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Analysis of Attitudes, Gender, and Beliefs of Adolescent Students Concerning Interactive Technology

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Approval Page

This applied dissertation was submitted by Courtney L. Teague under the direction of the persons listed below. It was submitted to the Abraham S. Fischler College of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova Southeastern University

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Statement of Original Work

I declare the following:

I have read the Code of Student Conduct and Academic Responsibility as described in the *Student Handbook* of Nova Southeastern University. This applied dissertation represents my original work, except where I have acknowledged the ideas, words, or material of other authors.

Where another author's ideas have been presented in this applied dissertation, I have acknowledged the author's ideas by citing them in the required style.

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Date

Acknowledgments

I would have never been able to finish my dissertation without the guidance of Christ, my family, my committee members, my friends, my coworkers and students.

Without Christ nothing would be possible. There were many nights I wanted to give up but I remembered two key scriptures.

Deuteronomy 31:6 " Be strong and of a good courage, fear not, nor be afraid of them: for the LORD thy God, he *it is* that doth go with thee; he will not fail thee, nor forsake thee."

Isaiah 40:29 "He gives strength to the weary and increases the power of the weak."

So I kept going! Nonstop.

To my late father, your baby girl finally did it! To my grandmother, thank you for assisting mama with raising me and instilling the importance of education in my early years. To mama, your words did not fall on deaf ears.

To my friends thank you for letting me vent.

To my co-workers and students thank you for taking time to assist me.

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Never give up on your passion. #GoalGetters

Abstract

Analysis of Attitudes, Gender, and Beliefs of Adolescent Students Concerning Interactive Educational Technology. Courtney Teague, 2015: Applied Dissertation, Nova Southeastern University, Abraham S. Fischler College of Education. ERIC Descriptors: Technology, Internet, Media Use, Technology Perceptions, Middle School, Title I School

This applied dissertation was designed to provide insight about the perceptions of middle school students attending a Title I school about technology use and careers. Using a mixed methods approach, the researcher explored the beliefs and circumstances that affect attitudes and behaviors in technology usage by eighth-grade boys and girls. The research questions for this study included: 1) female Title I middle school students' perceptions of interactive technology, 2) male Title I middle school students' perceptions of interactive technology, and 3) gender differences towards interactive technology. Data were collected from six focus group participants and 226 students who completed a survey.

Overall, both male and female participants exhibited similar perceptions about interactive technology. Participants used technology for academic and social reasons, had computers at home, and thought cognitive ability, not gender, contributed to one's ability to use technology. Even though participants of both genders reported using technology frequently, they used it differently. Both male and female participants had technology roles models, immediate family members with jobs with technology responsibilities. Participants were well versed in technology use and were interested in learning more about the field. Male and female participants also reported not receiving technology education even though they accessed assignments online, conducted research with electronic devices, and received instruction via technological means. The results were mixed in regards to pursuing technology careers in the future. Participants also shared contradicting perceptions: they reported interest and using technology (male and female participants), thinking technology was boring (female participants), and neutral about a possible career in technology in the future (female participants). Both males and females expressed the view that males and females were equally capable of making use of technology.

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Chapter 1: Introduction

Contextual Information

The setting of this research study was a Title I middle school in urban school district in a southern region of the United States. Title I, formally titled “Title I, Part A of the Elementary and Secondary Education Act" was an amendment to the Elementary and Secondary Education Act (U.S. Department of Education, 2014). The purpose of this federal legislation was to provide financial assistance to local education agencies (LEAs) (i.e., school districts) and schools with large proportions of children from low socio-economic backgrounds to ensure they meet or exceed state achievement standards (U.S. Department of Education, 2014). The goal of Title I is to provide supplemental activities and educational services that support underachieving students in elementary and secondary schools (U.S. Department of Education, 2004). As of October 4, 2013, 416 female students and 451 male students were enrolled in Grade 8 at the school being used to recruit participants for this study (Georgia Department of Education, 2013). Two challenges to student achievement at the school involve technology: technology was unequally integrated across classrooms, and there were no formal technology courses offered to the students.

Description of the Problem

The problem addressed by the proposed study is the lack of knowledge of the factors that influence the attitudes, beliefs, self-efficacy, and willingness to use interactive technology of Title-I middle-school girls in comparison to those of Title-I middle-school boys. Studies also suggested gender difference was correlated to the less positive computer attitudes of girls compared to those of boys (Barak & Asad, 2012; Wu, 2009; Ong, 2006). According to Wu (2009) and Ong and Lai (2006), male students had a higher rating of self-efficacy than their

female counterparts. Gender differences, self-efficacy, and students' interests influenced the formation of female and male career identity, which was an area of concern of adolescence (Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2010; Turner & Lapan, 2005).

Anecdotal evidence collected during the researcher's eight-year tenure as a teacher in a middle school environment suggested that boys and girls completed and processed instructions differently when students were given class assignments and projects. Boys used their interactive devices such as mobile phones and tablets to retrieve information from search engines and websites. Conversely, the girls tended to use traditional methods such as textbooks to research information. When boys were given standards-based projects, they collaborated using blogs, text messages, wikis, or group chats. The girls preferred to meet face-to-face to complete projects. The researcher also noted that when teachers placed girls and boys in groups for collaborative assignments and the teacher defined the roles of group (i.e., writer, technology researcher, and discussion leader), the girls opted to write and lead the discussions while the boys took the role of technology researcher. While serving in the role as the technology club sponsor for the middle school, the researcher noticed differences among students related to gender. Specifically, the researcher noted that during club registration only four girls signed up to participate out of a total of 25 students.

Some studies suggested, in spite of increasing concern over the underrepresentation of women in scientific and engineering fields, and jobs related to technology, the computing field has made little progress in increasing their participation (Cohoon & Aspray, 2006; Virtanen & Ikonen, 2011). At the researcher's school, no technology education courses or formal technology trainings were offered to the students. Classroom teachers received technological tools with basic introductory training. Yet classroom teachers are charged with the responsibility of integrating

interactive technology techniques into the classroom instruction. These classroom teachers complained that their students were not prepared or equipped to use interactive technology and that instructional time was lost because the learners had to ask questions about using basic technology skills. Instead of focusing on academic content of the discipline, teachers had to provide technology training even though they had limited experience with the platforms.

The researcher took an informal poll of community business owners and the results indicated that local business owners perceived that the adolescents were not prepared for the workforce because they lacked basic technology usage skills.

About the Researcher

The researcher was an eight-year special education teacher who has worked as a moderate-intellectual-disabilities teacher and a middle school inclusion teacher. The researcher was on the "Bring Your Own Device" team at the Title I school. Her responsibilities as the inclusion teacher were to provide free and appropriate education for students with disabilities, to establish rapport with the parents and other stakeholders, to monitor and record Individualized Education Programs.

Purpose of the Study

The purpose of this study was to investigate and identify the factors that influence gender-based attitudes and behaviors in technology usage by boys and girls in Grade 8 at a Title-I middle school. The researcher anticipated that the results of this study would aid practitioners in creating learning environments that will improve the quality of female learners' interactions with technology and inform the process of purchasing instructional technology that would be suitable for learners' current and future educational needs.

Background and Justification

Researchers indicated that gender differences exist between male and female self-efficacy as it related to their technology skills (Barak & Asad, 2012; Wu, 2009; Ong, 2006). They attributed the variance in self-perception and technology interest and ability to student learning styles and comfort levels with and knowledge of electronic devices and navigating the Internet (Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2010). Boys were found to be more likely to use electronic means to communicate, research, and complete assignments, while girls used traditional methods such as hard copy resources, verbal communication in person, and traditional submission methods such as term papers (Turner & Lapan, 2005). When assigned to mixed gender groups, boys often assumed leadership roles and girls accepted supporting positions in groups (Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2010; Turner & Lapan, 2005).

Women made great strides to close the overall college enrollment and completion rates but continue to be underrepresented in science, engineering, technology, and mathematics (STEM) fields (Cohoon & Aspray, 2006; Virtanen & Ikonen, 2011; Jacob, 2002). Recognizing the gender differences between students at the secondary level, the researcher was interested in exploring how technology use, interest, and formal and informal instructional opportunities impacted students' future academic and career choices. Students at the researcher's school lacked the opportunity to take technology courses and had to acquire knowledge through other means. Since the school was designated as Title I, it was unlikely that the parents had the financial means to secure technology training for the students outside of school. Teachers were expected to integrate technology into their classrooms and assignments; however, they did not receive training or assistance to help them achieve this charge. This study is important for the

exploration of a variety of factors that might contribute to students' technology skills and how secondary teachers and school leaders can positively impact student achievement.

Deficiencies in the evidence. Insufficient research has been conducted towards specifically identifying the factors that influence at-risk Title I middle school adolescent girls' and boys' positive attitudes toward technology. Most of the prior research that examined gender differences and attitudes has been conducted in elementary, high, and postsecondary levels (Abbiss, 2011; Buche, Davis, & Vician, 2007; Corneliussen, 2005; Kelan, 2007; Ito, et al., 2008; Lang, 2010; Lewis, Lang & McKay, 2007; National Science Foundation, 2010; Vekiri, 2010; Warschauer & Matuchniak, 2010; Sainz & Eccles, 2012). What is true for adults may not be true for adolescents. It has been pointed out that middle school is the developmental period for teens where their attitudes toward technology and career choices are formed (Heemskerk et al., 2009; Hunley, 2005; Wu, 2009). Limited research is available about the middle school population, particularly middle school students who attended Title I schools. The results of this study will contribute to the canon of technology education for girls and provide data pertaining to Title I efforts.

Audience. As more school systems are transforming in the technologically advanced districts, it is important to examine the influence of technological updates. Findings from this study were expected to assist local school officials, teachers, school technologists, administrators, and school board employees as they make technology and instructional-related decisions. The information from the study may assist the district with acquiring interactive technology based on students' perceptions and state and national standards. The decision-makers may use this study as a foundation to evaluate current purchases. Moreover, key stakeholders and education researchers will also have evidence about how eighth-grade students perceive their

relationship to technology and rate their technology aptitudes both in general and in respect to gender differences. The study may provide the district and education researchers with quantitative and qualitative data based on student perceptions (Castagnaro, 2012).

Definitions of Terms

At-risk students. At–risk students are those who are at risk of dropping out and who experience one or more of various difficult conditions, including but not limited to, substance use and abuse, dropping out of school, early sexual activity, pregnancy underachievement and lack of motivation, mental illness, suicide, poverty, and gang-related behavior (Manning 2006).

Computer attitudes. Computer attitudes are described as cognitive, affective, and behavioral responses and perceived control when interacting with computers or anticipating using computers (Kessler, 2010).

Interactive technology. Any form of technology used by learner or teacher that provides immediate feedback to actions (Prensky, 2001).

