category includes differentiated learning, accessibility of learning, and assistive technology.

Benjamin touched on lesson flexibility in the following way:

Lessons do not have to be stagnant, they can be evolving during the class period, new questions, current events, and deeper thinking can impact a lesson and force a change in focus. Lessons are accessible with technology. Now a teacher can shift their lesson focus fluidly without having to sit down and rewrite what the lesson of the day is for spur of the moment need for knowing information.

Clare touched upon positive lesson flexibility by stating

This type of classroom has helped in flexibility of learning. The choices that students have to create the end result to an assignment/project. I believe mobile technology help students to use different tools from the internet to get their point across in the lesson assignment. The choices that students have to create the end result to an assignment/project.

Tess then added how “technology has enabled new ways for me to deliver instruction to students.” Andy added that “I am able to get students to explore the world with different outlooks.” Mary talked about collaboration and discussions at various levels by saying:

Questions and answers can be shared with other students collaboratively through discussions and this gives way for all students of various levels to be involved. I use the Schoology platform which allows students to do discussions using their devices.

Carrie and Mona also touched upon flexibility of student needs in relation to adjusting lessons to suit student needs. Technology interest students in exploring subjects they are working on in class and at home for their own fun and education. Students gain knowledge on many subjects, and are able to compare sources and find which are better to use than others. Students can now learn at their own pace....as well. Mona then added: “Lesson planning was easier to adjust to students various needs. I just integrated the device into the lesson to support my instruction and not let the device drive my lesson planning.”

Malcolm spoke about lesson flexibility in reference to teacher and student interaction as being flexible as it is becoming virtual with the implementation of technology.

I feel that technology has taken away the four-walled environment....it has made it possible to change the location of the student teacher....say to become more virtual. The interaction allows for lesson flexibility.... when the four walls are opened.

James pointed out lesson flexibility as benefits of technology allowing a flexible way to change or improve a lesson by stating “It is so much simpler now.....so much more flexible....to say...just change up a lesson on the computer and send it to the students’ device.

Carol was the only participant who did not make reference to this theme. The perceptions indicated lesson flexibility as being able to quickly shift the focus of a lesson, enabling students to have more flexibility through creative choices, and the flexibility of changing up the lesson quickly and sending changes to the student’s device. Table 10 shows an overview of the important statements that lead to lesson flexibility. The table also includes the number of times each participant mentioned lesson flexibility in the classroom as well as the percentage of times mentioned.

Table 10

*Lesson Flexibility in the Classroom*

Participant	Flexibility in lesson planning	# of times mentioned	Percentage of times mentioned
Andy	Explore with different outlooks.	5	14.7
Ben	Evolving lessons, shifting lessons.	3	8.8
Carol	N/A	0	0
Carrie	Students can explore more.	2	5.9
Clara	Different tools for students to create an assignment to be more flexible	4	11.8
James	Lesson planning is so much simpler, easy to change up.	4	11.8
Malcolm	Virtual allows for more lesson flexibility	5	14.7
Mary	Students of various levels are involved.	4	11.8
Mona	Easier to adjust planning for student needs.	4	11.8
Tess	New ways to deliver lessons shortens time.	3	8.8
		Total = 34	

Upon looking at lesson flexibility, two subthemes emerged. These were differentiated learning and accessibility of learning/assistive technology.

**Positive: Differentiated learning.** Yet another positive factor of BYOD was that teachers felt they had more opportunity to differentiate learning. Differentiated learning referred to improving the way information is delivered to pupils with special needs. Differentiated learning included reaching students in a variety of methods. This is in an effort to make improvements in the provisions of information when planning lessons,

with reasonable adjustments. Included in differentiated learning were terms such as accessibility of educational tools, and assistive technology.

Differentiation was segmented throughout the participant responses. Since the word “differentiation” appeared within the dialogue of 7 out of 10 participants it became one of the subthemes of lesson flexibility. Benjamin mentioned “students can be taught at all levels using technology as they can interpret information at their own pace making it easier to reach various learning levels.” The mention of various learning levels indicated to myself that Benjamin was referring to differentiation as differentiation refers to approaching students at their level of learning or their learning style Clare stated at one point “technology helps especially when it comes to differentiated approaches of instruction,” Tess stated that “differentiation in instruction is made easier with the variation of technology tools.” Mary went on to say “obstacles encountered in variation of lessons is not as much of a problem with the use of technology.” I interpreted these as differentiating lessons. Andy stated that “differentiation of instruction bringing school lessons into the 21<sup>st</sup> Century by the use of 21<sup>st</sup> Century technology.” Carrie in a fragmented sentence stated, “and as you know, we are always looking for ways to fluctuate and deliver materials to students.”

Malcolm approached differentiation in his instruction by saying “you know I do not teach everyone the same way, so with technology, I think students appreciate the diversity in the presentation of different styles. I can use a link from YouTube and send it to them for discussion. Technology allows for many diverse ways to deliver a lesson....

trying to reach all students.” Malcom believes that using YouTube can help those students who are either visual learners or hortatory learners, or both

Differentiated learning was a theme that surfaced from seven out of the ten participants, or 70% of the participants. Table 11 shows an overview of the participants’ comments for this subtheme. Differentiated learning could be addressed by the way the technology was used by the participants’ in their teachings. For example, obstacles are no longer a problem as adjustments can be easily rendered, fluctuation in the delivery of material, and presentation by different styles of teaching with technology. The table also includes the number of times each participant mentioned differentiated learning as well as the percentage of times mentioned. Eight out of ten or 80% of the participants made a reference to thoughts on differentiated learning. Malcolm and Andy made a reference to differentiated learning five times where the other six participants who referenced to differentiated learning mentioned this theme more than two times.

Table 11

*Thoughts on Differentiated Learning*

Participant	Differentiated learning	# of times mentioned	Percentage of times mentioned
Andy	Differentiated instruction bringing lessons into 21 <sup>st</sup> Century technology.	5	18.5
Ben	Students taught at all levels.	3	11.1
Carol	N/A	0	0
Carrie	Fluctuate delivery of lessons.	4	14.8
Clara	More differentiated approaches to instruction	4	14.8
James	N/A	0	0
Malcolm	Diversity and different styles.	5	18.5
Mary	Obstacles encountered with variation.	2	7.4
Mona	N/A		
Tess	Differentiated instruction is made easier	4	14.8
		Total = 27	

**Positive: Accessibility of learning/Assistive technology.** Accessibility of learning referred to a system that allows students to access classroom information and their curriculum anywhere, and at any time. Assistive technology referred to technology suited to students' needs that help them learn faster and more efficiently. The responses from the participants show that accessibility and assistive technology were of importance to 9 out of 10 of the participants, or 90% of the participants. Table 12 provides an overview of the important statements.

Ben believed that accessibility of learning means that students have access to their educational lessons and information twenty-four hours a day, and seven days a week.

The student has access to assignments at all times. Well they have access 24/7 to information at hand when they have their own mobile device. They will always have the use of technology to gather information by way of the internet. Learning comes so easy. Resources are at their fingertips.

Clare then added “Students’ have immediate accessibility to classroom assignments.

They can view assignments even on their phones.” Tess replied “Students gain knowledge at an incredibly rapid rate, literally at their fingertips.” Mary then responded by saying “Students can no longer provide excuses for not handing in assignments as they are now accessible on their own devices and can access information 24/7.”

Mona’s thoughts were “Well... all students now will be able to use their devices for learning instead of just texting each other and playing games. It’s become a valuable tool as the students have their phones at all times. There is no more reason or excuses for work to be turned in late. Their information is in their hands at all times...for the most part anyways.” Mona referred to accessibility of information in the same manner as Andy. Andy similarly to Mona on the subject of accessibility of information by responding “That technology “allows them to get information quickly. Knowledge is at the students’ fingertips.” Both Mona and Andy made a reference to student accessibility of information at hand. With mobile technology. In the demonstrations by both Mona and Andy, their emphasis was on the fact that students today have technology “in their pockets,” and therefore have continual access to their schoolwork. Their responses indicate that students do have instant accessibility to technology to provide quick information.

James referred to accessibility of learning and assistive technology as meeting the needs of his students individually by saying: “students now have the opportunity to access information at all times as they have their phones in their pockets.” James’s statement about students having their phones at hand went along with what Malcolm mentioned “technology is at hand.... students are so use to their own devices that they can have resources at their fingertips.” Malcolm also added “their phones are very assistive in my getting them to .....know what I want them too.” Malcolm referred to technology being accessible “at hand” and therefore, he can provide classroom assistance at any given time.

Finally, Carrie thought about the availability as students have availability to their classrooms and their assignments not only in school but after school.

Phones interest students in exploring subjects they are working on in class and at home for their own fun and education. All students have technology available to them to use in class and after. Students are using different devices, you have to be sure they have access to what they need, and sometimes they have to use a computer in the classroom, and all classrooms have a computer or two for that purpose.

In the mock demonstrations given by each of the participants, accessibility became clear. This was demonstrated by each of the participants taking their phones out of their pockets, or off their desks and then just giving a mock demonstration. They often talked about how students are now carrying devices that are capable of being used “24/7” for educational purposes. They also demonstrated how students download platform applications where they have “24/7 access to class lessons and class discussions. They

also have access to their grades which makes it easily accessible to monitor how they are doing in their classes.

Nine out of ten or 90% of participants viewed technology as active for accessibility of learning and as assistive technology. Reference was given to students having access to information and resources “24/7.” Accessibility was immediate and the technology assisted students in availability for obtaining pertinent classroom information. The table also includes the number of times each participant mentioned determinants for accessibility of learning as well as the percentage of times mentioned.

Table 12

*Key Determinants for Accessibility of Learning*

Participant	Accessibility of information with technology	# of times mentioned	Percentage of times mentioned
Andy	Quick access to information.	4	10.8
Ben	Access to assignments is 24/7.	6	16.2
Carol	N/A	0	0
Carrie	Exploring information anytime.	4	10.8
Clara	Immediate accessibility.	4	10.8
James	Enable students to meet instructional goals 24/7.	5	13.5
Malcolm	Resources are at fingertips.	5	13.5
Mary	Access to assignments is 24/7.	3	8.1
Mona	Accessibility for learning.	2	5.4
Tess	Information at fingertips.	4	10.8
		Total = 37	

**Negative: student off task.** In addition to positive factors that BYOD program bring, teachers also described some negative factors as well. The first is dealing with students being off task. This theme referred to technology distractions including any factor that

contributes to off-task behavior due to technology use such as music, texting others, or playing games. This section also included the focus being transferred from the lesson objective to the use of technology.

Benjamin saw the negative-student off task as trying to “keep the kids honest and on the correct websites.” Tess went on to say

If not properly facilitated, they can be easily distracted. When technology doesn't work network or site being inaccessible, and keeping students on task and not moving to other sites/apps that aren't connected to the lesson at hand are the biggest challenges.

Tess's statement was in line with Benjamin as students being driven off-task as a result of technology usage. Andy experienced “the biggest challenge is off task behavior.” Clare focused more on the technology itself by stating “A big barrier may be that the new focus becomes technology rather than the lesson objective itself. Students getting unfocused by “surfing the web” to unblocked websites.

Mary thought that student off task was a result of technology problems and went on to include lack of support at home by stating “Obstacles encountered are tech problems, firewall, bandwidth issues, and lack of support at home.” Carrie followed through with the experience that students would “not be looking at the teacher while we were directly teaching, they would be fiddling with their devices and powering them up.”

James and Malcolm were both in agreement about student distraction, leading to the student being off task. James indicated “sometimes technology can become a catalyst for distraction and off task behavior.” Malcolm mentioned “students can be distracted by

multitasking.... meaning clicking on more than one site.... also, minimizing sites that you don't want them to be on.... like games.....or even texting.”

Eight out of ten or 80% of the participants thought that technology could have an adverse impact on student learning. Distractions and being off task appeared to go hand-in-hand.

Also, a distraction causing a student to be off task included obstacles such as firewalls and technical issues. Table 13 gives an overview of the negative impact of students “off task.” These factors include distractions, minimizing sites for playing games, distractions, technology problems, and surfing. The table also includes the number of times each participant mentioned an adverse impact students off task as a result of implementing technology as well as the percentage of times mentioned.

Table 13

*Students Off-Task While Using Technology*

Participant	Students off task	# of times mentioned	Percentage of times mentioned
Andy	Off task behavior.	4	14.8
Ben	Honesty in Web sites.	4	14.8
Carol	N/A	0	0
Carrie	Lack of concentration (surfing).	3	11.1
Clara	Focus on technology rather than lesson objective. Surfing the Web.	2	7.4
James	Distractions.	4	14.8
Malcolm	Multitasking, minimizing sites for gaming.	4	14.8
Mary	Technology problems.	3	11.1
Mona	N/A		
Tess	Easily distracted.	3	11.0
		Total = 27	

**Negative: safety issues/problems.** Another negative factor that teachers brought up often, was the issue of student safety. This theme was used to code any references to any inappropriate use of devices that provide any potential signs of safety concerns. Participants' responses primarily referred to gaming, unfiltered browsing, cheating, plagiarism (as part of cheating), and reliable research. Unfiltered browsing can occur when the student uses their own device such as a smartphone or tablet that has its own Internet service. Plagiarism is a category of cheating that researchers have suggested is on the rise over the past two decades (Larkham & Manns, 2002). Also included was inappropriate picture taking and the possibility of uploading pictures on social media such as Facebook or Twitter.

Benjamin was concerned with plagiarism, honesty, and lack of wanting to do the assignments: "Reliable data, honesty in research, plagiarism, laziness devices for everyone with BYOD, however it does not mean that everyone is totally engaged in the lesson." Benjamin also included in his mock demonstration how a student can be found on an inappropriate site. In Benjamin's mock lesson he demonstrated how he will call out a student's name and ask them to raise their device and show him. Benjamin also stated that "I go around the room pretending to be looking at another student's device when I am actually checking out a different student."

Clare was concerned with both gaming and cheating as a safety issue when students are using their own mobile devices. These concerns include cheating on tests and sometimes not knowing if the students were able to text other students with test information. Clare indicated this by stating "I also am a bit concerned with using devices

for taking tests. You don't know if a student is texting answers to another student." The misuse of mobile devices by texting answers to texts would apply to cheating.

Tess was another participant who was also concerned with cheating:

I think, but I am not sure if students could cleverly put a cheat sheet on their device and then pull it up during a test. I do give tests in Schoology which can be accessed on a mobile device.

Andy's' concerns were for students 'cheating included using social media and texting. Andy indicated that students would be cheating by not using the protocol for network access as well as texting other students by indicating "I fear students' who do not log onto the school network re accessing social media instead of using devices for lesson purposes. Also, texting others in class or in other classrooms. Andy also said "for cheating purposes on quizzes or tests."

James concerns were about how "students can cheat on exams by sharing pictures of tests.... or can text answers on tests" James also mentioned "students love to copy paste...not thinking this is plagiarism." Mary also made reference to cheating by stating "cheating can happen by texting answers."

Mona just simply stated her "concerns were related to security and misuse of these devices." Mona was not specific to what concerns or security and misuse she was referring to.

Carrie talked about students' conscious use of practice of plagiarism. Conscious use and plagiarism referred to how "students will simply copy and paste information off the Internet to use in their assignments or projects." Carrie also emphasized how students

“need to learn to use it conscientiously and carefully.” Then Carrie went on to say: “they want to cut and paste material from sources and consider it their own work.”

Malcolm referred to “sexting.” Sexting is the misuse of phones for texting or sending provocative or inappropriate messages or pictures. Malcolm mentioned how “I worry about students’ texting or sending inappropriate things to other students.....although I have not encountered this. Malcolm went on to say “others have spoken about inappropriate texting or sexting.”

The statements from the participants show that the participants have concerns about cheating on tests, plagiarism and gaming or being on sites they should not be on during class time and sexting. Nine out of ten participants or 90% spoke of technology usage as carrying a safety issue. Reliability of data, honesty, gaming, cheating, plagiarism, social media, texting, and inappropriate sharing of pictures or texts were all mentioned as concerns. Table 14 gives an overview of the concerns for technology use and security issues. Most of the issues of concern appear to be cheating and plagiarism. However, all of the nine participants have made reference to a concern that implies a security misuse of the technology. The table also includes the number of times each participant mentioned security issues as an adverse impact on learning as well as the percentage of times mentioned.

Table 14

*Security Issues When Implementing Technology*

Participant	Security issues	# of times mentioned	Percentage of times mentioned
Andy	Social media, security misuse	4	12.9
Ben	Plagiarism	5	16.1
Carol	N/A	0	0
Carrie	Plagiarism	3	9.7
Clara	Cheating and gaming	4	12.9
James	Plagiarism	3	9.7
Malcolm	Sexting	2	6.5
Mary	Cheating	4	12.9
Mona	Security misuse	2	6.5
Tess	Cheating	4	12.9
		Total = 31	

**Summary**

The results of this qualitative phenomenology analysis were reviewed carefully for alignment with each research question. This process was to relate qualitative responses with the three research questions referenced to experiences and perceptions of implementing mobile technology into teachers' curriculum for student knowledge. Themes and subthemes developed from analyzing the data. The depth of the topic was based on the responses from the participants, and of how many times the responses were of a similar issue. The presentation of quotes was representative of the themes that emerged from the analysis. The question posed for Research Question 1 was "What are both the perceptions and shared perceptions of teachers in using mobile devices to provide knowledge to their students?" The main themes that emerged from the responses

to this topic included replacement of old tools, instructional planning changes, and shifting learning to students or student-centered learning.

The question posed for Research Question 2 was “How do teachers describe their experiences when using mobile devices to provide knowledge?” When considering the participant’s, responses related to this focus, the themes that emerged were student engagement and collaboration and monitoring students’ use of mobile technology.

The final Research Question 3 was “What are positive and negative factors that teachers indicate when using mobile devices in the classrooms for student learning?” When considering the responses from the participant teachers, themes that emerged included both negative and positive components. The positive components included efficient use of class time, lesson flexibility, and accessibility of learning. The negative elements included the students off task and safety issues such as plagiarism, cheating, and surfing the internet inappropriately.

This chapter shared particulars of the lived experiences of ten teachers of two suburban districts who not only instituted a BYOD program but have implemented mobile technology in their teachings for more than two years. The interview and demonstrations revealed that implementing mobile technology most have positive perceptions and experiences using technology in their BYOD/BYOT programs. However, teachers also shared the challenges of mobile technology implementation and shared about their concerns for the student being off task, cheating, and plagiarism. Therefore, the participants shared that they found that their responsibilities were shifting and now include monitoring what their students were doing during assignments.

However, there were many positive aspects which included differentiated learning, accessibility of educational tools, and assistive technology.

Differentiated learning involved the various ways that teachers could now change up the lesson, during the lesson to encounter the different learning styles of their students. The accessibility of the various applications in the hands of their students helped in differentiating instruction as well as assistive technology. The assistive tools or adaptive tool can help with some learning attention issues, especially those mobile technologies that the student is personally comfortable with using.

Chapter 4 included an analysis of the data that identified specific themes that emerged from the teacher/participant responses. A presentation of qualitative quotes represented the emergence of these themes that gave a genuine voice to the participants' experiences and perceptions. At last, the process of analysis and presentation of quotes gave way to the interpretation and discussion that appears in Chapter 5.

## Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this study was to understand the lived perceptions and experiences of teachers who have adopted the use of mobile devices in their teachings for student knowledge for a period of 2 or more years. The intent was to discover what has worked to date for those teachers who have implemented mobile technology through a BYOD/BYOT program. This study may help other educators to understand the outcomes of implementing these programs in their lesson designs. The participants of this study found that implementing technology led to a student-centered learning environment where students were collaborating, focusing on lessons, and having the accessibility of their coursework at hand. The only negative aspects of implementing mobile technology were monitoring the students more closely to make sure they were on task with the lessons and were not doing other activities with their devices such as texting other students or cheating by sending each other answers or looking up information that was not part of the lesson plan.

I begin this chapter with an interpretation of the findings organized by research questions. According to the data that emerged from the study, I chose Honebein's (1996) framework, which falls within the constructivist theory and that data were analyzed accordingly. Then, I discuss the limitations of the study, the recommendations, as well as the implications for future research and practice. This chapter will then close with an overall conclusion.

### **Interpretation of Findings**

For each research question, I describe the ways that the results of this study confirm, disconfirm, or extend knowledge in the discipline of education with what is found in the literature. Additionally, I interpret the findings in the context of the constructivist conceptual framework using Honebein's (1996) model for constructivist classrooms.

#### **Current Literature and Conceptual Framework for Research Question 1**

Research Question 1 was designed to acquire information about teachers' perceptions: What are both the perceptions and shared perceptions of teachers using mobile devices in their instructional design for their students? During data analysis, the three themes emerged. They were related to replacement of old tools, instructional changes, and shifting delivery away from teacher to student or student-centered learning. The findings of this study confirm, disconfirm, and extend what is found in the current literature.

The theme of replacement of old tools confirms what has been shown in the literature. Bruder (2014) does not directly imply but suggests that mobile technologies can be used in the replacement of many traditional applications such as paper test taking and giving feedback using the technology instead of a pen. Jarmuz-Smith (2014) made reference to mobile technologies as saving files to a safe place rather than using paper files. The security concerns were based on confidential information of students as being safer when stored in a computer, rather than in paper folders as prevalent in traditional classrooms. Parsons and Adhikari (2016) found that reading books and handwriting are

less familiar to students, and although parents in the study felt these skills were declining, students are progressing to the new dimension of the 21st century of learning with technology.

Replacement of tools is often the first way that teachers use technology. As noted in Table 3, 90% of the participants made reference to the replacement of old tools with today's technology. Education is becoming paperless with technology replacing old tools such as paper, pens, and pencils. Replacement is an introductory, low-level implementation of technology to only replace something, a process previously used (Hall, 2013). Teachers' comments about being able to accomplish and organize more efficiently show that they are indeed implementing technology, but this theme indicates that teachers often commented on how using technology helps them replace a similar teaching and organizational strategy that they previously used. Hall (2013) calls this mechanical or routine level of use (p. 273.)

Chang, Wu, Lai, and Sung (2014) studied two groups of geometry students. One group used the traditional pencil and paper approach to learning and the other group went paperless and used a technology system approach. They found that the technology group showed improvements over the pencil and paper group in reference to effective learning and overall geometry scores. Going paperless in this study had an effect on overall improvement of learning geometry. Shadieff, Hwang, Huang, and Liu (2015) compared two groups of students performing learning activities. One group used traditional textbooks and the other group used mobile technology. The group using mobile technology outperformed the students who used traditional textbooks as presented on

posttests. The implications of going paperless appear to have an effect on student achievement.

The theme of instructional planning changes confirms the current literature. Trebbi (2011) reported that new roles for teachers and students are emerging as a result of the influence of technology in education. BYOD/BYOT programs are developing in school districts and, therefore, strategies to cope with the skill levels of students need to focus on implementing technology platforms and various classroom strategies to accommodate the implementation of these programs (Cavanagh, 2015).

In this study, 100% of the participants made references to planning changes in their instructional design, which are indicated in Table 4. The opportunities for student-centered learning are increasing the scope of learning with mobile technology. Students adapt to change, so the way teachers need to organize lessons, provide learning materials, and communicate assignment descriptions changes in a mobile environment. To be effective, teachers must adapt to serve the students in a communicable technology environment (Bailey & Williams-Black, 2008). Within the constructivist environment, teachers have the opportunity to provide students with the means to succeed as student-centered learners, allowing students to take charge using their own mobile devices to solve problems, research issues, and complete classroom assignments.

In the traditional classroom, the teacher controls the learning with an emphasis on attaining the correct answer rather than implementing real-world learning activities or self-regulation (Loyens, Rikers, & Schmidt, 2007). A constructivist classroom promotes the shifting of learning to the student or a student-centered learning environment with

meaningful learning (Baylor & Kitsantas, 2005). Although these studies are not current, the literature supports a move towards the shift from a traditional classroom environment of the teacher as a lecturer to a teacher as a facilitator promoting student-centered learning.

According to Ozdamli and Uzunboylu (2015), the increased use of technology for every day purposes such as banking and entertainment have made way to mobile technology usefulness in the classroom. Ozdamli and Uzunboylu stressed the purpose of understanding teachers' perceptions on the use of mobile technology when considering student learning. In this quantitative study, it was determined that the perceptions of both students and teachers were positive and the use of technology in education was welcomed.

The results from this study support a similar finding from a qualitative study by Parsons and Adhikari (2016), which indicated that students are more independent as learners when mobile technologies are implemented in their curriculum. Noonoo (2016) suggested that teachers need to move to the new way of teaching in the 21<sup>st</sup> century to include BYOD/BYOT to promote student learning. Through the implementation of mobile technology, the participants of this study have provided multiple perspectives of representing information through exploring knowledge, discussions, and executing projects using mobile technology. The participants believe that mobile technology has provided their students with the opportunity to collaborate and discuss the final analogies of their class assignments. Teachers in this study felt that the use of BYOD/BYOT changed the role and responsibilities for both themselves and their students. They viewed

themselves as the facilitators of learning and their students more responsible for their own learning. Current literature supports this trend. For example, An and Reigeluth (2012) described an instructional theory where student progress is based on task-based instruction. In this task-based design, the student is in a student-centered learning environment and the teacher plays the role of a guide with technology in the new paradigm. Twenty-first century students are considered to be the App Generation, according to Garner and Davis, (2013). This suggests that students need to be guided by the teacher to become independent learners when technology is implemented in teachings. The teacher participants of this study have implemented mobile devices for more than 2 years. From the data presented in Table 5, it is evident that 100% of the participants enabled students to be their own learners by showing them how to use their own devices for educational purposes.

Honebein's model for constructivist classrooms (1996) was the conceptual framework of this study. When analyzing the data from the research questions through this lens, the data align with several design elements of constructivist classrooms, but not all. Honebein explained a characteristic as providing experience with the knowledge construction process. Students oversee how they learn and strategize problem-solving, and the role of the teacher is to facilitate this process. This theme of shifting learning to students aligns this element of Honebein's model. Data from this study show that teachers perceived a shift of responsibilities from teacher to student or a student-centered learning environment. This may indicate that the implementation of a BYOD/BYOT program promotes a constructivist environment.

Data from Research Question 1 was also reflected in the second characteristic of Honebein's (1996) design for constructivist classrooms, which was to provide experience in and appreciation for multiple perspectives. Honebein stated that engaging in various activities that enables students to come up with alternative solutions to understand problems in their method. As part of a student-centered environment, the teachers of this study all indicated that the implementation of mobile technology enabled their students to engage in alternative solutions to enrich their understandings of lessons given. In the mock lessons, teachers showed how they ask their students to complete projects where they had to engage collaboratively in activities and evaluate solutions to problems. Collaborating on various research projects could provide students with experiences from multiple perspectives.