Middle-school. The middle grades of school in this study consist of an educational setting that educates students from grades 6 through 8.

Perceived ease of use. Perceived ease of use describes the degree of freedom regarding the effort required to use a specific innovation (Davis, 1989).

Perceived usefulness. Perceived usefulness describes an individual's perception of using technology and how the tool will help them perform their job (Davis, 1989).

Self-efficacy. Self-efficacy is concerned specifically with personal expectation of one's own effectiveness and competence (Skaalvik, 1997).

Social cognitive career theory. Social cognitive career theory "views academic progress as a developmental complement to career initiation and growth" (Smith, 2005, p. 47).

Chapter 2: Literature Review

In this chapter, the literature review explores the factors that influence attitudes, beliefs, self-efficacy, and willingness to use interactive technology by boys and girls in public middle schools. However, the researcher was unable to find in the literature an examination of the effects of the above factors as they relate to at-risk Title-I middle school girls and boys in a school where formal technology courses are not offered. In addition, current research points out that women are underrepresented in fields related to science, technology, engineering, and math (Leaper, Farkas, & Brown, 2012; Warschaure & Matuchniak, 2010; American Association of University Women Education Foundation Commission on Technology [AAUW], 2000; National Science Foundation [NSF], 2008).

Evolution of Interactive Educational Technology

During the beginning of the 20th century, instructional technology included film, television, and radio. In 1910, George Kleine published the Catalog of Educational Motion Pictures, which included over 1000 films that could be rented by educational institutions (Cuban, 1986). These forms of media were predecessors to the computer—theatrical entertainment films, which began to be used for educational purposes turning into an instructional medium (Saettler, 1990).

Saettler (1990) stated in the mid-1920s that educational radio broadcasts changed traditional education as broadcast began to be offered at postsecondary institutions. The U.S. Office of Education developed an interest and began to invest in forming a radio section. Researchers suggested that educational radio programs were seen as sources of teen identity formation due to their increased listening to programs and content (Christian & DeBenedittis, 1986; Cuban, 1986; Paik, 2000). Frost (1937) observed that as educational and commercial stations received licenses

to produce classroom broadcasts most programs were aligned to traditional academic courses. Palmer (1930) postulated that educational radio programs were essential tools to influence adolescents when they were faced with societal conflict or matters. Moreover, the radio medium was an opportunity for students to develop and reinforce academic skills.

Taggart (2007) reported that after the Second World War television became a commercial sensation, and advocates were boasting of the success of this form of communication in the classroom. Ackerman (1997) indicated that supporters assured the public that television would "deliver tantalizing aural and visual displays, which would transform the process of education… The highest qualities of creative human expression were to merge in a constructive concert of facilitated learning" (Ackerman, 1977, p. 153).

According to Saettler (1990), Thomas Edison, claiming that books were outdated media, created classroom films that taught science and math. Teachers used the programs as a supplemental instructional tool or replacement tool for their instruction. The films provided an avenue to present information to large groups of students in areas where resources and knowledgeable teachers were absent. Innovative lessons were broadcast on television for children and typically aired at the same time as direct instruction occurred during school hours between 8 a.m. and 3 p.m.

Overview of Gender Differentiation

Gender and learning experiences. Admiraal, Heemskerk, ten Dam, and Volman's (2009) study investigated three levels of curriculum: the formal, the operational, and the experimental. The study included 81 participants, ages 14-15, in four schools. The researchers interviewed students individually about their experience of working with a particular educational technological tool and their attitudes toward technology integration. They concluded that there

are gender differences in learning experiences between girls and boys. Although both boys and girls benefited from learning with educational technology tools, girls were shown to benefit more from using these tools (Admiraal et al., 2009). The researchers suggested that gender differentiation in technology could be expressed in terms of the culture in which girls and boys are experiencing innovation. They observed that in individualist cultures, girls and boys who are younger adolescents developed less positive attitudes towards science and mathematics than younger adolescents who grow up in collectivist cultures. According to various studies, in collectivist cultures, these students view mathematics and science as promising careers (Zeldin, Britner, & Pajares, 2008; Huntsinger, Jose, Liaw, & Ching, 1997; Li, 2004; Trends in International Mathematics and Science Study [TIMSS], 2007).

In one study, female middle school students were observed to perform information-searching tasks better than males but had greater difficulty completing the tasks (Li & Kirkup, 2007). Roy, Taylor, and Chi (2003) conducted a mixed methods study to examine how 28 eighth-grade students ages 13 and 14 used an Internet browser to search for and learn information. The study showed that boys demonstrated distinctly different approaches from girls to finding information and selecting pertinent information on the Internet. The study results indicated, "Boys had a tendency to scan many more document excerpts than girls, while girls had a tendency to actually open and browse the entire linked documents without going through a preliminary scanning step" (Roy, Taylor, & Chi, 2003, p. 249). Lin and Yu's (2008) study investigated the gender differences within Internet usage, motives for use, online activities by Taiwanese adolescents. The researchers used random sampling to select 629 participants from 10 schools. The sample included 347 boys and 282 girls. There was no reliability or validity information available on the questionnaire. The questionnaire results revealed that girls and boys

use the Internet for diverse reasons but there was no difference between girls' and boys' Internet usage motives (Lin & Yu, 2008).

Career and identity. Turner and Lapan (2005) concluded that gender differences and stereotypes are evident and are demonstrated in students' interest in and formation of a career identity, an area of immense concern of adolescents. Career interests develop during childhood and become stable after eighth grade (Low, Yoon, Roberts, & Rounds, 2005; Rottinghaus, Coon, Gaffey, & Zytowski, 2007; Swanson, 1999; Tracey, 2002; Tracey, Robbins, & Hofsess, 2005). The concept of gender identity can be traced back to Erikson's (1968) Psychological Development Theory of how people focus on their sense of identity development and how people develop or fail to develop abilities and beliefs about themselves which would allow them to become productive, satisfied members of society. Researchers suggested that adolescents need to be exposed to career options before middle school to inform their career paths and sense of identity (Low, Yoon, Roberts, & Rounds, 2005; Rottinghaus, Coon, Gaffey, & Zytowski, 2007).

Previous studies suggest adolescents' academic, social, and self-efficacy perceptions influence the types of career paths for which they judge themselves to be successful directly through their influence on academic ambitions (National Science Foundation, 2010; Sainz & Eccles, 2012; Spires, Lee, Turner, & Johnson, 2008; Virtanen & Ikonen, 2011). Researchers (Bandura, 2006; Betz, 1994; Wang & Noe, 2010; Lewin, 1998; Salminen-Karlsson, 2007; The Clute Institute, 2012) posited that career selection and perception differs based on gender. Girls shun technical and scientific fields; girls perceive themselves as more successful for careers in educational, social, and health services; boys perceive themselves as better in technological and science coursework (Bandura, 2006; Betz, 1994; Lewin, 1998; Salminen-Karlsson, 2007; The Clute Institute, 2012).

According to some researchers, adolescents develop their own beliefs and values regarding their career through interaction with parents, peers, instructors, and other people who impact their lives such as mentors and community members (e.g., Lent et al., 2005; Piaget, 1965). There is considerable research to show that adolescents examine their preferences, values, attitudes, and interests through evaluating different gender roles in the areas of religion, work, philosophy, politics, and relationships (Oswalt, n.d.; Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2010; Crocetti, Rubini, Luychz, & Meeus, 2008; Marcia, 1966; Schroder, Schmitt-Rodermund, & Arnaud, 2011).

At-Risk Adolescents

Middle school students. Margolis and Fisher (2003) reported that adolescents struggle with identity and wonder about questions such as identifying their strengths and how they are perceived. Middle school adolescents' behavior and attitudes may be affected by gender stereotypes. In middle school, students have to manage social roles, educational and biological transitions simultaneously, during which the transitions challenge self-efficacy (Pajares & Urdan, 2006). As adolescents mature, according to Pajares and Urdan (2006), they express their self-efficacy during life transitions, which influence the role or roles they assume in setting the course of their individual life paths. Sanders and Stone (1986) suggested the gender gap in technology becomes apparent in the middle school level as girls and boys are trying to conclude their roles in society:

> Adolescents are figuring out what is means to be men and women in this society, and their conclusions are naturally not yet very subtle. Behavior that seems especially characteristic of the opposite sex becomes forbidden at this age. To fit in with the all-powerful peer group adolescents adopt the accepted role norms with almost fanatic fidelity. (p. 13)

Research indicates the transition from elementary school to middle school can be challenging for adolescents because the change in established relationships with family and friends conflicts with adolescent developmental needs (Eccles & Midgley, 1989; Goossens, 2006; Pajares & Urdan, 2006; Eynon, R., & Malmberg, 2011). There is research that points out that the middle school environment is competitive and less personal resulting in a regression of self-efficacy, academic achievement and competency, and increase in school dropout (Barber & Olsen, 2004; Goldschmidt & Wang, 1999).

At-risk students' technology-usage disparities. McCann and Austin's (1988) meta-analysis reviewed studies that suggested the interrelationships of at-risk students' and technology disparities. McCann and Austin (1988) defined students who are at risk based on three characteristics:

> First, they are students who are at risk of not achieving the goals of education, of not meeting local and state standards of high school graduation, and of not acquiring the knowledge, skills, and dispositions to become productive members of society (receiving less than 2.00 grade average).
>
> Second, there are children who exhibit behaviors that interfere with themselves and others attaining an education, requiring disciplinary action (at least three incidents).
>
> Third, there are those whose family background characteristics may place them at risk (low income below poverty level, non-English native speaker, etc.). (pp. 1-2)

Veraquest Research (2011) conducted a national survey of 500 K-12 teachers within in the United States. The participants were randomly selected. Ninety-one percent of the participants reported having computer access for students in their classroom. Only 22% said they have access to the right level of technology in their classrooms. Sixty-three percent of the surveyed teachers indicated that budget is the biggest barrier to technology integration in their

classroom. Seventy percent of the teachers who taught in low-income communities reported budget as the biggest obstacle. According to the national survey results, less than 59% of the teachers indicated students have access to interactive technology such as whiteboards.

According to the National Dropout Prevention Center/Network (n.d.), educational technology has the potential to remove learning barriers for at-risk students. However, Hienken and Mahar's (2008) quasi-experimental study with 121 New Jersey middle school eighth-grade students suggested that computer-assisted instruction negatively influenced low-achieving students' performance. Edmonds and Li's (2005) study explored nine high school teachers' perspectives when teaching at-risk students with technology. These results indicated that technology-rich environments helped the students overcome barriers and contributed to increased student achievement for at-risk learners. However, the researchers cautioned that the approach of integrating technology may not be beneficial for every student and may create another learning barrier.

Peer relationships and acceptance. Laible et al. (2000) and Muuss (1996) reported middle school students have a greater need for peer recognition and engagement than students in other grades. Some researchers suggested that peer relationships are an essential part of the socialization process that affect adolescents' psychological development (Borzekowski, Robinson, & Killen, 2000; Fuligni & Eccles, 1993; Jones, 2001). Laible, Garlo and Raffaelli (2000) claimed adolescents often seek peer validation from their classmates who share similar values and beliefs. Jones (2001) reported that adolescents often encounter social comparisons based on physical appearance and that girls' popularity is often based on looks and not intelligence. Researchers have proposed that girls become more concerned with how they look, which influences their values and preferences in regards to future careers and activities

(Borzekowski et al., 2000; Eccles & Widget, 1994, Jones, 2001; Steinberg, 2001; Bennett, Maton, & Kervin, 2008).

Theoretical Frameworks

Self-efficacy. Bandura (1992) suggested that children develop self-beliefs during early childhood, as they experience various tasks and situations, and self-beliefs continue to evolve throughout life as people gain understanding and acquire new skills. Mayall (2008) and Bandura (1986) stated self–efficacy is not concerned with one's skills, whatever the ability transfer and use of the skills one possesses. Self-efficacy is indicative of an individual's confidence in his or her ability to perform the required behavior. Lent, Brown, and Hackett (1994) stated that self-efficacy is a dynamic set of beliefs that are specific to person, behavior, and contextual factors.

Self-efficacy is the nucleus of Bandura's theory of social cognitive theory (Bandura, 1977):

> Self-efficacy beliefs influence the courses of action people choose to pursue, how much effort they put forth in given endeavors, how long they will persevere in the face of obstacles and failures, their resilience to adversity, whether their thought patterns are self-hindering or self-aiding, how much stress and depression they experience in coping with taxing environmental demands, and the level of accomplishments they realize. (p. 3)

Bandura (1977) proposed four major sources that individuals can use to evaluate their self-efficacy: vicarious experiences, physiological state, verbal experience, and verbal persuasion. Bandura (1977) stated the most vital source of self-efficacy is mastery experience: mastery experience is defined as a personal experience with failure or success. "The most effective way of developing a strong sense of efficacy is through mastery experiences," Bandura (1994, p. 4) explained. Olivier and Shapiro (1993) stated that when individuals create their own experiences, they create their own self-efficacy based on their own capability of engaging in tasks. Various researchers have stated that once strong self-efficacy is established, minute

setbacks cease to have a major influence on individuals' beliefs (Olivier & Shapiro, 1993; Pajares, 2002; Smith, 2001).

According to Bandura (1977) the second-most essential source of developing self-efficacy is vicarious experience. Self-efficacy can be influenced by observation of others' experiences and achievement of goals. Alderman (1999) and Bandura (1986) speculated that students with a high level of self-efficacy are able to increase their level through the observation of others achieving their goals. Olivier and Sharpiro (1993) explained, "hence seeing others succeed often gives the observer more confidence in the belief that, they, too can succeed" (p. 82).

Bandura's (1977) third source of influence is verbal persuasion. Providing verbal feedback to heighten the level of self-efficacy is atypical but can contribute to success. Bandura also stated that, conversely, negative verbal feedback could have a greater lowering effect on self-efficacy than the heightening effect of positive feedback. Some researchers suggested that it is complicated to change an individual's beliefs by providing positive feedback in contrast to giving negative feedback (Olivier & Shapiro, 1993; Pajares, 2002).

Bandura (1977) stated the most influential source is a physiological state. Mental stability reflects the learners' perceptions of their performance and self-efficacy. Bandura (1986) suggested that if a person is tired, experiencing pain, nervous, or agitated, she or he will not demonstrate the highest level of confidence. Pajares (2002) advised that the one way to enhance self-efficacy is to increase one's emotional wellbeing and to try to minimize the negative thought process.

Hohlfeld, Ritzhaupt, and Barron (2013) indicated that variables such as gender and socioeconomic status can have a major impact on engagement and achievement in an academic

setting; however, little research exists to investigate the role of self-efficacy in using interactive technology such as mobile technology, blogs, wikis, and collaborative tools (Jackson et al., 2008). Tsai, Tsai, and Hwang (2010) conducted an exploratory study that consisted of 414 third- to sixth-grade female and male students from a Taiwanese elementary school. The purpose of the study was to administer self-efficacy and attitudinal surveys about the use of personal digital assistants (PDAs) in ubiquitous learning environments. The participants completed two surveys: PDA attitude survey (PAS) and PDA self-efficacy survey (PSS). The PAS survey results suggested that both male and female students have similar attitudes towards PDA usage. The PSS survey results indicated that female students on average had a lower confidence score than male students.

Studies on adolescents' self-efficacy and career-related interests mainly focused on mathematics and science; the studies examined ethnicity but not the relationship between self-efficacy and interests (Ali & McWhirter, 2006; Ali, McWhirter, & Chronister, 2005; Quimby, Wolfson, & Seyala, 2007; Turner & Lapen, 2003). Some studies indicated that females and males possess different perspectives about technology and their technological ability, which may impact the way they interact with technology (e.g. Vekiri & Chronaki, 2008; Pierce, Stacey, & Barkatasas, 2007). These studies indicated that female students reported lower confidence ratings with technology and mathematics in contrast to males who reported the opposite. Female students typically underrated their ability to use the Internet and computers according to Li and Kirkup (2007). Even in adulthood, men express higher self-efficacy than women (Li & Kirkup, 2007).

Ong and Lai (2006) conducted a study with 67 female and 89 male participants based on the Technology Acceptance Model and the results indicated that men's rating of computer self-

efficacy, perceived usefulness, perceived ease of use, and behavioral intention to use e-learning were higher than women's. Further research has noted the consequences of such attitudes:

> Inequalities between the genders in computer self-efficacy beliefs have been shown to influence decisions to engage in activities. If females are choosing not to be involved in technology based situations (i.e. educational or work-related) because they have low confidence in their abilities to be successful, then it is necessary to use the knowledge we have about changing self-efficacy to increase computer self-efficacy and subsequently technology use by women. (Mayall, 2008, p. 148

Diffusion of Innovation theory. Rogers' (1962) theory of diffusion of innovation explains how personality types influence adoption of innovation. According to Rogers (1962), people adopted new technology in different ways. Rogers (1981) posited diffusion as the process in which innovation is communicated through members of a social system. Four essential factors are embedded in the definition: innovation, communication channels, social system, and time. Innovation is defined as "an idea, practice, or object perceived as new by an individual or other unit of adoption" (Rogers, 2003, p. 12).

The second factor of the process of diffusion is communication channels. Communication, according to Rogers (2003), is an interactive process between individuals with the integral goal of establishing consensus. The channel of communication refers to the means by which information is exchanged from a sender to a receiver. Diffusion is a type of communication with a purpose (Rogers, 2003). The purpose of diffusion is for the receiver to gain a new revelation from information given.

Rogers (2003) stated that the third factor in the innovation process, *time*, influenced diffusion in three ways. Time is relative to the diffusion of innovation during the individual decision-making process. The individual moves from the primary stage of innovation awareness through the stages of rejection or adoption. Secondly, time is relative to how soon or late the

innovation is adopted among system members. Thirdly, time is relative to the rate of adoption for the diffusion of innovation. The rate of adoption is quantitative and is measured by more than 75% of social system members who adopt the innovation at a given time.

The final factor of diffusion of innovation is the *social system* defined as "a set of interrelated units that were engaged in joint problem solving to accomplish a common goal" (Rogers, 2003, p. 23). A social system can include other subsystems, learners, groups, and other organizations.

Rogers (2003) identified five varying personality types characterized by their pattern of adopting new technologies measured in terms of the behavioral, cognitive, and attitudinal openness to change. The personality types included innovators, early adopters, early majority, late majority, and laggards. Innovators control the flow of new ideas; early adopters hold the highest level of opinion leadership; early majority adopters seldom hold positions of opinion leadership; late majority adopters include those whose general acceptance is established; laggards do not accept change. The theory of diffusion explains technology integration into the classroom as well as how learners are willing to accept and use interactive technology. The model helps to structure an analysis of perceptions and attitudes towards technology. However, it does not explain barriers such as the lack of training for teachers or how one may change their personality type (Rogers, 2003).

Technology Acceptance Model (TAM). The purpose of this model was to explain the rationale for people's acceptance of technology (Davis, 1989). The Technology Acceptance Model stated that there are two primary factors that drive a person's decision of whether they will use a piece of technology: believing that the device will impact his/her job effectiveness, and perceiving the degree of ease in using the technological device. An assumption underlying the

model is that people are more likely to use new technology if they see the direct benefit or how it is superior to other devices or services**.** Conversely, people are apprehensive to trying forms of technology if they do not understand how to utilize it in their personal or professional lives or it appears too difficult to learn. According to Davis (1989), TAM has five dimensions: relative advantage (improvements when compared to other instruments), compatibility (consistent with users and social norms), complexity (ease to use or learn to use), trialability (technology available to use from implementation), and observability (the gains of implementing the new technology is clear). The researcher described perceived usefulness, which has been defined as the belief that the use of a particular application can enhance achievements (Davis, 1989). Secondly, he pointed out perceived ease of use, the degree to which users can use a particular system without great effort and the degree to which technological products are perceived to be less difficult. Davis also suggested that attitudes towards using technology, actual system use, and behavioral intention of use were dimensions that drove a person's decision to accept technology.

Technology Usage in Education

Interactive technology. Interactive technologies can be used in a variety of ways in the classroom. Prensky (2001) and Shana (2009) suggested that learners are digital natives and the current educational systems are not designed for their diverse cognitive learning needs. Digital natives have been described as those who have not known the world without the Internet and digital technologies (Elgart, 2013). Students in grades K-12 in the United States have grown up with digital technologies (Prensky, 2001; Jacobs, 2010; Roberto, 2010; U.S. Department of Commerce, 2005; Spires et al, 2008; Vekiri & Chronaki, 2008). Interactive technologies can include mobile technologies and virtual learning environments. Mobile technologies include

different types of technology that are portable, such as laptops, MP3 devices, mobile telephones, personal computers, and tablets (Attewell, 2005; Ostashweski & Reid, 2010). According to Loertscher (2011), some schools have opened their wireless Internet infrastructures to student mobile devices, a practice which has been a growing trend. Attewell (2005) examined 128 participants ages 16-24 years old. The results of the *M-Learning Project*, a four-year study, indicated that most learners were enthusiastic about mobile learning and 62% said they would participate in mobile learning activities again. Additionally, 80% of participants used a mobile device. Participants also stated they believed mobile games helped improve their reading, mathematics, and spelling skills. Mobile devices have been described as providing collaborative opportunities because "mobile technology can effectively support a wide range of activities for learners of all ages and they can provide for each student to have a personal interaction with the technology in an authentic and appropriate context of use" (Naismith, Lonsdale, Vavoula, & Sharples, 2004, p. 32). Sternberg, Kaplan, and Borck (2007) pointed out that technology is readily available to adolescents in the form of Internet-connected computers, portable video, music players, and cell phones. Mobile devices can communicate with similar devices to share data, files, and messages (Naismith, et al., 2004).