Honebein's sixth design element "encourage the use of multiple modes of representation" is also reflected in the data collected for Research Question 1. Within the shifting learning to students, the teachers discussed how students use multiple apps and resources as a result of their BYOD/BYOD program. According to Honebein (1996), conventionally communicating in both oral and written ways are the two top common forms of conveying knowledge in education. However, Honebein also suggested that learning with just written and oral communication can limit how students view what they are learning and also how they view their world. Honebein suggested that curriculum should also implement media such as videos, computers, and photographs to provide a wealth of experiences. These results may indicate that mobile technologies are replacing traditional methods or oral and written communication supporting a constructivist

classroom environment. The use of mobile technologies does encourage multiple modes of representation. Characteristic six extends over to all of the research questions as the teachers' of this study have successfully adopted additional media with the implementation of mobile technologies in their teachings for student knowledge.

Honebein's seventh design element is to "encourage self-awareness in the knowledge construction process" (p. 11). Honebein made a reference to constructivist learning environments as how the designer or teacher creates learning activities that encourage students to show and explain their work. The student should defend his or her positions on valuable solutions to the lesson inquiry. The participants of this study demonstrated how they created learning activities that required their students to use applications such as Microsoft PowerPoint, Google Slides, and Publisher to present the findings of their research work to their peers. To reach the point of using these presentation applications, the students had to research ideas or read novels and defend their positions about their findings according to the lessons planned by their teacher. In finality, the students would show and explain their work to student peers. The participants facilitated students to create the activities that they were to present to their peers. These lessons would encourage learners to show their work and defend their positions in a demonstration using various presentation applications.

However, there were some design elements of constructivist classrooms (Honebein, 1996) that were not evident in the data collected about teacher's perceptions in Research Question 1. The elements not touched on were 3 and 5, which were "embedding learning in realistic and relevant context" and "embedding learning in social

context” (p. 11). This could be applied in the participant’s classrooms; however, the data collected in this study did not reflect this. No participants talked about using BYOD/BYOT for pulling in real or current events. Likewise, using technology to support social context was not touched upon in the teachers’ reflection of their implementation of BYOD/BYOT. The lack of these two design elements means that either teachers lack these elements in their classrooms, or at least they did not perceive them as important enough to mention in interviews as the other aspects of teaching and learning that they did share. This shows that teachers still have areas to grow in developing strong constructivist classrooms. The results of this study may indicate that while mobile technology helps teachers perceive that they are moving to a more constructivist classroom, the inclusion of mobile technology did not transform the classroom to meet all of Honebein’s design elements for effective constructivist classrooms.

### **Current Literature and Conceptual Framework for Research Question 2**

Research Question 2 generated two main themes: How do teachers describe their experiences when using mobile devices to provide knowledge? These themes were student engagement and collaboration and monitoring students’ use of mobile technology. The teachers are now experiencing how students are becoming more engaged in both learning and collaborating with one another. As a result of this, teachers are also experiencing that they now need to monitor what their students are doing. Students are independently learning using mobile devices and the internet, which could lead to safety issues and issues of being off task that will be addressed in Research Question 3.

The theme of student engagement and collaboration supports findings in the current literature. Various researchers have documented the effects of implementing mobile technology into the classroom as it relates to more student commitment, interaction, and teamwork. Reychav and Wu (2015) suggested that collaborative efforts in the use of mobile collaborative learning in education and organizations enhanced learning satisfaction. The study suggested that mobile collaborative learning had a greater impact on understanding than individual learning practices. Mobile technology has been shown to improve student engagement, interaction, collaboration, and communication (Allen, 2011; Kolb, 2011). Related current research included increasing knowledge in planning with technology and a more engaging learning environment for students. Santos (2012) described how teaching with technology generates a more engaged learning environment for students. Teaching with technology also meets student expectations of technology use in the classroom (Myran, 2009).

Martin and Ertzberger, (2013) investigated the effects of mobile technology on both student achievement and attitude on the “here and now” of computer based instruction (CBI). Here and now followed the concept of learning “anytime and anywhere.” The study was based on the differences between the use of an iPod versus a tablet, however, the results of their study showed positive attributes to CBI for both achievement and attitude when learning was delivered. The study indicated an increase in efficiency in completing tasks and increased independence as a student learner. A study at the University of South Carolina found that the use of owned mobile devices was significant when comparing different technologies, and teachers who allowed mobile

technology saw that students were more readily engaged (Grant et al, 2015). Haber-Curran, and Tillapaugh (2015) emphasized the importance of student-centered pedagogy and how the shift from the traditional classroom structure presents new challenges. This was a phenomenological study of students in a student-centered environment. The findings showed that the pedagogical approach of student-centered learning versus traditional methods proved to be affective for student engagement in learning. The teacher is now the “facilitator” or “consultant” to the students, formulating questions and discussions to promote problem solving and accountability for student learning. The student learning, although independent, also addressed challenges of collaborative efforts.

The participants of this study supported student engagement and collaboration by making statements such as “Better student engagement” and “Increased teacher/student interaction.” Table 6 highlights how 80% of the participants found key points for mobile technology enabling both student engagement and collaboration. Student engagement and collaboration can lead to a more constructivist classroom as the students become participants of what they are learning. Research Question 2 reveals that mobile technology implemented into lessons for student learning promotes students who both collaborate with each other and are engaged in their education.

As schools begin addressing the inflow of students’ mobile technology, they need to consider the experiences and perceptions of teachers’ who have influenced the idea of implementing the technology through programs such as BYOD/BYOT. Student-centered learners are more independent, taking charge of their learning. As the internet has become progressively ever-present in society, many researchers such as Grant et al.

(2015), and Murphy (2014) have argued it is no longer the specific device that matters, as much as the level of access to the internet for both content, knowledge, and information.

The second theme that emerged under research question 2 was the monitoring of student's technology. Results from this study both corroborate and challenge findings in the current literature. In the *Handbook of Classroom Management* by Emmer and Sabornie (2014) ideas elucidates that implementing technology in a classroom not only equips teachers with a new range of tools to manage, but also presents a new way of managing students in the BYOD/BYOT classroom. Monitoring students in a BYOD/BYOT classroom has become an important issue. Garba, Arnamego, Murry and Kenworthy (2015) wrote about how the implementation of mobile technologies bring about the need for careful monitoring of proper usage of the devices. The participants of this study indicated that with the implementation of mobile technology in the classroom, monitoring to maintain student on task was a definite entity of a BYOD/BYOT program. The misuse and abuse of technology can emerge both inside and outside of schools. As experienced by the participants of this study, using e-mail or texting to intimidate or threaten a student, downloading games or music, cheating on tests or cheating by plagiarizing information from the Internet, and inappropriately surfing the internet during class time are all aspects that they feel they must monitor.

When analyzing research question 2 through the lens of the study's conceptual framework, number 5 out of the 7 design elements was prominently evident in the teachers' descriptions of their classroom experiences. Constructivist characteristic 5 is explained by Honebein (1996) as social interactions reflecting collaboration between both

students and students and between students and teachers. In this study, the teachers found student collaboration to be a factor that arose as a result of implementing mobile technology into their teachings for student knowledge. The presence of this element of Honebein's constructivist characteristic implies that teachers feel that students are learning through social interactions and collaboration. The teachers are therefore, designing constructivist classrooms through the implementation of mobile technologies.

The theme of monitoring student learning did not align with any of the elements of Honebein's constructivist classrooms. This may indicate that teachers' nervousness about having to keep students on task, and trouble-shooting technology that may or may not be school owned might hinder their ability to allow students complete control of their learning, which is an important element of constructivist learning.

### **Current Literature and Conceptual Framework for Research Question 3**

Research Question 3 was "What are the positive and negative factors that teachers indicate in their exercise of using mobile devices in their instruction within their classrooms?" It is important to consider both the positive and negative factors that teachers indicate when implementing mobile technology in their teachings because better understanding can provide insight for future educators when making the decision to implement a BYOD program in their classroom. The positive themes that emerged from this study are efficient use of class time, lesson flexibility, and accessibility of learning. The negative themes that emerged from this study included students off task, inappropriate use, and safety issues.

The first theme of efficient use of class time, confirms what is found in the literature. Ninety percent of the teacher participants of this study referenced efficient use of time as the students were more engaged and as a result of their engagement, their lessons reflected a positive efficient use of time. LaFountain (2013) found that those management employees who use personal mobile devices are more likely to make efficient use of work time and will even work longer hours during the work year as they have their information needed at hand such as e-mails constantly and do not have to “leave for home” to check their e-mails. Although LaFountain’s was on BYOD/BYOT in business, perhaps it also applies to student’s who would feel more comfortable doing classwork, and making a more efficient use of their time. BYOD/BYOT is also used in the medical field. In one study, medical students who used their own phones to record patient care because of the convenience and because they were comfortable with their own technology (Tran et al., 2014). Individuals in business, medicine, and in schools like using mobile devices because they are already familiar with applications such as presentation applications, therefore, they do not have to present how to use them, saving class time.

The second positive theme, lesson flexibility, also confirms what is in the literature. Wu and Chao (2008) recognized mobile learning environments as allowing for adaptation for individual needs and situational instructional activities. Bailey and Williams-Black (2008) have indicated that mobile devices have promoted individualized learning and differentiated instruction. Having a combination of students with a variation of academic skill levels leads to a diversity of learning needs in today’s educational

classroom. Connecting to the Internet and running an array of software features brings about a vast amount of information including Web resources, graphic organizers as well as word processors such as Google docs. These technology resources can be leveraged to students' strengths and knowledge. Tomlinson (2001) defines differentiation as giving students multiple options to obtain information which is lesson flexibility. This flexibility allows for making sense of ideas and expressing individually what is learned. Flexibility provides different avenues for students to process ideas and demonstrate understanding. The implementation of technology allows flexibility to adapt or support ways for students to interact with lessons provided by the teacher. Technology tools for supporting comprehension for some students have been identified by several research studies published/located in National Institute of Child Health and Human Development, (2000).

The third theme of improved accessibility of learning confirms what is already known about BYOD/BYOT programs. Menkhoff and Bengtsson (2012) did a case study involving undergraduate students at a Singapore University. This study found that mobile devices had a positive outcome when used in blended instruction. Vanwelsenaers (2012) indicated how technology accessibility engages and empowers students to learn on their own. This study was a thesis, however, Vanwelsenaers also indicated that with the right mindset, training, and support, programs like BYOD can have a positive impact on student learning. Access to both mobile devices and the Internet appeared to be a clear factor in teachers' experiences and perceptions toward the successful implementation of technology in teachings. Most prominent was a 24/7 access to mobile devices and the Internet. Studies by other authors indicate technology integration and accessibility with

mobile technology and the Internet have been researched in reference to educational purposes (An & Reigeluth, 2011; Ertmer, Glazewski, Newby & Ottenbreit-Leftwich, 2010; Norris & Soloway, 2011; Ross, 2013).

The first negative theme of students off task, is confirmed with what teachers in other studies have experienced. The negative perception of implementing mobile technology in teachings was based on the experiences of 100% of the participants and were directed at off-task use in their classes or safety issues. Pew Internet and American Life Project (2013) found that 87% of teachers stated that they are creating an easily distracted generation with short attention spans (Purcell et al., 2012). In the same document, 64% of both middle and high school teachers thought that digital technology distracts students academically. In a study by Perry and Steck (2015), iPads were used in one geometry class and not in another to determine the effects of mobile technology on student engagement. Perry and Steck (2015) found that the students who were using iPads in the classroom showed “higher levels” of off-task behaviors than the students who did not use iPads. This study referenced how opportunities for students to become digitally off task, disruptive, or misuse technology can increase as they have the opportunities with the usage of technology at hand. This may indicate that teachers need more support in learning strategies for monitoring students so that the learning can be more focused on construction of knowledge.

The second negative theme was inappropriate use of technology. This too is supported by current literature. Smartphones and cellphones may use a cellular network to bypass the school networks and filters. Thus, some districts are reticent when allowing

students to use their own devices because of their fear of liability or protection from harm (Grant et al., 2015). Parsons (2014) and O'Bannon and Thomas (2015) suggested that all school technology initiatives should address the issue of negative behaviors students can engage in while online. Parsons suggested that mobile technology (as viewed by a school in London), can be a “digital distraction” through text messaging or social networking instead of doing classwork. Parsons also addressed concerns for security issues, mentioning security matters such as cyber bullying and the possibility of mobile devices getting stolen. Students are inquisitive and may always venture outside of the box to include activities outside of the classroom lesson design. Students may venture outside of the lesson and go to sites where they should not go to, for example, YouTube or Ducksters.com, or even any games that are loaded on their devices. Research on BYOD programs examined the impact of teaching staff, their perceptions of the programs and how to best to implement mobile technology in the classroom. When according to Nielsen (2011), choosing appropriate platforms and implementing technology it is ultimately the teacher who has the biggest impact on achievement.

The third negative theme was student safety, which is commonly discussed in the literature. Research by Tindell and Bohlander (2012) shows that common inappropriate uses of mobile devices in school include texting, game playing, and social networking. Participants of the interviews indicated a concern for inappropriate use of mobile technology that related to cheating, plagiarism texting, and sexting. According to Tallon (2010), sexting is sending explicit pictures of themselves or others. The importance of

considering inappropriate use of mobile devices is a factor that may or may not persuade an educator to adopt a BYOD program.

Improper use of technology can expose risks. Students can inadvertently share information that can put other students in danger. Technology can also make it easier to bully other students online. One participant in the study expressed the opinions that sexting is another high-risk concern. Sexting is defined by the U.S. court system as “an act of sending sexually explicit materials through mobile phones Data from this study indicates that teacher’s perception and fear related to sexting even though none of the participants actually witness evidence of this, the fear may impact a teacher’s willingness to give students more control.

When analyzing research question 3 through the lens of the study’s conceptual framework (Honebein, 1996), some of the themes align and others do not. Honebein’s (1996) first element or characteristic “experience with the knowledge of construction process” (p. 11) is supported by lesson flexibility. Lesson flexibility meets element 1 when teachers provide students with the responsibility of problem solving with a variety of strategies using various applications or methods for problem solving. Constructivist characteristic 2 “provides experience in and appreciation for multiple perspectives” where students engage in activities to help them understand problem solving. This would be executed through flexibility in lessons. Lesson flexibility allows for students to experience learning through multiple perspectives when mobile technology is implemented to complete a lesson or solve a problem. Honebein’s (1996) constructivist characteristic 4 “encourage ownership and voice in the learning process” provides

students with student centered constructivist learning (Honebein (1996). Providing lesson flexibility and accessibility of learning supports the process of moving learning from teacher to student where the teacher assists students to choose their own topics and helps them to find their own “voice” as well as to take ownership of their experience.

Characteristic 6 “encourage the use of multiple modes of representation” represents lesson flexibility when the participants referred to when implementing a BYOD/BYOT program. The implementation of mobile technology and a variety of applications encourages the use of multiple modes for completing lessons. Other themes aligned with element 7 “encourage self-awareness in the knowledge constructive process” (Honebein, 1996, p. 11) the participants created learning activities using mobile technology in their lessons to encourage learners to explain their work and come up with solutions to activities.

Particular insight is gained into the data for research question 3 when looked at through the conceptual framework of Honebein’s (1996) design elements for effective constructivist classrooms. If study participants had fully transformed their classrooms to constructivist pedagogy, the benefits should align with elements from Honebein’s design elements. However, only four out of seven were described by teachers as a benefit. Instead, the data show that teachers’ use of mobile technology were associated with routine and refinement implementation (Hall, 2013) and not transformative or connectivity to a global society. The data describing challenges show a focus on the task and logistical issues rather than challenges of supporting students’ in their constructivist learning. However, this is not all that different from what has been found in other studies

related to implementing an innovation. Teachers usually take years to reach the full potential of what the innovation has to offer (Hall, 2013; p. 274). It appears that teachers in this study perceive that mobile technology has radically changed their classrooms when in actuality if their goal is to use mobile technology to develop constructivist classrooms, more research and promotion of mobile technology implementation in the classroom instruction needs to be considered.

### **Implications of the Study**

There is a potential impact from this study for positive social change at the individual, organizational and societal levels. The first implication is for teachers and their students in BYOD/BYOT programs. Today's 21st-century students are connected globally in both communicating and collaborating through the use of mobile technology. In addition to communications and collaborations with friends and family, today's students' must be adequately taught how to engage mobile technologies as a tool for enhancing their education through critical thinking and problem solving by collaborating and communicating with their colleagues. Goad (2012) surveyed 44 teachers and found that smart phone usage in lessons promoted student engagement. To effectively and efficiently connect student devices to their educational objectives and their learning, teachers become the facilitators of helping students to make a connection on how to use their mobile devices for educational purposes. This study could create a positive social change because teachers may better understand how their pedagogy aligns with constructivist teaching and learning, and therefore, see what they do well, and what areas they can still grow.

There are also implications from this study on the organizational level, such as districts looking to implement BYOD/BYOT programs. In today's world, mobile technologies are continually being introduced and employed in all facets of life. These facets include personal, professional, and educational, and are being used to increase either productivity or information at an anytime anywhere access. In the educational sector, teachers are challenged to educate 21st-century learners to develop critical thinking skills and to improve global communication. The adoption or implementation of mobile technologies in K-12 schools is on the rise. Fullan (2001) stated how educational changes depends on what teachers do and think. With this in mind, the perceptions and experiences of teachers become the important factor when adopting innovations such as mobile technology in teachings (Ertmer et al., 2010). The results of this study may influence positive social change because school districts may better understand that using technology at first will be used to replace previous pedagogy practices only. Organizations need to know that it will take time for changes, such as technology implementation to impact changes in how teachers teach.

This study might also have implications at the societal level. Although this was a phenomenological study, the increased understanding of how teachers perceive BYOD/BYOT programs may shed light on bigger societal issues. Teachers who are intimidated by implementing technology in their lesson designs view the positive attributes the participants of this study have found and decide to employ the BYOD/BYOT program in their classroom. If other educators who were reluctant to adopt a BYOT/BYOT program now consider the adoption, they will benefit students to view

how their mobile devices have educational uses. Understanding the educational uses would be beneficial for the future of today's 21st-century students who are growing up in a technology driven generation.

### **Limitations of the Study**

Creswell (2013) refers to limitations of qualitative research as inherited. Several limitations existed in this study. The sampling size for this phenomenological study included ten participants who were adequate for this methodology. However, the results may not have been generalizable to other populations of teachers or for other locations of schools. This study focused on teachers in Grades 6 to 12 and did not include what teachers' perceptions or experiences are in Grades K to 5.

The content areas taught by the participant teachers could also be considered a limitation. Subject areas taught was not taken into consideration when participants were being sought for this study. Consequently, no assumptions can be made for all disciplines that are taught in grades six through twelve. Only the perspectives and experiences from the disciplines taught by the participants could be viewed.

In a qualitative study, another limitation to consider would be the subjectivity of the research which may lead to bias about the subject. I am a teacher in a school district who employs a BYOD program and acknowledged any bias that I may have had in regards to technology integration. To avoid this, I wrote reflections to bracket my personal opinions regarding the integration of mobile technology in my teachings. I also examined the data numerous times to view patterns from different points of view or perspectives.

### **Recommendations**

Constructed on the findings of this study, recommendations for future studies would include the following considerations for future research. Because this study was limited to participants from Grades 6 to 12, future research should consider teachers' perceptions and experiences using mobile technology from Grades K to 5. Also, the participants from this study were limited to those who volunteered from particular disciplines of instruction. Therefore, future research might investigate the use of mobile technologies in other disciplines such as math, physical education, health or ELA. Considering that this study only included grade levels 6-12, future studies could include grades K-5.

Additional studies may include the academic performances and student achievement based on the participants' perceptions and experiences of their student grades as a result of implementing mobile technology in their teachings. As this study was limited to two school districts in a suburban area, recommendations should also include areas of urban and rural districts. Including urban and rural areas would allow for investigating how teachers perceive or experience students with differing economic levels as they implement mobile technologies into their teachings.

A study on student's perspectives implementing mobile technology may also be useful. This study could provide insight as to what students' think about BYOD/BYOT programs, particularly about the positive and negative aspects. What do the students perceive as negative aspects such as cheating and being "off task?" The students may offer some remedies as to how the teachers can monitor more efficiently what the

students are doing when using the Internet for assignments. What do students' view as the positive aspects of using their devices in school? Understanding students' views may offer insight for teachers' when developing lesson plans addressing the effectiveness of BYOD/BYOT in their planning.

### **Conclusion**

In this study, to address the disconnect between teachers' implementation of personal devices in BYOD/BYOT programs and their preferred pedagogy, I explored the phenomenon of the experiences and perceptions of teachers who have implemented mobile technologies in their instruction. Even though this study, which included 10 participants based on the accepted qualitative tradition, the findings address several aspects of the larger more generalized problem. BYOD/BYOT programs will likely continue to increase and therefore more teachers will be asked to include the use of devices in their instruction. Therefore, a better understanding of their perceptions and experiences will inform how to improve future BYOD/BYOT implementation programs.

While the findings of this study show that the shared perceptions and experiences of teachers is that their students are more student-centered learners compared to before the BYOD/BYOT program, much of their discussion about implementation was not related to how devices helped them to create a more constructivist environment. Districts that move to these handheld technology programs can learn that even after several years, teachers still struggle with low-level introductory implementation barriers. If one of the goals of such a program is to help teachers move to more constructivist classrooms, teachers need lots of support not only in the form of professional development but also in

policies that are enforced building-wide. Multi-year, scaffolded professional development would provide teachers with increasingly sophisticated implementation strategies that would first address issues such as organizing an online LMS class but would later provide support in how to develop learning activities that require students to construct knowledge using resources and tools available on their devices.

If the goal of the program is to move student work online and to increase teacher and student efficiency, this study shows that teachers feel that BYOD/BYOT programs accomplish this. Teachers expected students to retrieve their class assignments, including content instruction and project rubrics for grading online. Teachers used web-based programs and apps in asynchronous and synchronous ways to improve classroom efficiency. Working individually with digital artifacts and working collaboratively online are essential 21st-century skills that students need in today's workplace (Kolb & Tonner, 2012, Edwards, 2014). While the use of mobile devices for personal purposes are natural to today's youth, BYOD/BYOT programs require that the devices be used for formal learning within the classroom. It is possible that the use of devices informal ways may help students use devices for more informal learning and problem solving outside the classroom, now and into the future.

## References

- Abell, F. (2008). One-to-one computing in public schools: Lessons from laptops for all programs. *Baltimore, MD: Abell Foundation*. Retrieved from <http://www.eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=ED505074>
- Ackerman, A. S., & Krupp, M. L. (2012). Five components to consider for BYOT/BYOD. *Proceedings Of The IADIS International Conference On Cognition & Exploratory Learning In Digital Age*, 35-41.
- Albion, P. R. (1999). *Self-efficacy beliefs as an indicator of teachers' preparedness for teaching with technology*. Retrieved from [http://eprints.usq.edu.au/6973/1/Albion\\_SITE\\_1999\\_AV.pdf](http://eprints.usq.edu.au/6973/1/Albion_SITE_1999_AV.pdf)
- Albion, P. (2008). Beyond the foundations: The role of vision and belief in teachers' preparation for integration of technology. *Techtrends*, 46(5), 34-38.  
doi.10.1007/BF02818306
- Algozzine, B., & Hancock, D. R. (2006). *Doing case study research: A practical guide for beginning researchers*. New York, NY: Teachers College.
- Almekhlafi, A., & Almeqdadi, F. (2010). Teachers' perceptions of technology integration in the United Arab Emirates school classrooms. *Educational Technology & Society*, 13(1), 165-175. Retrieved from <http://www.jstor.org/stable/jeductechsoci.13.1.165>
- Allen, R. (2011). Can mobile devices transform education? *Education Update*, 53(2), 2-7.

- Ally, M., & Samaka, M. (2013). Open education resources and mobile technology to narrow the learning divide. *International Review of Research in Open and Distance Learning, 14*(2), 14-27. doi:10.19173/irrodl.v14i2.1530
- Al-Yousif, F. A. (2001). *Assessment of constructability practices among general contractors in the eastern province of Saudi Arabia* (Doctoral dissertation). King Fahd University of Petroleum and Minerals.
- American Association for the Advancement of Science (AAAS). (1993). *American Association for the Advancement of Science: Benchmarks for science literacy: Project 2061*. New York, NY: Oxford University Press.
- An, J., & Reigeluth, C. (2012). Creating technology-enhanced, learner-centered classrooms: K-12 teachers' beliefs, perceptions, barriers, and support needs. *Journal of Digital-Learning in Teacher Education, 28*(2), 54-62. doi.10.1080/21532974.2011.10784681.
- Anderson, N. (2005). 'Mindstorms' and 'Mindtools' aren't happening: digital streaming via socio-economic disadvantage. *E-Learning, 2*(2), 144-152. doi.10.2304/elea.2005.2.2.3.
- Anthony, A. B. (2012). Activity theory as a framework for investigating direct-classroom system interactions and their influences on technology integration. *Journal of Research on Technology in Education, 44*(4), 335-356. doi:10.1080/15391523.2012.10782594
- Archambault, L., Wetzel, K., Foulger, T. S., & Williams, M. K. (2010). Professional development 2.0: Transforming teacher education pedagogy with 21st century

skills. *Journal of Digital Learning in Teacher Education*, 27(1), 4-11.

doi:10.1080/21532974.2010.10784651

Ashby, P. E., Baylor A. L., Doerr, C. E., & Rosenberg-Kima, R. B. (2009). Changing middle-school students' attitudes and performance regarding engineering with computer-based social models. *Computers & Education*, 53(2) 209-215.

doi:10.1016/j.compedu.2009.01.013

Association for Educational Communications and Technology (2004, February). *The definition of educational technology*. Retrieved from

[http://ocw.metu.edu.tr/file.php/118/molenda\\_definition.pdf](http://ocw.metu.edu.tr/file.php/118/molenda_definition.pdf)

Avraamidou, L. (2008). Prospects for the use of mobile technologies in science education. *Association for the Advancement of Computer Education Journal*, 16(3), 347-365. Retrieved from <http://eds.b.ebscohost>

Bai, H., & Ertmer, P. (2008). Teacher educators' beliefs and technology uses as predictors of pre-service teachers' beliefs and technology attitudes.