Virtual learning environments, also called course management systems, are software systems designed to assist with educational course management for students and teachers (Simonson, Smaldino, Albright, & Zvacek, 2012). Virtual learning environments can include three-dimensional worlds, virtual classrooms, websites, wikis, and blogs (Barkland & Kush, 2009). Virtual learning environments allow learners to collaborate and complete course-related activities asynchronously (Ko & Rossen, 2010; Simonson, Smaldino, Albright, & Zvacek, 2012). Jacobs (2010) stated that networking technologies can be potent tools to improve the future

learning process and outlined how these collaborative experiences are deemed important to learners' lives.

Barkland and Kush (2009) have stated that some virtual learning environments are based on gaming models. Jacobs (2010) argued that game environments help to engage and motivate learners: "Games with an educational orientation can become powerful tools in and out of the formal classroom" (p. 96). Learners can participate in multi-user virtual online role-playing games that allow learners to create digitally defined characters (avatars), build classrooms, buildings, and business settings (Jacobs, 2010). Online games give learners the ability to access psychological, community, and information resources not available in the real world (Dede, Dieterle, Clarke, Ketelhut, & Nelson, 2007).

Digital immigrants and digital natives. Researchers make claims that students' learning styles and profiles have changed due to growing up in a *digital age* (Oblinger & Hawkins, 2005; Prensky, 2000; Prensky, 2001; Valentine & Bernhisel, 2008). Digital immigrants are defined as individuals born before 1980, and digital natives are defined as having been born after 1980 (Helpser & Eynon, 2009; Lei, 2009; Prensky, 2001; Straker, Pollock, & Maslen, 2009). Prensky stated that, unlike digital natives, digital immigrants were not forced to adopt technology because they were born before the Internet. However, Selwyn (2009) and Guo, Dobson, and Petrina (2008) argued that there is little evidence to support Presky's claim. Selwyn (2009) stated, "many commentators are therefore led to construct dichotomous 'them' and 'us' arguments where adults and institutions are rendered obsolete by the rise of the digital native" (p. 369).

Home use of technology and gender gap. Goldstein (2012) pointed out that the technology gender gap begins with home usage when girls at a younger age are more likely to play with spatial-reasoning skill-building toys and boys will play video games and get their first

computer at a younger age. Veriki and Chronaki (2008) stated that home computer use transfers over into the classroom. Some researchers have claimed that student computer usage at home is directly related to student achievement and ability to adapt to technology-rich environments (e.g., Bebell, 2010; Shapeley, 2010; Bennett & Maton, 2010). For example, Tillberg and Cohoon (2005) explained that people who expressed interest in technology were introduced to computer technology by their families and by recreational computer-based media. The researchers implemented a qualitative study and collected data from focus groups, which included 182 participants. Tillberg and Cohoon claimed that the family provides a model for students to follow informally. The study also revealed that girls are less likely to be introduced to technology within the home by a family member. Instead, the teacher is usually the first to introduce girls to technology. The study also indicated that girls do not have as many female role models as boys to answer their questions related to technology-related fields. Ardies, DeMaeyer, Gijbels, and Van Keulen (2014) identified that technology interest is positively correlated with the amount of time devoted to technology instruction in schools. The researchers also found that parents influenced the attitude of technology users especially when either of the parents have a technology-related career.

Teachers'technological use. Bebell and Kay (2010) pointed out that teachers heavily influence when students access and use technology during the day. Bebell and Kay found that factors related to individual school settings had a greater impact on the role in technology integration and use in contrast to the effects of teachers' grade levels or subjects.

Shapley, Sheehan, Maloney, and Caranikas-Walker (2010) completed a quantitative study that included 21 Texas middle schools from urban, suburban and rural areas. The results of the surveys suggested that teacher approval is essential for technology integration:

> Respondents at higher implementing schools reported that committed leaders, thorough planning, teacher buy-in, preliminary professional development for teachers, and a commitment to the transformation of student learning were keys to their successful implementation of Technology Immersion. (Shapley et al., 2010, p. 46)

The survey items and scales Cronbach's alpha reliability scores ranged from 0.70 to 0.99 and the survey items and scales were adapted from previously validated instruments (Shapley et al., 2010).

Keengwe, Schnellert, and Mills (2012) examined how a one-laptop-per-student initiative impacted student learning at a mid-western high school. The study included 105 students enrolled in 10th-12th grades. The Likert scale survey results indicated that the 1:1 laptop computing increased student interest, motivation, and ability to work alone. The study also indicated that the staff believed that the integration of 1:1 computing improved the learning experiences of traditional, at-risk, and high achieving students. The results were statistically significant at a 0.01 level. Teachers' use of computer technology included requiring the students to create presentations, develop products, browse the Internet, manage media, engage in personal use, and complete assessments (Keengwe, Schnellect, & Mills, 2012). Glennan and Melmed (1996) commented that integrating technology into teaching can increase lesson effectiveness. The U.S. Department of Education (2010) stated that technology is vital to change and that technology can facilitate change with dedicated teachers. Dale (1996) explained, "learners could make valuable use of more abstract instructional activities drawing on reservoirs of their more concrete experiences" (p. 143).

Jacobs (2010) discussed technology trends that are dominant in teaching with:

> We live in an age of transformational communications technology. Our world and all of its many cultures and ways of things is smaller and more connected than ever before in human history. New technologies combined with social and cultural adaptations fundamentally change our understanding of knowledge, its creation, and authority. (p. 80)

Campbell and Varnhagen's (2002) study showed that female college teachers in their study used educational technologies as instructional tools to improve their teaching, to differentiate lessons to support various learning styles, to offer alternative assignments, and to increase collaboration. International Society for Technology in Education's ([ISTE], 2013) noted that the National Educational Technology Standards (NETS) for teachers states that teachers should meet five standards in their teaching with technology: facilitate and inspire student learning and creativity; design and develop digital-age learning experiences and assessments; model digital-age work and learning; promote and model "digital citizenship" and responsibility, and engage in professional growth and leadership. If teachers were to select appropriate technology, Gulbahar (2007) predicted that they would provide opportunities to adapt curriculum in various ways to improve the quality of learning. In this spirit, the American Association of University Women (2000) recommended, that in order to decrease the gender gap in computer science, teachers needed to provide computer equity for girls and boys.

Engaging learners. Kolikant (2009) predicted that engaging learners by implementing technology could affect students' learning preferences in the classroom. Some researchers posited that 21st-century learners have their brains stimulated by various technologies such as mobile devices, video games, television, and rapid online communication throughout the day. They are able to process information quickly and integrate technology in their daily lives (Jacobs, 2010; Spires et al., 2008). Some studies have indicated that learners need constant social connection because they are multitasking and are acclimated to Internet searches, images, updates and access to needed information (Hancock, Smith, Timpte, & Wunder, 2010; Wagner, 2008). Jones (2010) stated that technology advancements have influenced learners' feelings,

attitudes and perceptions to the point that the learning process includes the emotional experience of the learners. Jones' study indicated that technology could help learners share thoughts when they may have a discomfort in expressing their feelings in the context that emotions can influence a learner's behavior and how they learn. Bransford (2004) argued that interactive technologies provided an opportunity for learners to gain clarity in dealing with abstract concepts by allowing them to obtain information that is suitable for their various learning styles.

Kellough and Kellough (2008) stated adolescents were curious and ready to learn about topics and information they found applicable and useful. Scales (2003) pointed out that adolescents were more interested in active learning experiences and less interested in traditional academic subjects such as math, science, language arts, and reading. According to Krettenauerm (2005), Muuss (1996), Piaget (1965), adolescents learned through connecting prior knowledge and individual experiences to understand the world: the experiences played an essential role in cognitive development. Bransford (2004) proposed that interactive technologies provided an opportunity for adolescents to obtain clarity from abstract concepts by allowing them to obtain a vast array of information that is appropriate for their cognitive learning styles. There is evidence in the literature that technology creates opportunities for instruction by bringing real-world problems to the learners for exploration (Bransford, 2004; Jacobs, 2010; U.S. Department of Education, 2010).

As Jacobs (2010) posited,

> We live in an age of transformational communications technology. Our world and all of its many cultures and ways of thinking is smaller and more connected than ever before in human history. New technologies combined with social and cultural adaptations fundamentally change our understanding of knowledge its creation, and authority. (p.80)

Some research indicated that technology created opportunities for instruction by bringing real-

world problems to the learners for exploration, collaborative learning for teachers and administrators (Bransford, 2004; Jacobs, 2010; U.S. Department of Education, 2010).

Perceptions of Attitudes Toward Technology

Stereotypes. Brannon (2010) defined gender stereotypes as a set of beliefs about the characteristic and psychological traits, and/or activities related to males and females. Virtanen and Ikonen (2011) suggested that toddlers ages 2-3 begin to develop gender roles in selecting toys tagged for their own gender. The authors indicated that girls in that age group started turning away from the technology related careers. Mammes (2004) found that girls have less experience than boys in playing with technology toys and are less motivated to engage with technology toys.

Studies have investigated the impact of gender on middle school adolescents' preferences and options in technology education using quantitative and qualitative tools such as observation, interview, and survey methods (Holmes, Redmond, Thomas, & High, 2012; Li & Kirkup, 2007). Some research indicated more males than females were interested in engineering: the gender gap was manifested during middle school years (Holmes et al., 2012; Li & Kirkup, 2007). Even though more women were entering these professions (i.e., science, technology, engineering, and mathematics), men still outnumbered them overall as evidenced in Hill, Corbett, and Rose's (2010) study. The report indicated that girls and boys were equally prepared before entering postsecondary education and that a higher proportion of girls excelled in mathematics. However, there was strong evidence that girls would lose interest in technology when it was time for them to enter college (Holmes et al., 2012; Meelissen & Drent, 2008; Lubinski & Benbow, 2006). Fewer female college students pursued science, mathematics, engineering, and mathematics (STEM) majors than their male classmates. For example, the proportion of male students (33%)

pursuing STEM degrees doubled that of their female counterparts (15%) during 1993–2003. This rate is consistent with comparisons of degree completion: 13% of male students and 6% of female students earned a degree or certificate and 8% of male students and 4% of female students earned a bachelor degree in a STEM field (College Board, 2014). The American Association of University Women Educational Foundation Commission on Technology (2000) wrote that girls' lack of participation in technology is an area of growing concern for education, the economy, and culture.