*Journal of Technology and Teacher Education*, 16(1), 93-112. Retrieved from <http://www.learntechlib.org/p/19206>.

Bailey, J. P., & Williams-Black, T. H. (2008). Differentiated instruction: Three teachers' perspectives. In M. M. Foote, F. Falk-Ross, S. Szabo, & M. Sampson (Eds), *College reading association yearbook: Vol. 29* (pp.

133-151). Retrieved from

[http://www.aleronline.org/resource/resmgr/yearbooks/yearbook\\_volume\\_29.pdf#page=147](http://www.aleronline.org/resource/resmgr/yearbooks/yearbook_volume_29.pdf#page=147)

- Barron, A. E., Kemker, K., Harmes, C., & Kalaydjian, K. (2003). Large-scale research study on technology in K-12 schools: Technology integration as it relates to the national technology standards. *Journal of Research on Technology in Education*, 35(4), 489-507.  
doi:10.1080/15391523.2003.10782398
- Baylor, A. L., & Kitsantas, A. (2005). A comparative analysis and validation of instructivist and constructivist self-reflective tools (IPSRT and CPSRT) for novice instructional planners. *Journal of Technology and Teacher Education*, 13(3), 433-435. Retrieved from <http://www.aace.org/pubs/jate/>.
- Baytak, A., Tarman, B., & Ayas, C. (2011). Experiencing technology integration in education: Children's perceptions. *International Electronic Journal of Elementary Education*, 3(2), 139-151. Retrieved from <http://www.doaj.org/doaj>
- Beyerbach, B. (2007). From teaching technology to using technology to enhance student learning: pre-service teachers' changing perceptions of technology infusion. *Journal of Technology and Teacher Education*, 10(4), 11-52. Retrieved from <http://www.learntechlib>.
- Beam, R. A., Brownlee, B. J., Voakes, P. S., & Wilhoit, G. C. (2009). *The American journalist in the 21st century: US news people at the dawn of a new millennium*. Routledge, NY. doi:10.4324/9781410614568
- Bebell, D., Russell, M., & O'Dwyer, L. (2004). Measuring teachers' technology uses: Why multiple-measures are more revealing. *Journal of Research*

*on Technology in Education*, 37, 45-64.

doi:10.1080/15391523.2004.10782425

Becker, H. J. (1994). How exemplary computer-using teachers differ from other teachers: Implications for realizing the potential of computers in schools. *Journal of Research on Computing in Education*, 26(3), 291-321. doi:10.1080/08886504.1994.10782093

Becker, H. J., & Ravitz, J. L. (2001, March). Computer use by teachers: Are Cuban's predictions correct. In *annual meeting of the American educational research association, Seattle*.

Bem, D. J., McConnell, H.K. (1970). Testing the self-perception explanation of dissonance phenomena: On the salience of premanipulation attitudes. *Journal of Personality and Social Psychology*, 14(1), 23-31. doi.10.1037/h0020916

Bohyun, K. (2013). The mobile shift. *Library Technology Reports*, 49(6), 5-8. doi:org/10.5860/ltr.49n6

Brooks, J. (1990). Teachers and students: Constructivists forging connections. *Educational Leadership*, 47(5), 68-71. Retrieved from <http://eds.b.ebscohost>

Brooks-Young, S. (2007). *Digital-age literacy for teachers: applying technology standards in everyday practice*. ISTE (International Society for Technology Education).

Brown, J. L. (2004). *Making the most of understanding by design*. Alexandria, VA: Association for Supervision and Curriculum Development.

- Bruder, P. (2014). Gadgets go to school: The benefits and risks of BYOD (Bring Your Own Device). *Education Digest*, 80(3), 15-18. Retrieved from <http://www.njea.org>.
- Budd, J. M. (2005). Phenomenology and information studies. *Journal of Documentation*, 61(1), 44-59. doi:10.1108/00220410510578005
- Bursch, R. (1989). On phenomenology and its practice. *Phenomenology and Pedagogy*, 7, 187-217. Retrieved from [ejournals.library](http://ejournals.library).
- Cakir, M. (2008). Constructivist approaches to learning in science and their implications for science pedagogy: A literature review. *International Journal of Environmental & Science Education*, 3(4), 193-206. ERIC Document Reproduction Service No. EJ894860.
- Casey, D. M. (2008). The historical development of distance education through technology. *TechTrends*, 52(2), 45. doi.10.1007/s11528-008-0135-z
- Cavanaugh, C., Repetto, J., Wayer, N., & Spitler, C. (2013). Online Learning for Students with Disabilities: A Framework for Success. *Journal of Special Education Technology*, 28(1), 1. doi:10.1177/016264341302800101
- Cavanagh, S. (2015). Districts Learn to Embrace Ruckus Brought by “BYOD.” *Education Week*, 34(35), 26. ERIC Document Reproduction Service No. ED561012
- Chambers, J. M., Carbonaro, M., & Rex, M. (2007). Scaffolding knowledge construction through robotic technology: A middle school case study. *Electronic Journal for the Integration of Technology in Education*, (6) 55-70. Retrieved from

<http://www.itari.in/categories/futuretrendsineducation/roboticsinschool.pdf>

- Chang, K. E., Wu, L. J., Lai, S. C., & Sung, Y. T. (2014). Using mobile devices to enhance the interactive learning for spatial geometry. *Interactive Learning Environments*, 1-19. doi:10.1080/10494820.2014.948458
- ChanLin, L. J., Hong, J. C., Horng, J. S., Chang, S. H., & Chu, H. C. (2006). Factors influencing technology integration in teaching: A Taiwanese perspective. *Innovations in Education and Teaching International*, 43(1), 57-68. doi:10.1080/14703290601090390
- ChanLin, L. (2007). Perceived importance and manageability of teachers toward the factors of integrating computer technology into classrooms. *Innovations in Education and Teaching International*, 44(1), 45-55.
- Charles, A. (2012). Cell phones: Rule-setting, rule-breaking, and relationships in classrooms. *American Secondary Education*, 40(3), 4-16. Retrieved from EBSCO Host ERIC database Service No. EJ984910
- Cheek, J., Onslow, M., & Cream, A. (2004). Beyond the divide: Comparing and contrasting aspects of qualitative and quantitative research approaches. *Advances in Speech Language Pathology*, 6(3), 147-152. doi:10.1080/14417040412331282995
- Cheung, A. C., & Slavin, R. E. (2013). Effects of educational technology applications on reading outcomes for struggling readers: A best-evidence

synthesis. *Reading Research Quarterly*, 48(3), 277-299.

doi:10.1002/rrq.50.

- Chikasha, S., Ntuli, M., Sundarjee, R., & Chikasha, J. (2014). ICT integration in teaching: An uncomfortable zone for teachers: A case of schools in Johannesburg. *Education as Change*, 18(1), 137-150. doi:10.1080/16823206.2013.847013
- Clark, T. (2012, June 24). Transforming Learning with BYOT – Bring Your Own Technology [BYOT Network]. Retrieved from <https://byotnetwork.com/?s=Clark+2012>
- Clements, D., & Sarama, J. (2007). Effects of a preschool mathematics curriculum: Summative research on the building blocks curriculum. *Journal for Research in Mathematics Education*, 38(2), 136-163. Retrieved from EBSCOHost.
- Colaizzi, P. F. (1978). Psychological research as the phenomenologist views it. In R. S. Valle & M. King (Eds.), *Existential-Phenomenological alternatives for psychology* (pp. 48-71). New York, NY: Oxford University Press. ERIC Document Reproduction Service No. Retrieved from EBSCOHost.
- Coleman, C., King, J., Ruth, M. H., & Stary, E. (2001). Developing Higher-Order Thinking Skills through the Use of Technology. ERIC Document Reproduction Service No. ED459702.
- Collins, A. & Halverson, R. (2010). Rethinking Education in the Age of Technology. *Journal of Computer Assisted Learning*, 26, 18-27. doi:10.1111/j.1365-2729.2009.00339.x

- Conte, A. E. & Weber, R. E. (1999). Is technology the "best hope" for teaching students about mathematics and science? *The Technology Teacher*, 59(1), 19-23. . ERIC Document Reproduction Service No. 0746-3537.
- Cox, M., Preston, C., & Cox, K. (1999). What Factors Support or Prevent Teachers from Using ICT in their Classrooms? King's College London: MirandaNet Project University of Surrey. In *British Educational Research Association Annual Conference, University of Sussex at Brighton*. Retrieved from: <http://www.leeds.ac.uk/educol/documents/00001304.htm>.
- Creswell, J.W. (1997). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks, CA: Sage.
- Creswell, J.W. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks, CA: Sage.
- Creswell, J.W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage Publications.
- Creswell, J. W. (2009). Editorial: Mapping the field of mixed methods research. *Journal of Mixed Methods Research*, 3(2), 95-108. doi.10.1177/1558689808330883
- Creswell, J. (2012). *Research Design: Qualitative and Quantitative Approaches*. Thousand Oaks.
- Creswell, J.W. (2013). *Educational research: planning, conducting, and evaluating quantitative and qualitative research*. Upper Saddle, NJ: Pearson Merrill Prentice Hall.

- Creswell, J. W., & Creswell, J. D. (2005). Mixed methods research: Developments, debates, and dilemmas. *Research in organizations: Foundations and methods of inquiry*, 315-326.
- Cuban, L. (2006). Getting past futile pedagogical wars. *Phi Delta Kappan*, 87(10), 793-795 doi:10.1177/003172170608701017
- Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent paradox. *American educational research journal*, 38(4), 813-834. doi:10.10.3102/00028312038004813
- Davison, C. B., & Lazaros, E. J. (2015). Adopting mobile technology in the higher education classroom. *Journal of Technology Studies*, 41(1). Retrieved from <http://scholar.lib.vt.edu/ejournals/JOTS/v41/v41n1/pdf/davison.pdf>
- Davidson, N., & Stone, J. (2009). 21st century transformation. *Principal Leadership* 10(1), 52-55. ERIC Document Reproduction Service No. EJ447483
- Dawson, K., Cavanaugh, C., & Ritzhaupt, A. (2009). Florida's EETT leveraging laptops initiative and its impact on teaching practices. *Journal of Research on Technology in Education*, 41(2), 143-159. doi:10.1080/15391523.2008.10782526
- Dawson, K. (2012). Using action research projects to examine teacher technology integration practices. *Journal of Digital Learning in Teacher Education*, 28(3), 117-124. doi:10.1080/21532974.2012.10784689
- Deemera, S. (2006). Classroom goal orientation in high school classrooms: Revealing links between teacher beliefs and classroom environments. *Educational Research*, 46(1), 73-90. doi:10.1080/0013188042000178836

- DiCicco-Bloom, B., & Crabtree, B. F. (2006). Making sense of qualitative research. *Medical Education*, 40(4), 314-321. doi:10.1111/j.1365-2929.2006.02418
- Devaney, L. (2011, September). *A blueprint for ed-tech success*. Retrieved from <http://www.eschoolnews.com/2011/09/29/a-blueprint-for-ed-tech-success/>
- Dewey, J. (1916). *Education and democracy*. Retrieved from [http://www.ilt.columbia.edu/columbia.edu/publications/Projects/digitexts/dewey/d\\_e/chapter07.html](http://www.ilt.columbia.edu/columbia.edu/publications/Projects/digitexts/dewey/d_e/chapter07.html)
- Dewey, J. (1938). *Experience and education*. New York: Collier Books.
- Dewey, J. (1897). My pedagogic creed. *School Journal*, 54, 77-80. Retrieved from <http://dewey.pragmatism.org/creed.htm>
- DiFilipo, S., & Kondrach, C. (2012). Rolling out a BYOD (Bring Your Own Device) program. *EDUCAUSE webinar*. Retrieved from: <http://www.educause.edu/library/resources/rolling-out-byodbring-your-own-device-program>
- Dobo, N. (January 23, 2015). Preparing for the future: Summits to help schools make smart technology choices. *The Hechinger Report*. Retrieved from <http://hechingerreport.org/preparingfor-the-future-summits-to-help-schoolsmake-smart-technology-choices/>
- Dupagne, M. & Krendl, K. A. (1992) Teachers' attitudes toward computers: are view of the literature, *Journal of Research on Computing in Education*, 24, 420-429. ERIC Document Reproduction Service No. EJ447483.

- Duncan-Howell, J. A., & Lee, K. T. (2007). M-Learning–Innovations and Initiatives: Finding a place for mobile technologies within tertiary educational settings. Ascilite. Retrieved from <http://www.ascilite.org.au/conferences/singapore07/procs/>
- Edwards, M. (2014). Trends in digital learning: Students’ views on innovative classroom models. *Blackboard Report*. Retrieved from: [http://www.tomorrow.org/speakup/2014\\_OnlineLearningReport.html](http://www.tomorrow.org/speakup/2014_OnlineLearningReport.html)
- Emmer E., & Sabornie, J. (2014). Handbook of Classroom Management (2011). Routledge. Retrieved from <http://books.Google.com/books?isbn=1135106895>
- Engel, G., & Green, T. (2011) Cell phones in the classroom: Are we dialing up disaster? *Tech Trends*, 55(2), 34-45. doi:10.1007/s11528-011-0482-z
- Ertmer, P. (2008). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research and Development*. 53(4), 25-39. doi:10.1007/bf02504683
- Ertmer, P. (1999). Addressing first-and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, 47, 47-61. doi:10.1007/bf02299597
- Ertmer, P., Glazewski, K., Newby, T., & Ottenbreit-Leftwich, A., (2010). Teacher value beliefs associated with using technology: Addressing professional and student needs. *Computers & Education*, 55, 1321-1335. doi:10.1016/j.compedu.2010.06.002

- Evans-Andris, M. (1995). An examination of computing styles among teachers in elementary schools. *Educational Technology Research and Development, 43*(2), 15-31. doi:10.1007/BF02300470
- Evans, J. S. B. (2008). Dual-processing accounts of reasoning, judgment, and social cognition. *Annual Review of Psychology, 59*, 255-278. doi.10.1146/annurev.psych.59.103006.093629
- Evans, R., & Forbes, L. (2012). Mentoring the 'net generation': Faculty perspectives in health education. *College Student Journal, June 2012*, 397-404. Retrieved from <http://eds.b.ebscohost>
- Fallon, M. A. (2010). *Changing instructional strategies and methods to meet the needs of all learners*. Charlotte: IAP Information Age Publishing.
- Fosnot, C. T. (1996). Teachers construct constructivism: The center for constructivist teaching/teacher preparation project. *Constructivism: Theory, perspectives, and practice, 205-216*.
- Foster, P. N. (2005). Technology in the standards of other school subjects. *The Technology Teacher, 65*(3), 17-21.
- Fox, S., & Duggan, M. (2013). Pew internet and American life project. *Health online, 2013*. Retrieved from <http://pewinternet>  
<http://bibliobase.sermais.pt:8008/BiblioNET/Upload/PDF5/003820.pdf>
- Franklin, T., Sexton, C., Lu, Y., & Ma, H. (2007). PDAs in Teacher Education: A Case study examining mobile technology integration. *Journal Of*

- Technology And Teacher Education*, 15(1), 39-57. Retrieved from Proquest.
- Friedrich, H. F., & Hron, A. (2011). Factors affecting teachers' student-centered classroom computer use. [Article]. *Educational Media International*, 48(4), 273-285. doi:10.1080/09523987.2011.632276
- Fullan, M. (2001). *Leading in a culture of change*. San Francisco, CA: Jossey-Bass.
- Garba, A. B., Armarego, J., Murray, D., & Kenworthy, W. (2015). Review of the information security and privacy challenges in Bring Your Own Device (BYOD) Environments. *Journal of Information Privacy and Security*, 11(1), 38 54. doi:10.1080/15536548.2015.1010985
- Gardner, H. (2000). *The disciplined mind: Beyond facts and standardized test, the K-12 education that every child deserves*. New York: Penguin Books.
- Gardner, H. (2006). *Multiple intelligence: New horizons*. New York: Basic Books. doi:10.1016/j.intell.2006.04.002
- Gilakjani, A. P., Lai-Mei, L., & Ismail, H. N. (2013). Teachers' use of technology and constructivism. *International Journal of Modern Education and Computer Science*, 5(4), 49. doi:10.5815/ijmeecs.2013.04.07
- Giorgi, A. (2009). *The descriptive phenomenological method in psychology*. Pittsburgh, PA: Duquesne University Press.

- Goad, K. D. (2012). The perception of teachers toward the use of mobile technology as a tool to engage students in learning. (Doctoral Dissertation). Indiana State University, Indiana. Retrieved from: <http://hdl.handle.net/10484/4004>
- Gordon, M. (2009). Toward a pragmatic discourse of constructivism: Reflections on lessons from practice. *Educational Studies*, 45(1), 39-58.  
doi:10.1080/00131940802546894
- Grainger, R. (2006). Organizational factors affecting teachers' use and perception of information & technology. *SEASRCC '05 Proceedings of the 2005 South East Asia Computer Science Confederation (SEARCC) Conference*, 46(6), 19-102.
- Grant, M., Tamim, S., Brown, D., Sweeney, F., & Jones, L. (2015). Teaching and learning with mobile computing devices: Case study in k-12 classrooms. *Techtrends: Linking Research & Practice to Improve Learning*, 59(4), 32-45.  
doi:10.1007/s11528-015-0869-3.
- Gu, X., Zhu, Y., & Guo, X. (2012). Meeting the "Digital Natives": Understanding the acceptance of technology in classrooms. *Educational Technology & Society*, 16(1), 392-402. Retrieved from <http://jstor>
- Haber-Curran, P., & Tillapaugh, D. W. (2015). Student-centered transformative learning in leadership education: An examination of the teaching and learning process. *Journal of Transformative Education*, 13(1), 65-84.  
doi:10.1177/1541344614559947

- Hadley, M., & Sheingold, K. (1993). Commonalities and distinctive patterns in teachers' integration of computers. *American Journal of Education*, 261-315.  
doi:10.1086/444044
- Hall, G.E. (2013). Evaluating change processes. *Journal of Educational Administration*, 51(3), 264-289. doi:10.1108/09578231311311474
- Harmon-Jones, E., Amodio, D. M., & Harmon-Jones, C. (2009). Action-based model of dissonance: A review, integration, and expansion of conceptions of cognitive conflict. *Advances in experimental social psychology*, 41, 119-166.  
doi:10.1016/S0065-2601(08)00403-6
- Hargreaves, A. (2003). *Teaching in the knowledge society: Education in the age of insecurity*. New York, NY: Teachers College Press.
- Harris, J., Mishra, P., & Koehler, M. (2009). Teachers' technological pedagogical content knowledge and learning activity types: Curriculum-based technology integration reframed. *Journal of Research on Technology in Education*, 41(4), 393-416.  
do:10.1080/15391523.2009.10782536
- Harris, J. B., & Hofer, M. J. (2011). Technological pedagogical content knowledge (TPACK) in Action: A descriptive study of secondary teachers' curriculum based, technology- related instructional planning. *Journal of Research on Technology in Education*, 43(3), 211-229. doi:10.1080/15391523.2011.10782570
- Hatch, A. (2002). *Doing qualitative research in education settings*. Albany, NY: SUNY Press.

- Hew, K. (2008). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development*, 55(3), 223-252. doi:10.1007/s11423-006-9022-5
- Higgins, B., Miller, M., & Wegmann, S. (2006). Teaching to the test...not! Balancing best practice and testing requirements in writing. *Reading Teacher*, 60(4), 310-319. doi:10.1598/rt.60.4.1
- Hipsher, C. A. (2014). *Educators perceptions regarding common core state standards and professional development*. (Doctoral dissertation) Liberty University, Lynchburg, Virginia. Retrieved from ProQuest (UMI3615145).
- Honebein, P. C. (1996). Seven goals for the design of constructivist learning environments. In B. G. Wilson (Ed.), *Constructivist learning environments: Case studies in instructional design* (pp. 11-24). Englewood Cliffs, NJ: Educational Technology Publications
- Hu, P. T. H., Clark, T. H. K., & Ma, W. W. (2003). Examining technology acceptance by school teachers: A longitudinal study. *Information and Management*, 41(2), 227-241. doi.org/10.1016/s0378-7206(03)00050-8
- Husserl, E. (2002). *Ideas: General introduction to pure phenomenology*. New York: Routledge. (Original work published 1931).
- Husserl, E. (1964). The idea of phenomenology. (Alston, W.P., & Nakhnikian, G., Trans.). The Hague: Martinus Nijhoff. doi:10.1017/s0031819100052694

- Intel Corporation (2012). *BYOD planning and implementation framework*. Retrieved from <http://www.k12blueprint.com>.
- International Society for Technology in Education (ISTE). (2000). *National educational technology standards for students: Connecting curriculum and technology*. Eugene, OR: International Society for Technology in Education (ISTE). doi.org/10.1080/1047621950070123
- Ivers, K. S. (2002). Changing Teachers' Perceptions and Use of Technology in the Classroom. (ERIC Document Reproduction Service No ED467095). ERIC Document Reproduction Service No. ED467095
- Jarmuz-Smith, S. (2014). BYOD: Friend or Foe. *Communique (0164775X)*, 43(1), 35. ERIC Document Reproduction Service No. 12009103697
- Johnson, L., Smith, R., Willis, H., Levine, A., & Haywood, K., (2011). *The 2011 Horizon Report*. Austin, Texas: The New Media Consortium.
- Johnson, D. (2012). Power up! On board with BYOD. *Educational Leadership*, 70(2), 84-85. ERIC Document Reproduction Service No. 00131784
- Jonassen, D. H. (2000). *Computers as mindtools for schools: Engaging critical thinking*. Prentice Hall.
- Jones, I. (2014). *BYOT and Me: Teacher Perceptions of a Bring Your Own Technology Initiative* (Doctoral dissertation). Lesley University, Cambridge, MA. Retrieved from ProQuest (UMI3628527).
- Joseph, P. B. (2011). *Cultures of curriculum*. New York, NY: Routledge.

- Judson, E. (2006). How teachers integrate technology and their beliefs about learning: Is there a connection? *Journal of Technology and Teacher Education*, 14(3), 581.  
ERIC Document Reproduction Service NO. 1059-7069
- Katz, J. E. (2006). Mobile phones in educational settings in J. E. Katz (Ed.), *Magic in the air: Mobile communication and the transformation of social life*, 91-103. New Brunswick, NJ: Transaction.
- King-Shaver, B. (2008). Differentiated instruction: The new and not so new. *California English* 13(4), 6-8. ERIC Document Reproduction Service No. 02791161
- Kirova, A. & Bhargava, A. (2002). Learning to guide preschool children's mathematical understanding: a teacher's professional growth. *Early Childhood Research & Practice*, 4(1). Retrieved from <http://www.ecrp.uiuc.edu/v4n1/kirova.html>
- Koc, M., & Bakir, N. (2010) A needs assessment survey to investigate pre-service teachers' knowledge, experiences and perceptions about preparation to using educational technologies. *Turkish Online Journal of Educational Technology*, 9(1), 13-22. ERIC Document Reproduction Service No. 21467242
- Kolb, L. (2011). Adventures with cell phones. *Educational Leadership*, 68(5), 39-43.  
Retrieved from <http://warrencountyschools>
- Kolb, L. & Tonner, S. (2012). Mobile phones and mobile learning. In S. McLeod & C. Lehmann (Eds), *What school leaders need to know about digital technologies and social media* (pp. 159-172). San Francisco, CA: Jossey-Bass

- Kopcha, T.J. (2010). A systems-based approach to technology integration using mentoring and communities of practice. *Educational Technology Research & Development*, 58(2), 175-190. doi:10.1007/s11423-008-9095-4
- LaFountain, M. (2013). Managing Your District's BYOD Program. *School Business Affairs*, 79(11), 38-39. ERIC Document Reproduction Service No. 93359320
- Lambert, L., Walker, D., Zimmerman, D. P., Cooper, L. E., Lambert, M. D. Gardner, M. E., & Szabo, M. (2002). *The Constructivist Leader* (2nd ed.). New York: Teacher College Press.
- Larkham, P. J., & Manns, S. (2002) Plagiarism and its treatment in higher education. *Journal of Further and Higher Education*, 26, 339-349.  
doi:10.1080/0309877022000021748
- Lecklider, D., Britten, J. S., & Clausen, J. M. (2009). Principals' priority for technology as an indicator of observed use in schools. *AASA Journal of Scholarship and Practice* 5(4), 27-32. Retrieved from <http://www.aasa.org/uploadedFiles/Publications/Journals/AASA>
- Leonidis, A., Korozi, M., Margetis, G., Ntoa, S., Papagiannakis, H., Antona, M., & Stephanidis, C. (2012). A Glimpse into the Ambient Classroom. *Bulletin of the IEEE Technical Committee on Learning Technology*, 14(4), 3. Retrieved from <http://ITTF.ieee>
- Lester, S. (1999). *An introduction to phenomenological research*. Taunton UK: Stan Lester Developments.

- Liaw, S-S., Hatala, M., & Huang, H-M. (2010). Investigating acceptance toward mobile learning to assist individual knowledge management: Based on activity theory approach. *Computers & Education*, 54, 446-454.  
doi:10.1016/j.compedu.2009.08.029
- Lincoln, Y.S., & Guba, E.G. (1985). *Naturalistic Inquiry*. Newbury Park, CA: Sage Publications, Inc.
- Levinson, D.J. (1978). *The seasons of a man's life* (1<sup>st</sup> ed.). New York, NY: Knopf.
- Levinson, D.J. (1996). *The seasons of a woman's life* (1<sup>st</sup> ed.). New York, NY: Knopf.
- Lodico, M., Spaulding, D., & Voegtler, K. (2010). *Methods in educational research*. Hoboken, NJ. Wiley & Sons.
- Loucks-Horsley, S., & Matsumoto, C. (1999). Research on professional development for teachers of mathematics and science: The state of the scene. *School science and mathematics*, 99(5), 258-271. doi:10.1111/j.1949-8594.1999.tb17484.x
- Loyens, S., Rikers, R., & Schmidt, H. (2007). The impact of students' conceptions of constructivist assumptions on academic achievement and drop-out. *Studies in Higher Education*, 32(5), 581-602. doi:10.1080/0375070701573765
- Lovedahl, G.G. (2001). Technology education's role in the new national science standards. *The Journal of Technology Studies*, 27(1), 28-32.  
doi:10.21061/jots.v27i1.a.6
- Loveless, A. (2008). 'Retooling or renaissance?' Teacher education, professional knowledge and a changing landscape. *Contemporary Clinical Trials* (48), 139-145.  
doi:10.1016/j.cct.2016.04.010

- Lynn, S. K., & Woods, A.M. (2010). Following the yellow brick road: A teacher's journey along the proverbial career path. *Journal of Teaching in Physical Education, 29*(1), 54-71. doi:10.1123/jtpe.29.1.54
- Marion, T. (2001). Translating learning styles theory into university teaching practices. *Journal of College Reading and Learning, 9*(3) 25-27.  
doi:10.1080/10790195.2001.10850128
- Marlowe, B., & Page, M. (2005). *Creating and sustaining the constructivist classroom*. Thousand Oaks, CA: Corwin Press.
- Marshall, C., & Rossman, G. B. (2006). *Designing qualitative research*. Sage: California.
- Marzano, R.J., Marzano, J.S., & Pickering, D. J. (2003). *Classroom management that works*. Alexandria, VA: ASCD
- MAXQDA. *The professional tool for qualitative data analysis*. Available at [www.MAXQDA.com](http://www.MAXQDA.com).
- McInerney, D. M. (2005). Educational psychology – Theory, research, and teaching: A 25-year retrospective. *Educational Psychology, 25*(6), 585-599.  
doi:10.1080/01443410500344670
- Menkhoff, T. & Bengtsson, M. (2012). Engaging Students in Higher Education Through Mobile Learning: Lessons Learnt in a Chinese Entrepreneurship Course. *Educational Research for Policy and Practice, 11*, 225-242. doi:10.1007/s10671-011-9123-8
- Merriam, S.B. (1998). *Qualitative research and case study applications in education*. San Francisco, CA: Jossey-Bass Publishers.