Smith and Hung (2008) observed that girls were instructed to believe that they are not equal to boys, specifically in the fields of science and math. Girls had a negative attitude toward technology in comparison to boys (deVries, 2005; Rees & Noyes, 2007; Mawson, 2010). Kahveci (2010) found that secondary school females felt less comfortable in using technology although they had a positive attitude toward technology. Some researchers explored gender differences in response to the use of technology (Colley, 2003; Hou et al., 2006; Turkle, 1995). Gender roles and stereotypes are concerns related to girls' technology use, skills, and attitudes. According to Dakers, Dow, and McNamee (2009), while girls preferred completing tasks such as checking email, boys preferred playing video games. Dakers, Dow, and McNamee (2009) and Virtanene and Ikonen (2011) stated the technology field has traditionally been a male-dominated field. Honey et al. (1991) found that "women commonly saw technological instruments as people connectors, communication, and collaboration devices" (p. 331).

Hill, Corbett, and Rose (2010) argued that when girls are pressured by parents and peers to adapt to the stereotypical view that boys are more competent than girls, they experience "an extra emotional and cognitive burden" (p. 39). The National Coalition for Women and Girls in Education examined gender-role development and found that by the time children are six or

seven years of age, they have developed clarity about gender based on their world perspective and experiences (Gunn, 1994). At this age, Gunn explained, children choose to play with children of the same sex. By the time children are 8-10 years old, they begin to understand gender roles (Gunn, 1994). During adolescence, girls and boys become influenced by roles of women and men as communicated through society and their peers. The messages that society conveys may directly influence their behavior and the activities and course selections (Gunn, 1994; McCarthy, 2009).

Castell and Bryson (1998) surveyed 500 high school boys and girls about their technology use, access, competence, and interest. The results of the survey showed "eighty-two percent of the respondents indicated that girls and boys were equally competent in the use of computers" (p. 236). Students were also asked to sketch a person who can comprehend computer skills and give the illustration a name and draw a person who is able to learn computer skills and give the computer expert a name. In contrast to the survey results, the sketches yielded different results. The results revealed 71% were male, 18% were female, and 11% were of an undetermined gender. The conflicting results may be attributed to the students' responding with what they thought was seen as acceptable in comparison to their actual beliefs and perceptions (Castell & Bryson, 1998). Tsai, Tsai, and Hwang's (2010) exploratory study implied that both female and male students have similar attitudes (i.e., perceived usefulness, affection, behavior, and perceived control) towards interactive technology, At the same time, stereotypes in the United States are changing; however, non-White minorities and women are portrayed as undereducated and less skill-oriented than Caucasian men in technology and mathematics (Huckerson, 2013; Jacksonet al., 2008; Meece & Scantlebury, 2006).

Adolescents' attitudes towards technology. Kolikant (2009) postulated that it is important to understand how students perceive the relationship among school constructs, learning, and digital technology. Students' previous experience with technology, according to Alghazo (2006) and Khunyakari, Mehrotra, Natarajan, and Chunawala (n.d.), is an essential factor influencing attitudes toward technology, with more experience resulting in more positive attitudes. Cantrell and Sudweeks (2009) claimed that girls' learning performances had improved when the technological tools addressed their interests. A survey conducted by Khunyakari et al. (n.d.) indicated that middle school students viewed technology as an essential component for fulfilling their career plans. Loyd and Gressard (1984) analyzed the attitudes toward technology of 142 high school language arts students, 107 community college mathematics students, and 105 students living in dormitories at a small liberal arts college. The researchers used the Computer Attitude Scale (CAS), which they created to measure three components of students' attitudes: computer anxiety, computer confidence, and computer liking. The results of the study indicated that prior experience heavily influenced the students' computer anxiety, computer confidence, and computer liking. The researchers observed that students viewed technology as relevant to their lives and learning.

Johansson (2009) found that young people were interested in technology, but their opinions on careers and education were negative. Middle school students often had misleading or misguided information about the technology profession. Scherz and Oren (2006) concluded that these inaccurate perceptions contributed to their lack of interest in the subject matter and pursuing the discipline in school or as a career. Additionally, middle school students did not consider the use of technology in the classroom helpful or beneficial to instruction, according to Lawrenz, Gravely, and Ooms (2006). In Lee, Turner, and Johnson's (2008) study, the students

indicated that they had perceived the schools' technology as antiquated. Some researchers have stated that learners are inundated by and hypersensitive to technology and that learners expect information instantaneously because they have technology readily accessible (Yates, 2003; Lindgren, 2010; Farber, Shafron, Hamadani, Wald, & Nitzburg, 2012).

Teachers' attitudes toward technology. Kessler's (2010) mixed methods study collected data from a 41-item questionnaire. The constructs of the measure included subjective norm, perceived behavior, and intention. The overall Cronbach's alpha coefficient was .93 (Kessler, 2010). The content validity was confirmed by a panel of experts. The results of the study indicated that 116 elementary teachers' attitudes toward educational technology were decisive in influencing the decision to implement technology. Agbatogun (2010) suggested that successful technology integration depended on the teachers' and students' attitudes toward technology. Schecklhoff (2007) pointed out that the lack of teacher training influenced teachers' resistance to implementing technology. Some researchers concluded that professional development and training would have a positive impact on achievement and effective technology integration (Byrom & Bingham, 2003; Tinker, 2000).

Wagner (2008) posited:

> To better understand how young people today are differently motivated, we need to see that they are growing up in an environment that is radically different from previous generations. They are coming of age while tethered to the Internet as well as to a host of instant communication devices that were unimaginable twenty years ago. (p. 170)

Schecklhoff (2007) indicated that some teachers negatively viewed interactive technology as disruptive, which moreover required sufficient preparation time to effectively use the technology. Purcell, Heaps, Buchanan, and Friedrich's (2013) study found that 6 in 10 teachers found that time constraints were a major challenge for them to integrate technology in

the classroom and personally. Hernandez-Ramos (2005) suggested, "teachers' personality factors such as preference for order and neatness, resistance to change, and flexibility could influence their decision on whether to integrate technology into their curriculum using messy, noisy, innovative project-based, collaborative learning opportunities" (p. 13). Howery (2001) suggested that teachers should be able to demonstrate proficiency before they are able to effectively integrate technology into the classroom.

Zhao and Cziko (2001) suggested that three conditions are needed for teachers to engage in the use of technology:

> The teacher must deem that she or he has or will have adequate resources and ability to use technology.
> The teacher must deem that technology is not disruptive to other higher-level goals that she or he deemed more essential than the one being provided.
> The teacher must deem that technology can more efficiently meet the higher-level goal than what has been used. (p. 20)

Kolikant (2009) and Saettler (1990) suggested that as technology continues to evolve, it is essential to shift pedagogical focus to implementing interactive teaching and learning to prepare learners while aligning their needs with the needs of the learners as future employees.

Technological interests. A considerable amount of literature has been published on females' technological interests. Studies revealed that males prefer "utilizing" and taking risks and females prefer "designing" and seeking encouragement (e.g. Holmes, Redmond, Thomas, & High, 2012; Admiraal et al., 2009; Schecklhoff, 2007; Weber & Custer, 2005; Forgasz, 2006). Dewey (1913) and Bandura (1997) proposed interest is important in human development and career development. Many researchers have suggested future interests in technology and science careers are formed before the age of 14 (Lindahl, 2007; de Vries, 2005; Osborne et al., 2000; Stein & McRobbie, 1997).

Lim and Meier's (2011) study indicated that Korean high school males and females used computers for home use purposes such as formal learning, entertainment, social networking, and personal knowledge. Males liked playing multiplayer online games while girls used social-networking websites. Zhou (2007) and Mammes (2004) argued that exposure to technology education at elementary school leads to a high level of technological interest for both boys and girls. Quantitative data collected from the College Board (2009) indicated that a number of college-bound high school students who intended to major in technology decreased 52% from 2000 to 2009. Lent et al.'s (2008) study of computing interests and computing goals indicated that computing interests predict the choices of computing majors.

Summary

In light of the research conducted in this literature review, it can be concluded that there is a connection between perceptions and technology use (Edmond & Li, 2005; Hess & Leal, 2001; Tienken & Mahar, 2008). As technology advanced from recorded sound to tablets, smart boards, and the Internet in the past century, instructional strategies also changed (Paik, 2000; Saettler, 1990). However, a digital divide remained, usually based on socio-economic status: families from lower SES backgrounds had less access to technology at home than their higher SES counterparts (McCann & Austin, 1988). Male and female students rated their technology aptitude in different ways, with males having a more positive self-efficacy than females. Male students were also more likely to use technology as educational, entertainment, and communication tools, while girls used traditional means to complete similar tasks (Bandura, 1992; Pajares, 2002; Smith, 2001).

Chapter 2 presented the theoretical framework for the study. The study will be grounded in three theoretical components: self-efficacy, Technology Acceptance Model, and Diffusion of

Innovation Theory. Previous research has the Technology Acceptance Model (TAM) as the only proposed model to explain the adaptation to an information system (Chang & Tung, 2008; Chuttur, 2009; Davis, 1989; Jantan, Ramayah & Chin, 2001; Pituch & Lee, 2006; Surendran, 2012; Taylor & Todd, 1995; Venkatesh & Davis, 2000). Jantan et al. (2001) and Surendran (2012) suggested that the TAM model can be used in foretelling adoption and technology user usage than nontechnology users.

Insufficient research has been conducted towards identifying the factors that influence Title I adolescent girls' negative attitudes toward technology and boys' positive attitudes toward technology. Past studies have focused on identifying factors that influence other populations such as adults and elementary and colleges students (Doube' & Lang, 2012; Lang, 2010; Loyd & Gressard, 1984; Watt, 2006). Moreover, the need to explore the perceptions and needs of students at Title I schools is needed for theoretical and practical knowledge.

Middle school is the developmental period for teens where their attitudes toward technology and career choices are formed (Heemskerk et al., 2009; Hunley, 2005; Wu, 2009). More research is needed in the area of identifying the factors that influence at risk Title 1 middle-school girls' and boys' attitudes toward interactive technology. This study will contribute to filling the gap in the academy related to this area.

Research Questions

1. What are the perceived experiences of female students in a Title I middle school regarding the use of interactive technology?

2. What are the perceived experiences of male students in a Title I middle school regarding the use of interactive technology?

3. What are the differences in perceptions towards interactive technology between males and females?

Chapter 3: Methodology

Problem Statement

The problem that was addressed is the lack of knowledge of the factors that influence attitudes, beliefs, self-efficacy, and willingness to use interactive technology of Title I middle school girls in comparison to those of middle school boys. According to Creswell (2008), a cross-sectional study can examine current attitudes, beliefs, opinions, or practices. The researcher conducted a mixed-methods approach research study to investigate this issue. The mixed methods approach was selected because it provides a richer analysis of the topic by providing narrative (qualitative) support to the quantitative data collected (Creswell, 2012).