- Merriam, S. B. (2002). *Qualitative research in practice: Examples for discussion and analysis*. Francisco, CA: Jossey-Bass.
- Merriam, S. B. (2011). *Qualitative research: A guide to design and implementation*. San Francisco, CA: Jossey-Bass.
- Meskill, C., & Mossop, J. (2009). Expert and novice teachers talking technology: Precepts, concepts, and misconcepts. *Language Learning and Technology*, 6(3), 46-57. ERIC Document Reproduction Service No. 91579592
- Meyer, E. J., Abrami, P. C., Wade, A., & Scherzer, R. (2011). Electronic portfolios in the classroom: Factors impacting teachers' integration of new technologies and new pedagogies. *Technology, Pedagogy and Education*, 20(2), 191-207.  
doi:10.1080/1475939x.2011.588415
- Mills, L. A., Wakefield, J. S., & Knezek, G. A. (2015). Student-driven classroom technologies: Transmedia navigation and transformative communications. In *E-Learning Systems, Environments and Approaches*, 133-144. Springer International Publishing. doi:10.1007/978-3-319-05825-2\_10
- Mishra, P., & Kereluik, K. (2011, March). What 21<sup>st</sup> century learning? A review and a synthesis. In *SITE Conference* (pp. 5-236).
- Moeller, B., & Reitzes, T. (2011). Integrating technology with student-centered learning. A report to the Nellie Mae Education Foundation. *Education Development Center, Inc.*
- Moustakas, C. (1994). *Phenomenological Research Methods*. Thousand Oaks, CA: Sage. doi:10.4135/9781412995658

- Moye, J. J. (2009). Technology education teacher supply and demand--a critical situation: If the technology education profession is to survive, the time for action to ensure that survival is now. *The Technology Teacher*, 69(2), 30-37. ERIC Document Reproduction Service No. 209800612
- Mulnix, J. W. (2012). Thinking critically about critical thinking. *Educational Philosophy and Theory*, 44(5), 464-479. doi:10.1111/j.1469-5812.2010.00673.x
- Munby, H. (1982). The place of teachers' beliefs in research on teacher thinking and decision making, and an alternative methodology. *Instructional Science*, 11(3), 201-225. doi:10.1007/BF00414280
- Murphy, M. (2014, August 5). Why some schools are selling all their iPads. *The Atlantic*. Retrieved from <http://www.theatlantic.com/education/archive/2014/08/whats-thebest-device-for-interactive-learning/375567/>
- Navariz, D. N. (2015). *Examining teachers' acceptance and use of mobile applications and iPads in instruction through the technology acceptance model: A mixed methods study*. (Doctoral dissertation.) The University of Texas at El Paso, El Paso, Texas. Retrieved from ProQuest. (No. 3712747).
- National Council for the Social Studies. (1994). *Expectations of excellence: Curriculum standards for social studies*. Retrieved from <http://www.socialstudies.org/standards>

- National Council of Teachers of English. (2000). *Standards for the English language arts*. National Council of Teachers of English. Retrieved from <http://www.ncte.org>
- National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. National Council of Teachers of Mathematics.
- National Center for Education Statistics (NCES) (2000). *Teachers' tools for the 21st century: A report on teachers' use of technology* (NCES 2000-102). Jessup, MD: U.S. Department of Education, Office of Educational Improvement and Research.
- National Center for Education Statistics (2012). *Technology in schools*. Retrieved from [http://www.nces.ed.gov/pubs2003/tech\\_schools/chapter7.asp](http://www.nces.ed.gov/pubs2003/tech_schools/chapter7.asp) – 4
- National Education Technology Plan (NETP). (2010). *Transforming American education: Learning powered by technology*. Retrieved from <http://www.ed.gov/sites/default/files/netp2010.pdf>
- Neuman, W. L., & Kreuger, L. (2003). *Social work research methods: Qualitative and quantitative approaches*. Boston, Allyn and Bacon, Pearson Education.
- Neuman, W. L. (2006). *Social Research Methods: Qualitative and Quantitative Approaches*, Boston, MA; Pearson Education.
- Neuman, W. L. (2009). *Understanding research*. Boston: Allyn and Bacon.
- Nielsen, L. (2011). 7 myths about BYOD debunked. *T.H.E. Journal*. Retrieved from <http://thejournal.com/Articles/2011/11/09/7-BYOD-Myths.aspx?p=1>

- Norris, C., & Soloway, E. (2011). From banning to BYOD. *District Administration*, 94. Retrieved from <http://www.districtadministration.com/article/banning-byod>
- Noonoo, S. (2016). The Digital Learning Plan Every Educator Should Read. *Education Digest*, 81(5), 33-36. Retrieved from ProQuest database.
- O'Bannon, B. W., & Thomas, K. M. (2015). Mobile phones in the classroom: Preservice teachers answer the call. *Computers & Education*, 85, 110-122. doi:10.1016/j.compedu.2015.02.010
- O'Dwyer, L. M., Russell, M., & Bebell, D. (2005). Identifying teacher, school, and district characteristics associated with middle and high school teachers' use of technology: A multilevel perspective. *Journal of Educational Computing Research*, 33(4), 369-393. doi:10.2190/4BVW-5NDJ-L2G3-EAND
- Ocak, M. (2005). Mathematics teachers' attitudes toward the computer. *Turkish Online Journal of Educational Technology*, 4(3), 82-88.
- Otstot, M. L. (2015). *iEngage, iEducate, and iEmpower: A Collaborative Apprenticeship Project in a "Bring Your Own Technology" School.* (Doctoral dissertation) Arizona State University. Available from ProQuest Dissertations and Theses database. (UMI No.1677008921)
- Owens, A. M. (2009). Do Your Teachers Need a Personal Trainer? Preservice Teachers Learn the Ropes while Helping Classroom Teachers Integrate Technology into Their Lessons. *Learning & Leading with Technology*, 36(8), 14-17. Retrieved from <http://www.learningandleading-digital.com/learningandleading>

- Oxford, R., & Yilmazel-Sahin, Y. (2004). Enriching teacher education via technology, styles, and strategies, In Ferdig, R. (Ed.). *Proceedings of Society for Information Technology & Teacher Education International Conference 2004* (pp. 3556-3561), Chesapeake, VA: AACE.
- Ozdamli, F., & Uzunboylu, H. (2015). M-learning adequacy and perceptions of students and teachers in secondary schools. *British Journal of Educational Technology*, 46(1), 159-172. doi:10.1111/bjet.12136
- Park, S. H., & Ertmer, P. A. (2007). Impact of problem-based learning (PBL) on teachers' beliefs regarding technology use. *Journal of Research on Technology in Education*, 40(2), 247-267. ERIC Document Reproduction Service No.174671296
- Parsons, D. (2014). The future of mobile learning and implications for education and training. In M. Ally & A. Tsinakos, (Eds.). *Increasing access through mobile learning* (pp. 217-230). Vancouver, British Columbia: Commonwealth of Learning. Retrieved from [http://dspace.col.org/bitstream/handle/11599/558/pub\\_Mobile%20Learning\\_web.pdf?sequence=4&isAllowed=y](http://dspace.col.org/bitstream/handle/11599/558/pub_Mobile%20Learning_web.pdf?sequence=4&isAllowed=y)
- Parsons, D., & Adhikari, J. (2016). Bring Your Own Device to secondary school: The perceptions of teachers, students and parents. *Electronic Journal of E-Learning*, 14(1), 66-79. Retrieved from <http://www.ejel.org/>
- Pascopella, A. (2009). Why teachers must go mobile. *District Administration*, 45(10-11).
- Patton, M.Q. (2002). *Qualitative research and evaluation methods*. Thousand Oaks, CA: Sage Publications.

- Pegrum, M., Oakley G. & Faulkner, R. (2013). Schools going mobile: A study of the adoption of mobile handheld technologies in Western Australian independent schools. *Australasian Journal of Educational Technology* 29(1).  
doi:10.14742/ajet.64
- Penuel, W. R. (2006). Implementation and effects of one-to-one computing initiatives: A research synthesis. *Journal of Research on Technology in Education*, 38(3), 329-348. doi:10.1080/15391523.2006.10782463
- Perry, D. R., & Steck, A. K. (2015). Increasing student engagement, self-efficacy, and meta-cognitive self-regulation in the high school geometry classroom. Do iPads help? *Computers In The Schools*, 32(2), 122-143.  
doi:10.1080/07380569.2015.1036650
- Piaget, J. (1969). *The mechanisms of perception*. London: Rutledge & Kegan Paul.
- Piaget, J. & Inhelder, B. (1969). *Psychology of the child*. Boston, MA: McGraw-Hill.
- Powell, R. G., & Powell, D. (2007). *Classroom e-communication and diversity: Enhancing instructional practice*. London: Routledge.
- Project Tomorrow. (2012). *Personalizing the classroom experience: Teachers, librarians, and administrators connect the dots with digital learning*. Retrieved from [http://www.tomorrow.org/speakup/pdfs/SU11\\_PersonalizedLearning\\_Educators.pdf](http://www.tomorrow.org/speakup/pdfs/SU11_PersonalizedLearning_Educators.pdf)
- Purcell, K., Rainie, L., Heaps, A., Buchanan, J., Friedrich, L., Jacklin, A., Chen, C., & Zickuhr K. (2012). *How teens do research in the digital world*. Pew research Center's Internet & American Life Project. Retrieved from:

<http://www.pewinternet.org/2012/11/01/how-teens-do-research-in-the-digital-world/>

- Reychav, I., & Wu, D. (2015). Mobile collaborative learning: the role of individual learning in groups through text and video content delivery in tablets. *Computers in Human Behavior*, 50, 520-534. doi.10.1016/j.chb.2015.04.019
- Richards, L. (2005). *Handling qualitative data*. London: Sage.
- Robinson, L., Brown, A., & Green, T. D. (2010). *Security vs. access: Balancing safety and productivity in the digital school*. International Society for Technology in Education. ERIC Document Reproduction Service No. EDSgcl.272444242
- Rock, M. L., Gregg, M., Ellis, E., & Gable, R. A. (2008). Reach: A framework for differentiating classroom instruction. *Preventing School Failure* 52(2), 31-47. doi:10.3200/PSFL.52.2.31-47
- Roschelle, J. M., Pea, R. D., Hoadley, C. M., Gordin, D. N., & Means, B. M. (2000). Changing How and What Children Learn in School with Computer-Based Technologies. *The Future of Children*, (2). doi:10.2307/1602690
- Rosen, L. D. & Weil, M. M. (1995). Computer availability, computer experience, and technophobia among public school teachers, *Computers in Human Behavior*, (11), 9-31. doi.10.1016/0747-5632(94)00018-D
- Ross, K. (2013). *Teacher implementation of "bring your own device" at a suburban high school serving high SES students* (Doctoral dissertation). Available from ProQuest. Dissertations and Theses database. (UMI No. 3559642)

- Rossing, J. P. (2012). Mobile Technology and Liberal Education. *Liberal Education*, 98(1), 68-72. ERIC Document Reproduction Service No. 280857204
- Rotherham, A. J., & Willingham, D. (2009). To work, the 21st century skills movement will require keen attention to curriculum, teacher quality, and assessment. *Educational Leadership*, 9(1), 15-20. Retrieved from <http://aft.org>.
- Seidman, I. S. (1998). *Interviewing as qualitative research: A guide for researchers in education and the social sciences* (2<sup>nd</sup> ed.). New York: Teachers College Press.
- Selwyn, N. (2005). The social processes of learning to use computers. *Social Science Computer Review*, 23(1), 122-135. doi:10.1177/0894439304271553
- Shadiev, R., Hwang, W. Y., Huang, Y. M., & Liu, T. Y. (2015). The impact of supported and annotated mobile learning on achievement and cognitive load. *Journal of Educational Technology & Society*, 18(4), 53-69.
- Shank, G. D. (2006). *Qualitative Research: A Personal Skills Approach* (2nd ed.). New Jersey: Prentice Hall.
- Sharples, M., Sanchez, A.M, Milrad, M., & Vavoula, G. (2008). Mobile learning: Small devices, big issues, In N. Balacheff, S. Ludvigsen, T. de Jong, A. Lazonder & S. Barnes (Eds.), *Technology Enchanced Learning: Principles and Products* (pp. 233-249). Heidelberg-Germany: Springer.
- Shengold, K., & Hadley, M., Center for Technology in Education N. N. (1990). Accomplished teaches integrating computers into classroom practice. ERIC Document Reproduction Service No. ED322900.
- Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, 22(2), 63-75.