Design

The mixed method approach that was used is the concurrent triangulation design. Harwell (as cited in Conrad and Serlin, 2011) described the approach as being "used when the focus is on confirming, cross-validating or corroborating findings from a single study" (p. 155). Some researchers suggested the rationale for mixing quantitative and qualitative data within one study is that neither method is individually sufficient to provide a complete analysis of trends or situational details (Ivankova, Creswell, & Shick, 2010; Tashakori & Teddlie, 2010).

Bandolier (2007) and Creswell (2007) stated that qualitative research is used to understand phenomena through examining an individual's beliefs, attitudes, experiences and interactions. Qualitative data in this study included focus group interview responses. Six participants responded to the same questions. Due to the in-depth nature of convening a focus group, this number of participants is consistent with best practices, which dictate that focus groups should include at least four and no more than six participants (Berg, 2004: Krueger, 2009).

Quantitative research tests a theory deductively to refute it or support it (Creswell & Plano Clark, 2007; Bandolier, 2007). Trochim and Land (1982) outlined quantitative research design as the

> glue that holds the research project together. A design is used to structure the research, to show how all the major parts of the research project-the samples or groups, measures, treatments, or programs, and methods of assignments work together to try to address the central research questions. (p. 1)

It is for those reasons that quantitative data collection was included. The quantitative data in this study were used to describe the participants, and descriptive statistics were reported.

The mixed-methods approach was used to address real life situations and examine its multiple perspectives. This research method combined the strengths of both qualitative and quantitative dimensions to develop a deeper understanding of the subject (Johnson, Onwuegbuzie, & Turner, 2007). The qualitative approach focused on the context and individual (or small group) experiences based on non-numeric data, and the quantitative approach focuses on deductive reasoning and collecting descriptive information to yield numerical data. The mixed-methods approach was an integration of the two approaches instead of two distinct studies (Creswell & Plano Clark, 2011; Greene, 2007; Johnson, Onwuegbuzie, & Turner, 2007; Morgan, 2007). The data were merged in the discussion section of the study to explain and assess the identified results. The researcher also used tables and figures to provide visual descriptions of the study results (Sandelowski, Voils, & Knafl, 2009). The researcher collected descriptive data about participants and survey results (quantitative) and conducted focus group interviews (qualitative). The quantitative data were reported to describe the participants (descriptive statistics) and the qualitative data, which includes interview transcripts, were coded and merged into themes.

Student Participants

The target population consisted of 226 eighth-grade Title-I middle school students from an urban school district in a metropolitan area of the southern region of the United States. The researcher randomly selected 226 eighth-grade students out of the 877 enrolled in the same grade at the researcher's school to complete the questionnaire. The sample size represents 25.7% of the students in this grade level. Each eighth-grade student was assigned a number (1–465 for female students and 1–412 for male students). An electronic random number generator was used to select female and male participants.

For the qualitative portion of the study, six students were selected to participate in the focus group. For the quantitative portion of the study, the survey was administered to 226 participants. Creswell and Plano-Clark (2007) suggested that the qualitative sample should be smaller than the quantitative sample. Creswell (2012) stated, "the researcher selects individuals because they are available, convenient, and represent some characteristic the investigator seeks to study" (p. 145) to select participants via the convenience sampling method. Creswell (2008) postulated that the weakness of this sampling is that the researcher is not confident that the participants will represent the intended population. However, this method is effective as it allows the researcher to recruit participants based on very specific characteristics such as grade level, school types, and gender. Participants were selected using convenience sampling for the focus group. The six student participants for the focus group were selected based on their grade, attendance at the school and gender. Three boys and three girls were interviewed and selected based on one of two factors, membership in the Technology Club and/or a student in the researcher's class. These two criteria for participation were selected because the students with a

relationship with the researcher may be more likely to share their views honestly during focus group interviews (Fowler, 2009).

Instruments

This section presents descriptions of the questionnaire and interview instruments that will be used for the purpose of this mixed methods study.

Student questionnaire. The quantitative research measure that was used is a questionnaire. Best and Kahn (1993) and Gall (1996) defined questionnaires as data gathering instruments through which all participants answer the same questions. The revalidated version of the Pupils Attitude Towards Technology (PATT) (Bame & Dugger, 1989) was used in a large-scale investigation of 2973 participants between the ages of 12 and 14 years old. Best and Kahn (1993) and Creswell (2008) defined reliability as the consistency of the research instrument. Table 1 contains reliability estimates as reported by Ardies et al. (2013). The table presents the number of items that address each subfactor on the questionnaire and the alpha (**α**) level resulting from the data analysis. The alpha levels for four of the six sub-categories were above .80, which supports statistical significance (Ardies et al., 2013).

According to Fink (2002) and Gall et al. (2007), validity indicates whether a survey or questionnaire measures what it aims to measure. The validity of the Pupils' Attitudes Towards Technology instrument has been verified on multiple occasions, the first time being when it was developed in the late 1980s. Most recently, in 2013, the instrument was tested for validity with a pilot study of 250 participants and main study of 3,000 students (Ardies, DeMaeyer, & Gijbels, 2013). The validity of the instrument was determined on several occasions and most recently in 2013 with a pilot (*n=250*) and main studies (*n=3,000*) (Ardies, De Maeyer, & Gijbels, 2013). Ardies et al. (2013) administered the survey to reassess reliability and validity. The authors

analyzed the data by performing factor analysis, goodness of fit, Cronbach's alpha (✔ of .70), and Chi squared (p-value lower than 0.05) tests. The results of the pilot and main studies indicated the instrument was valid and reliable.

Table 1

Factors of Attitudes Towards Technology

Sub-factor	✔	# items
Technological career aspirations	.92	4
Interest in Technology	.84	6
Boredom with technology	.81	4
Perceived consequences of technology	.72	4
Perceived difficulty of technology	.64	4
Beliefs about gender differences	.82	3

The Pupils' Attitudes Towards Technology questionnaire consists of two groups of questions (see Appendix A). The first group of questionnaire focuses on demographic variables of the student participant (i.e., gender, student grade, curriculum, the presence of technological toys at home, the parents' professions, and educational level). The second part of the questionnaire is the PATT-SQ survey (Raat et.al, 1988; Ardies et al., 2013). The survey consists of 25 five-choice multiple-choice questions. The questions measure six factors of attitudes toward technology: interest in technology, boredom, perceived difficulty of technology, technological career aspirations, perceived consequences of technology and beliefs about gender (Ardies et al., 2013).

Procedures

After receiving IRB consent to conduct the study, the researcher sent an informed consent form to student participants' parents or guardians/caregivers and an assent form to the students. The forms provided a written explanation that describes the purpose and procedures involved with the mixed methods study. The consent also gave the researcher permission to digitally store data collected.

Questionnaire. The questionnaire was administered using online software, Survey Monkey, and pencil and paper. Survey Monkey was selected because of its security, ease of use, response, and analysis features. Participants were given a choice of paper or online formats of the revalidated PATT questionnaire. When the participant selected the paper format, the information was keyed into the online format by the researcher. After the questionnaire was completed, a copy of the data was saved on the researcher's password-protected computer. The data were kept confidential.

Focus group interview. To gain additional information about the participants' perspectives on interactive technologies, gender, and beliefs, the researcher convened a focus group of six students (three males and three females) from the same population used in the quantitative survey. The qualitative portion of the research process to interview questions was based on the items included on the PATT questionnaire. The participants were able to provide more information about their perspectives of interactive technology and technology use. The focus group followed a semi-structured interview process that was recorded with an audio recorder (see Appendix B). The researcher secured permission from two scholars, Julio Talez and Jan Ardie, to use questions they created for other studies to inspire the focus group interview questions for this dissertation (J. Talez, personal communication, May 6, 2014; J. Ardie, personal

communication, November 19, 2013). Their studies addressed students' (in different settings) technology use and were informed by the PATT questionnaire. The participants were each assigned a number and only answered in the order of the assigned number during the focus group interview. This was designed to help the researcher maintain a record of students' individual responses without specifically identifying the participants. The focus group interview lasted about 90 minutes. The focus group session was transcribed by talk-to-text software. The researcher read the transcribed interviews and identified the categories for data coding based on frequency. After the categories were coded and themes emerged from the data collection, the researcher compared the data to the survey data.

Data Analysis

The qualitative data included transcripts from the focus group. The results of the Pupils' Attitude Towards Technology instrument were used for quantitative analysis.

Qualitative data analysis. Qualitative data collected from the focus group were analyzed and coded following the five steps of analyzing data as suggested by Powell and Renner (2003):

1. Focusing on understanding the data to extract meaning and value.
2. Focusing the analysis to look at how each student responded to the questions asked.
3. Identifying and arranging in coherent categories the themes or patterns to bring meaning to the information.
4. Looking for patterns or connections that might have been within and between categories.
5. Interpreting the collected information by attaching meaning and significance to the analysis.

Patton (2001) suggested that examining key phrases, key ideas, and words filter the data. Each focus group member’s response was read to capture the participants’ attitudes, beliefs, and experiences.

Quantitative data analysis. The questionnaire included multiple-choice questions and each item reflects students' attitude in regards to technology use and skill level. Once all of the surveys were collected, the researcher coded the data. Each answer received a numerical designation to allow the researcher to analyze the data using quantitative analysis techniques (Ardies, De Maeyer, Gijbels, 2013). Quantitative data were analyzed using Statistical Package for Social Sciences (SPSS) using descriptive statistics to examine data related to demographics (Creswell, 2012). The modes of the answers were calculated. In addition to demographic information, male and female participant responses were analyzed, which accounts for subfactors such as gender (Hox, 2010; Goldstein, 2011). This method would identify any possible differences between the male and female students (Bame, Dugger, de Vries, & McBee, 1993; De Maeyer, van den Bergh, Rymaneas, Petegem, & Rijlaarsdam, 2010).

Chapter 4: Results

This chapter includes the results of the surveys and focus group interviews administered to middle school students attending a Title I school. The purpose of this study was to investigate and identify the factors that influence gender-based attitudes and behaviors in technology usage by boys and girls in Grade 8 at a Title-I middle school. The participants addressed their exposure to, and use of, technology. The 226 participants (see Table 2) who completed the survey included mostly 13- and 14-year-old students (see Table 3), and six participants comprised the focus group. The responses from both data sources were aligned in regards to technology practices of middle school students. Survey participants answered questions related to their technology perceptions. The data for each question do not provide a compelling story when analyzed in isolation. However, themes emerge when the survey questions are grouped into similar categories.

Table 2

Gender of Survey Participants

Response	N	Percent
Male	111	49.1
Female	115	50.9
Skipped Question	0	0
Total	226	100

Table 3

Age of Survey Participants

Response	All N/Percent	Male N/Percent	Female N/Percent
13	104/46.0	51/45.9	53/46.1
14	109/48.2	50/45.1	59/51.3
15	11/4.9	8/7.2	3/2.6
16	2/0.9	2/1.8	0/0
Skipped Question	0/0	0/0	0/0
Total	226/100%	111/100%	115/100%

Research Question 1

What are the perceived experiences of female students in a Title I middle school regarding the use of interactive technology?