- Shohel, M. C., & Power, T. (2010). Introducing mobile technology for enhancing teaching and learning in Bangladesh: Teacher perspectives. *Open Learning, 25*(3), 201-215. doi:10.1080/02680513.2010.511953
- Shohel, M. M. C., & Power, T. (2010). Introducing mobile technology for enhancing teaching and learning in Bangladesh: teacher perspectives. *Open learning, 25*(3), 201-215. doi:10.1080/02680513.2010.511953.
- Singh, U. (2013). Factors relating to technology integration in education by the pre-service and the in-service teachers. *Journal of Humanities and Social Science, 11*(3), 3-12. Retrieved from: <http://iosrjournals.org/iosr-jhss/papers/Vol11-issue3/B01130312.pdf>
- Song, Y (2016). “We found the black spots on campus on our own” development of inquiry skills in primary science learning with BYOD (Bring Your Own Device). *Interactive Learning Environments, 24*(2), 291-305  
doi:10.1080/10494820.2015.1113707
- Song, Y., Sun, D., & Jong, M. S. Y. (2016). Enhancing students’ science learning in a seamless inquiry-based learning environment leveraged by BYOD (Bring your own device). *Learning Environments for Deep Learning in Inquiry and Problem-Solving Contexts, 37*. Retrieved from  
[http://scholar.google.com/scholar?q=Enhancing+students%E2%80%99+science+learning+in+a+seamless+inquiry-based+learning+environment+leveraged+by+BYOD+%28Bring+your+own+device%29.&btnG=&hl=en&as\\_sdt=0%2C7](http://scholar.google.com/scholar?q=Enhancing+students%E2%80%99+science+learning+in+a+seamless+inquiry-based+learning+environment+leveraged+by+BYOD+%28Bring+your+own+device%29.&btnG=&hl=en&as_sdt=0%2C7)

Stansbury, M. (2012, May). *Six technologies that soon could be in your classrooms.*

Retrieved from <http://www.eschoolnews.com/2012/05/23/six-technologies-thatsoon-could-be-inyour-classrooms/>

Tallon, K. (2010). Addressing sexting in schools. *Children's Legal Rights Journal*, 30(4),

1. Retrieved from

<http://heinonline.org/HOL/LandingPage?handle=hein.journals/clrj30&div=43&id=&page=>

Tindell, D. R., & Bohlander, R. W. (2012). The use and abuse of cell phones and text messaging in the classroom: A survey of college students. *College Teaching*, 60(1), 1-9 doi:10.1080/87567555.2011.604802

Thomas, K. & O'Bannon, B. (2014). BYOD—As Long as your device is not a cell phone! Perspectives from the classroom on cell phones integration. In M. Searson & M. Ochoa (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2014*, 1354-1364. Chesapeake, VA: AACE.

Thomas, K. M., & McGee, C. D. (2012). The only thing we have to fear is... 120 characters. *TechTrends: For Leaders in Education & Training*, 56(1), 19. doi:10.1007/s11528-011-0550-4

Tobin, R., & McInnes, A. (2008). Accommodating differences: Variations in differentiated literacy instruction in grade 2/3 classrooms. *Literacy*, 42(1), 3-9. doi:10.1111/j.1467-9345.2008.00470.x

- Tomlinson, C.A. (2001). *How to differentiate instruction in mixed- ability classrooms* (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.
- Tomlinson, C.A. & Allan, S. (2000). Leadership for differentiating schools & classrooms. *Alexandria, VA: Association for Supervision and Curriculum Development.*
- Tran, K., Morra, D., Lo, V., Quan, S. D., Abrams, H., & Wu, R. C. (2014). Medical students and personal smartphones in the clinical environment: The impact on confidentiality of personal health information and professionalism. *Journal of Medical Internet Research, 16*(5), e132. doi:10.2196/jmir.3138
- Traxler, J. (2007). Defining, discussing and evaluating mobile learning: The moving finger writes and having written *The International Review in Open and Distant Learning, 8*(2), 1-13. doi:10.19173/irrodl.v8i2.346
- Trebbi, T. (2011). The potential of ICT for a new educational paradigm: Toward generalizing access to knowledge. *American Journal of Distance Education 25*(3), 152-161. doi:10.1080/08923647.2011.589759
- U.S. Department of Education, National Educational Technology Plan. (2013). *Executive Summary*. Retrieved from: <http://www.ed.gov/technology/netp-2010/executive-summary>.
- Valdez, G.,M., McNabb, M., Foertsch, M., Anderson, M., Hawkes, M., & Raack, L. (2000). Computer-based technology and learning: Evolving uses and expectations. ERIC Document Reproduction Service No. ED456816.
- Vanwelsenaers, M. (2012). Students using their own technology device in the classroom:

- Can “BYOD” increase motivation and learning. (Masters Thesis) Northern Michigan University, Marquette.
- Van Manen, M. (1990). *Researching lived experience: Human science for an action sensitive pedagogy*. New York: State University of New York Press.
- VanRullen, R., and Koch, C. (2003). Is perception discrete or continuous? *Trends in Cognitive Sciences* 7(5), 207-213. doi:10.1016/S1364-6613(03)00095-0
- Veen, W. (1993) How teachers use computers in instructional practice: four case studies in a Dutch secondary school, *Computers and Education*, 21(1/2), 1-8. doi:10.1016/0360-1315(93)90041-G
- von Glasersfeld, E. (1984). An introduction to radical constructivism. In P. Watzlawick (Ed.), *The Invented Reality*. New York; W.W. Norton.
- Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- Vygotsky, L. (1986). *Thought and language*. Cambridge: MIT Press.
- Vygotsky, L. S. (2012). Thought and Language. In E. Hanfmann, G. Vakar, & A.Kozulin (Eds.), *Thought and Language*. (Revised and Expanded Ed). Cambridge, MA: Massachusetts Institute of Technology.
- Wachira, P. & Keengwe, J. (2011). Technology integration barriers: Urban school mathematics teachers’ perspectives. *Journal of Science Education & Technology*,20(1), 17-25. doi:10.1007/s10956-010-9230-y
- Walker, R., Cooke, M., & McAllister, M. (2008). A Neophyte’s journey through qualitative analysis using Morse’s cognitive processes of analysis. *International*

- Journal of Qualitative Methods*, 7(1), 81-93. Retrieved July 8, 2008, from ProQuest database.
- Waterhouse, S. (2005). *The Power of e-learning*. Boston: Pearson
- Weiner, B. (2010). The development of an attribution-based theory of motivation: A history of ideas. *Educational Psychologist*, 45(1), 28-36.  
doi:10.1080/00461520903433596
- Wicklein, R. C., (2005). Appropriate technology: Value adding application for technology education. *The Technology Teacher*, 65(1), 10-12. Retrieved from <http://iteea.org/Publications/ttt.htm>.
- Widger, S., & Schofield, A. (2012). Interaction or interruption? Five child-centered philosophical perspectives. *Australasian Journal of Early Childhood*, 37(4), 29-32. ERIC Document Reproduction Service No. 318105826
- Willig, C. (2008). *Introducing qualitative research in psychology* (2nd ed.). New York: Open University Press.
- Wright, V. H., & Wilson, E. K. (2007). A partnership of educators to promote technology integration: Designing a master technology teacher program. *Education*, 128(1), 80-87. Retrieved from <http://www.projectinnovation.biz/education.html>
- Wu, T., & Chao, H. (2008). Mobile e-learning for next generation communication environment. *International Journal of Distance Education Technologies (IJDET)*, 6(4), 1-13. doi:10.4018/jdet.2008100101

- Yilmaz, K. (2008). Constructivism: Its theoretical underpinnings, variations, and implications for classroom instruction. *Educational Horizons*, 86(3), 161-172. Retrieved from <http://www.jstor.org/stable/42923724>.
- Yin, R. K. (2011). *Qualitative research from start to finish*. New York, NY: Guilford Press.
- Zhao, Y., & Frank, K.A. (2003). Factors affecting technology uses in schools: An ecological perspective. *American Educational Research Journal*, 40, 4, 807-840. doi:10.3102/00028312040004807
- Zhao, Y. (2012). *World class learners: Educating creative and entrepreneurial students*. Corwin Press.
- Zmuda, A. (2009). Take the plunge into a 21st-century conception of learning. *School Library Monthly*, 26(3), 16-18. ERIC Document Reproduction Service No. 44809338

## Appendix A: Participant Interview

*Interview Script:*

- Welcome and introductions
- Verbally restate the information in the informed consent form
- Explain taping procedure and reviewing of data (by myself)
- Introduce the purpose of the study
- Opening prompt: “Please tell me your experiences as a classroom teacher; the number of years teaching; the grade(s) taught; the subjects taught.”
- Follow interview topics below, using probing questions as needed.

<b>Research Question</b>	<b>Interview Topic</b>	<b>Probing Questions</b>
<b>RQ1:</b> What are the perceptions of teachers in using mobile devices to provide knowledge to their students?	Perceptions using mobile technology in instruction.	How do you view mobile technology impacting your ability to teach students?  How do you view student use of mobile technology changing student engagement, if at all?
<b>RQ 2:</b> How do teachers describe their experiences when using mobile devices to provide knowledge?	Experiences using mobile technology devices in instruction.	How have you integrated mobile technology into your teaching?  What devices do your students bring to use in the classroom for educational purposes? What are some of the applications that you have students use with their mobile devices?  How has mobile technology changed how

		<p>student gain knowledge, if at all?</p> <p>How has the implementation of a BYOD program impacted how you plan your lessons?</p>
<p><b>RQ 3:</b> What are positive and negative factors that teachers indicate in their exercise of using mobile devices in the classrooms?</p>	<p>Perceptions and experiences using mobile technology in instruction.</p>	<p>What positive impacts you have seen in your classroom since implementing BYOD? (Positive probe) What makes one a lesson using mobile technology more successful than another? What are the biggest challenges in a BYOD program and how have you dealt with these challenges? (Challenge probe) How do you deal with the challenge of students each having different devices?</p> <p>How do the benefits of the BYOD program outweigh the challenges, if at all?</p>
<p>In addition to the interviews, the participants will be asked to if they could demonstrate what they have described as “usage of mobile technology in the classroom” a mock lesson, with no students present. This would then become an observation and not an interview. The</p>	<p>Observe the demonstration. The data from this demonstration will be audio-recorded and also be recorded using hand-written notes taken by the researcher during the observation.</p>	<p>What apps and programs do you use with mobile technology in your lessons?</p>

demonstration would be given to the researcher by the teacher/participant (NO STUDENTS).		
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## Appendix B: Letters to Interviewees

November 10, 2015

Dear Teacher:

I am a graduate student under the direction of Dr. Darci Harland and Dr. Asoka Jayasena both professors at Walden University. I am conducting a research study to analyze the perceptions and experiences of teachers' implementation of a mobile-learning program such as Bring Your Own Technology or Device (BYOT, BYOD) that utilizes mobile devices in their instructional design.

I am inviting your participation in my research study. In order to participate in this study, you need to be currently implementing mobile learning in your classes and have been implementing mobile technologies for a minimum of two years. Participation in this study will include up to two interviews and at least one observation. In the first interview, I have predetermined questions that should take about 60 minutes of your time. The observation is an extension of the first interview, and is a mock lesson for you to demonstrate how you implement mobile device(s) in your instruction. No students would be present. The demonstration that will take place at the same time as the first interview will take as long as required for you to demonstrate to me your usage of mobile technology in your teachings and will also be audio recorded. The first interview will take place in the beginning of January and, a second interview for clarifying ideas you shared in the first interview, would be scheduled at the end of January. Both interviews will be audio-recorded. You have the right not to answer any question, and to stop the interview or demonstration at any time.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty, your participation will not have any bearing on your evaluation, and your evaluator will not see the results of interviews or observation.

There is a lack of empirical research in the area of mobile-learning using student-owned devices. Your participation in this study will benefit not only your school and school district, but also the field of education by providing school and district leaders with new knowledge about the implementation of m-learning BYOD/BYOT programs. There are no foreseeable risks or discomforts to your participation.

Your responses will be confidential; you will never be identified by name to anyone. The results of this study may be used in reports, presentations, or publications but your name, and other elements that might identify you will not ever be used. Interview and observation data will be coded to protect your identity.

As a participant of this study, you should keep a copy of this consent letter for your records. If you have any questions concerning the research study, please contact me by email at [joy.winterhalder@waldenu.edu](mailto:joy.winterhalder@waldenu.edu). You may also reach me [REDACTED]. In addition, you may reach me at [REDACTED] (cell phone #). You may also contact Research Participant Advocate at [IRB@waldenu.edu](mailto:IRB@waldenu.edu) or phone Walden University directly at [REDACTED].

Thank you for your consideration,

Joy Winterhalder, MPH