Female participants comprised slightly more than half of the students who completed the survey. Participants were also asked about their parents' jobs (see Tables 4 and 5): about half of female participants' fathers and mothers worked jobs that required the use of technology.

Table 4

Extent to Which Participants' Fathers' Job Involves Technology

Response	All N/Percent	Male N/Percent	Female N/Percent
Nothing	55/24.3	26/23.4	29/25.3
Little	79/35.0	44/39.7	35/30.4
Much	66/29.2	29/26.1	37/32.1
Very Much	26/11.5	12/10.8	14/12.2
Skipped Question	0/0	0/0	0/0

Table 5

Extent to Which Participants' Mothers' Job Involves Technology

Response	All N/Percent	Male N/Percent	Female N/Percent
Nothing	56/25.0	31/27.9	25/21.5
Little	80/25.7	47/42.3	33/28.4
Much	52/23.1	18/16.3	34/30.1
Very Much	36/16.1	13/11.7	23/20.0
Skipped Question	2/0.1	2/1.8	0/0

The participants were asked about technology access and use in their homes (see Table 6). Almost all (87.9%) of the female participants had computers in their homes. However, when it came to technology toys and workshops a small minority of females had access to these things.

Male participants had more access to technology related toys and workspaces compared to female participants.

Table 6

Technology Availability at Home

Response	Yes N/Percent	No N/Percent	Skipped Question N/Percent
Technology Toys	84/37.5	140/62.4	2/0.1
Male	53/47.8	56/50.4	2/1.8
Female	31/26.9	84/73.1	0/0
Technical Workshop	40/17.8	184/82.1	2/0.1
Male	28/25.3	81/72.9	2/1.8
Female	12/10.4	103/89.6	0/0
Personal Computer	197/87.0	27/12.1	2/0.1
Male	96/86.5	13/11.7	2/1.8
Female	101/87.9	14/12.1	0/0

Participants were asked about personal and family professional aspirations and career choices related to technology (see Tables 7 and 8). About one third of female participants' had a sibling working in the technology field. The percentage of female participants who were interested in technology-using careers in the future was slightly greater than those not interested in this career track. Siblings of females showed a marked disinterest in pursuing such careers. Less than half of the girls were interested in technology education despite the fact that more than

half planned to enter careers which make use of technology. Also, complicating the picture is that only one fifth of the females (see Table 8) anticipated getting a technology job (a position that includes the use of technology as a primary function).

Table 7

Participants' and Family Technology Profession and Education

Response	Yes N/Percent	No N/Percent	Skipped Question N/Percent
Participants' Future Technology Profession	97/43.3	127/56.6	2/0.1
Male	37/33.3	72/64.9%	2/1.8
Female	60/52.1	55/47.9	0/0
Participants' Siblings Technology Profession	52/23.2	172/76.7	2/0.1
Male	20/18.1	89/80.1	2/1.8
Female	32/27.7	83/72.3	0/0
Participants' Technology Education	105/46.8	119/53.1	2/0.1
Male	49/44.1	60/54.1	2/1.8
Female	56/48.7	59/51.3	0/0

Table 8

Participants' Perceptions of Probability of Getting a Technology Job

Response	Disagree N/Percent	Tend to Disagree N/Percent	Neutral N/Percent	Tend to Agree N/Percent	Agree N/Percent	Mode
Total	45/20.2	31/13.8	85/37.9	41/18.3	22/9.8	Neutral
Male	30/27.7	17/15.5	27/24.7	18/16.6	17/15.5	Neutral
Female	15/13.1	14/12.1	58/50.4	23/20.1	5/4.3	Neutral

Four questions were used to develop the participants' general perceptions about the technology theme (see Table 9). The four questions addressed the need for technology, perception of the degree to which technology is improving things, the sense of importance of technology, and the belief that the world would be a better place due to technology. The mode for all female participants in regards to the opinion that everyone needs technology was Neutral (44.3%), but a much greater percentage of females indicated some form of agreement than did those who showed some form of disagreement. The mode for female participants in response to the their perceptions about technology making things better was Agree at 44.3%, and only a very small percentage indicated some form of disagreement. About two thirds of female participants responded Agree or Tend to Agree to the statement that technology is very important in life, and only a very small percentage indicated some form of disagreement. More than half of female participants indicated Disagree or Tend to Disagree with the statement proposing that the world would be a better place without technology.

The participants were surveyed about their perceptions about technology and cognitive ability (see Table 10). Among female participants, Neutral was the mode for "You have to be smart to study technology" (35.7%) and they were almost evenly split between the disagreement and agreement tendencies. "You can study technology only if you are good at mathematics and science" showed a mode of Neutral (36.6%), and they were almost evenly split between the disagreement and agreement tendencies. On a more positive note, Disagree was the mode for "To study technology you have to be talented" (40.1%), and the disagreement trend greatly overwhelmed the agreement trend. Similarly, Disagree showed up as the mode for "Technology is only for smart people" (38.3%), and the disagreement trend greatly overwhelmed the agreement trend.

Table 9

Participants' General Perceptions About Technology

Response	Disagree N/Percent	Tend to Disagree N/Percent	Neutral N/Percent	Tend to Disagree N/Percent	Agree N/Percent	Mode
"Everyone Needs Technology"						
Total	24/10.7	27/12.1	82/36.6	51/22.7	40/17.9	Neutral
Male	12/11.1	14/12.9	31/28.4	34/31.1	18/16.5	Tend to Agree
Female	12/10.4	13/11.3	51/44.3	17/14.7	22/19.3	Neutral
”Technology makes things work better”						
Total	5/2.3	6/2.7	50/22.3	73/32.6	90/40.1	Agree
Male	4/3.7	4/3.7	24/22.1	38/34.8	39/35.7	Agree
Female	1/0.9	2/1.7	26/22.7	35/30.4	51/44.3	Agree
"Technology is very important in life"						
Total	5/2.3	7/3.1	58/25.8	65/29.1	89/39.7	Agree
Male	3/2.7	4/3.7	27/24.8	33/30.3	42/38.5	Agree
Female	2/1.7	3/2.7	31/26.9	32/27.8	47/40.9	Agree
"The world would be a better place without technology"						
Total	98/43.7	54/24.3	53/23.6	8/3.5	11/4.9	Tend to Disagree
Male	54/49.5	29/26.6	21/19.3	1/0.9	4/3.7	Tend to Disagree
Female	44/38.3	25/21.8	32/27.9	7/6.0	7/6.0	Tend to Disagree

Table 10

Responses to Cognitive Ability and Need to Use Technology

Response	Disagree N/Percent	Tend to Disagree N/Percent	Neutral N/Percent	Tend to Agree N/Percent	Agree N/Percent	Mode
			"To study technology you have to be talented"			
Total	83/37.1	64/28.7	57/25.4	8/3.5	12/5.3	Disagree
Male	37/33.9	29/26.7	33/30.3	3/2.7	7/6.4	Disagree
Female	46/40.1	35/30.4	24/20.9	5/4.3	5/4.3	Disagree
			"You have to be smart to study technology"			
Total	34/15.1	45/20.1	78/34.9	39/17.4	28/12.5	Neutral
Male	16/14.7	24/22.1	37/33.9	15/13.7	17/15.6	Neutral
Female	18/15.6	21/18.3	41/35.7	24/20.9	11/9.5	Neutral
			"Technology is only for smart people"			
Total	107/47.7	57/25.5	39/17.4	13/5.9	8/3.5	Disagree
Male	63/57.7	18/16.7	19/17.4	6/5.5	3/2.7	Disagree
Female	44/38.3	39/33.9	20/17.4	7/6.1	5/4.3	Disagree
			"You can study technology only when you are good at both mathematics and science"			
Total	38/16.9	41/18.3	79/35.3	48/21.4	18/8.1	Neutral
Male	23/21.1	21/19.2	37/34.1	23/21.1	5/4.5	Neutral
Female	15/13.1	20/17.3	42/36.6	25/21.7	13/11.3	Neutral

In regards to gender perceptions (see Table 11), the female participants did not seem to think boys are more knowledgeable or capable than girls. More than 90% of the female participants indicated Agree or Tend to Agree that girls could become car mechanics. The mode for the remaining questions for female participants was Disagree.

Table 11

Gender Perceptions

Response	Disagree N/Percent	Tend to Disagree N/Percent	Neutral N/Percent	Tend to Agree N/Percent	Agree N/Percent	Mode
			"A girl can become a car mechanic"			
Total	5/2.3	8/3.6	21/9.3	37/16.5	153/68.3	Agree
Male	1/0.9	3/2.7	9/8.3	18/16.5	78/71.6	Agree
Female	2/1.7	5/4.3	12/10.4	19/16.7	77/66.9	Agree
			"Boys are able to do practical things better than girls"			
Total	140/62.5	40/17.8	24/10.7	15/6.7	5/2.3	Disagree
Male	67/61.4	18/16.5	13/11.9	9/8.3	2/1.9	Disagree
Female	73/63.4	22/19.1	11/9.5	6/5.3	3/2.7	Disagree
			"Boys know more about technology than girls do"			
Total	121/54.1	34/15.1	45/20.1	15/6.6	9/4.1	Disagree
Male	64/58.7	16/14.7	19/17.4	6/5.5	4/3.7	Disagree
Female	57/49.5	18/15.6	26/22.7	9/7.9	5/4.3	Disagree
			"Boys are more capable of doing technology jobs than girls"			
Total	111/49.6	48/21.4	41/18.3	13/5.8	11/4.9	Disagree
Male	56/52.3	24/22.1	18/16.1	5/4.1	6/5.4	Disagree
Female	55/47.9	24/20.9	23/20.0	8/6.9	5/4.3	Disagree

The participants provided a Neutral modal value about their opinions in regards to all three opinions about technology education (see Table 12). The responses from female participants seem consistent in regards to the need and interest in technology education. More than half (53.2%) of the participants indicated "Technology lessons are important" (Tend to Agree and Agree responses combined). Slightly less than half (43.4%) of the participants thought "There should be more education about technology" (Tend to Agree and Agree responses combined). A bit more than half (51.2%) of participants trended toward disagreeing that "They would rather not have technology lessons at school" (Tend to Disagree and Disagree responses combined).

Table 12

Respondents' Views on Technology Education

Response	Disagree N/Percent	Tend to Disagree N/Percent	Neutral N/Percent	Tend to Agree N/Percent	Agree N/Percent	Mode	N
			"Technology lessons are important"				
Total	11/4.9	20/8.9	81/36.2	62/27.7	50/22.3	Neutral	224
Male	6/5.6	8/7.3	44/40.3	28/25.7	23/21.1	Neutral	109
Female	5/4.3	12/10.4	37/32.1	34/29.5	27/23.7	Neutral	115
			"I would rather not have technology lessons at school"				
Total	71/31.6	47/20.9	81/36.3	11/4.9	14/6.3	Neutral	224
Male	34/31.1	25/22.9	39/35.8	5/4.5	6/5.7	Neutral	109
Female	37/32.1	22/19.1	42/36.6	6/5.3	8/6.9	Neutral	115
			"There should be more education about technology"				
Total	13/5.9	17/7.5	102/45.5	53/23.7	39/17.4	Neutral	224
Male	5/4.3	14/12.8	47/43.3	26/23.9	17/15.7	Neutral	109
Female	8/6.9	3/2.6	55/47.1	27/24.3	22/19.1	Neutral	115

Five questions were used to interrogate the respondents' interest in a technology career (see Table 13). The modal value for the "I would enjoy a job in technology" is Tend to Agree (29.5%). However, more than 40% indicated Agree and Tend to Agree combined, and much greater than those showed inclinations to disagree. Neutral was the mode for the female participants for the following question: "Most jobs in technology are boring" (40.1%) but almost half inclined toward "Disagree" or "Tend to Disagree". In response to "Working in technology would be interesting", the modal value (40.1%) was Neutral; however, over half inclined toward Agree or Tend to Agree. "I do not understand why anyone would want a job in technology" received a modally Neutral response (38.3%), but more than half indicated Disagree or Tend to Disagree. As for responses to "I am not interested in technology" (33.1%), clearly a much greater percentage (almost 50%) inclined toward disagreement rather than agreement.

Table 13

Technology Career Interests

Response	Disagree N/Percent	Tend to Disagree N/Percent	Neutral N/Percent	Tend to Agree N/Percent	Agree N/Percent	Mode
"Most jobs in technology are boring"						
Total	34/15.1	75/33.4	87/38.8	20/8.9	8/3.7	Neutral
Male	15/13.7	39/35.8	41/37.7	7/6.4	7/6.4	Neutral
Female	19/16.5	36/31.3	46/40.1	13/11.3	1/0.8	Neutral
"Working in technology would be interesting"						
Total	5/2.2	16/7.1	80/35.7	72/32.3	51/22.7	Neutral
Male	2/1.8	11/10.1	34/31.1	43/39.4	19/17.6	Tend to Agree
Female	3/2.5	5/4.3	46/40.1	29/25.2	32/27.9	Neutral
"I do not understand why anyone would want a job in technology"						
Total	76/33.9	55/24.7	77/34.4	4/1.7	12/5.3	Neutral
Male	47/43.1	21/19.3	33/30.3	3/2.8	5/4.5	Disagree
Female	29/25.3	34/29.5	44/38.3	1/0.8	7/6.1	Neutral
"I would enjoy a job in technology"						
Total	25/11.1	27/12.2	73/32.5	56/25.1	43/19.1	Neutral
Male	9/8.3	13/11.9	48/44.1	22/20.1	17/15.6	Neutral
Female	16/13.9	14/12.3	25/21.7	34/29.5	26/22.6	Agree
"I am not interested in technology"						
Total	76/33.9	48/21.4	66/29.7	17/7.5	17/7.5	Neutral
Male	39/35.9	21/19.3	28/25.6	8/7.3	13/11.9	Disagree
Female	37/32.1	27/23.5	38/33.1	9/7.9	4/3.4	Neutral

There were four questions that were used to develop the hobbies and interests categories (see Table 14). Most of the female participants responded Disagree to two questions and Neutral to two questions. “I enjoy repairing things at home” had a modal response of Neutral (36.6%); moreover, there was an even split between those who inclined to disagree and those who inclined to agree. Although the modal response for “I think machines are boring” was also Neutral (33.7%), almost 60% indicated Disagree or Tend to Disagree. Most of the female participants disagreed (Disagree and Tend to Disagree combined) with statements about their technology interests and hobbies as evidenced by the following: "I am not interested in technology" (56.4%), "A technology hobby is boring" (66.0%), and "I think machines are boring" (58.7%). The responses to the "I enjoy repairing things at home" were evenly distributed across the entire spectrum from Disagree to Agree.

Table 14

Respondents' Indications of Hobbies and Interests

Response	Disagree N/Percent	Tend to Disagree N/Percent	Neutral N/Percent	Tend to Agree N/Percent	Agree N/Percent	Mode
			"I am not interested in technology"			
Total	76/33.9	48/21.4	66/29.7	17/7.5	17/7.5	Disagree
Male	35/32.1	24/22.1	29/26.6	10/9.1	11/10.1	Disagree
Female	41/35.6	24/20.8	37/32.1	7/6.1	6/5.3	Disagree
			"A technology hobby is boring"			
Total	63/28.3	59/26.3	84/37.5	8/3.5	10/4.4	Neutral
Male	19/17.4	27/24.7	39/45.7	2/1.8	4/3.6	Neutral
Female	44/38.2	32/27.8	27/23.4	6/5.3	6/5.3	Disagree
			"I enjoy repairing things at home"			
Total	32/14.3	39/17.4	71/31.7	45/20.1	37/16.5	Neutral
Male	25/22.9	11/10.1	29/26.6	28/25.7	16/14.7	Neutral
Female	7/6.1	28/24.3	42/36.6	17/14.7	21/18.3	Neutral
			"I think machines are boring"			
Total	61/27.3	66/29.4	75/33.4	14/6.3	8/3.6	Neutral
Male	27/24.7	33/30.2	36/33.1	11/10.1	2/1.9	Neutral
Female	34/30.1	33/28.6	39/33.7	3/2.3	6/5.3	Neutral

Female focus group results. Three female participants were eighth-graders enrolled in the same Title I school. The career aspirations of participants included FBI agent, gamer, and teacher. All of the female participants described how technology was used in their school: computers, laptops, iPads, desktops, and promethium boards. The participants also discussed their ability to bring their own devices to use at school. They welcomed this option and thought it enhanced the education experience. All of the female participants liked using technology and used it for education and entertainment purposes. The female participants used technology during school to work in groups, research topics, and submit and review assignments. The female participants used the following types of technology at home: tablet, phone, laptop, Google Drive, Edmodo, and desktop.

The female participants discussed the pitfalls or challenges associated with technology. Examples they stated of how society is not benefitting from technology included hacking and becoming lazy. The participant who cited hacking as a detriment did not elaborate on her definition of hacking; however, in the context of the discussion, she was referring to identify theft. None of the female participants considered themselves someone who knew technology well. They explained the statement with comments such as, "I use it a lot. I use it for simple things." All of the female participants mentioned an interest in learning more about technology and continuing to develop their skills. They mentioned wanting to be on the cutting edge of technology advances and the peer influence associated with the newest trends. Their peer groups introduced them to various technological advances. They valued being the first person in their peer group to use an application or other form of technology. Reasons not to want to use technology cited by

the participants included hacking, identity theft, stalking, slow programs, viruses, and becoming dependent on technology.

Research Question 2

What are the perceived experiences of male students in a Title I middle school regarding the use of interactive technology?

Male participants comprised approximately half (49.1%) of the students who completed the survey (see Table 2). The ages of the participants ranged from 13–16 years old, most of them under 15 (see Table 3). The highest percentage of male participants indicated that their fathers' and mothers' jobs had little or nothing to do with technology at rates of 63.1% and 70.2% respectively (see Tables 4 and 5).

A little less than half of the male participants (47.8%) had technology toys at home (see Table 6). Most of the male participants had computers (86.5%) in their homes but did not have technical workshops (72.9%).

Participants were asked about personal and family professional aspirations and career choices related to technology (see Table 7). The rate of male participants who considered a future technology career was about half the rate of those who did not. These responses are consistent with the low rate (18.1%) of male participants with siblings working in the technology field and the high rate (54.1%) of male participants who responded that they did not receive technology education.

Participants were asked about the probability that they would get a job in the technology field (see Table 8) and their general perceptions of technology (see Table 9). Even though about one quarter of the male participants responded with Neutral (and roughly the same percentages trended to both agreement and disagreement) to their

estimation about the probability of their getting a technology job, they seemed to value technology in society, as evidenced by responding Tend to Agree or Agree for the "Everyone needs technology" (47.6%), "Technology makes things work better" (70.5%), and "Technology is very important in life" (68.8%) statements. The responses of male participants indicated Disagree or Tend to Disagree (combined 76.1%) to “The world would be a better place without technology”.

Four survey questions were used to create the “cognitive ability need to use technology” theme (see Table 10). Responses to “You have to be smart to study technology” had a modal value of 33.9% and roughly equal percentages showing a tendency toward agreement or disagreement. Similarly, the responses to "You have to be smart to study technology" were almost equally distributed between trending to disagree, trending to Neutral, and trending to agree. Nonetheless, male participants indicated that they disagreed (responded Disagree or Tend to Disagree) with the following statements: "To study technology you have to be talented" (60.6%), "Technology is only for smart people" (74.4%), and "You can study technology only when you are good at both mathematics and science" (40.3%).

The survey included four questions pertaining to gender perceptions (see Table 11). The male participants responded Disagree the most to three questions: “Boys are able to do practical things better than girls” (61.4%), “Boys know more about technology than girls do” (58.7%), and “Boys are more capable of doing technology jobs than girls” (52.3%). The mode Agree (71.6%) applied to the following statement: “A girl can become a car mechanic”. More than four fifths (88.1%) of male participants responded Agree or Tend to Agree with the statement "A girl can become a car mechanic". Similar

percentages of male participants responded Disagree or Tend to Disagree to the other statements in this category: "Boys are able to do practical things better than girls" (77.9%), "Boys know more about technology than girls do" (73.4%), and "Boys are more capable of doing technology jobs than girls" (74.4%).

The technology education category was comprised of three questions (see Table 12). The modal response to all of the questions in this category among male participants was Neutral. Almost half of the male participants responded with some form of agreement to “There should be more education about technology”, and the modal value of Neutral was at 43.3%. A much greater percentage (46.8%) of male participants agreed (responded Agree or Tend to Agree) about "Technology lessons are important" than those who indicated disagreement, and the modal value was Neutral at 40.3%. Similarly, a much greater percentage of male participants indicated Agree or Tend to Agree (39.6%) for "There should be more education about technology" than disagreed, and the modal value was Neutral at 35.8%. When phrased a different way, male participants echoed their thoughts about technology education when they disagreed (responded Disagree or Tend to Disagree) to the "I would rather not have technology lessons at school" (54.0%).

Five questions were used to create the technology career interest category (see Table 13). Almost half the male respondents indicate some form of disagreement with the statement “Most jobs in technology are boring” while the modal value of 37.7% indicated Neutral. Although about one third of male respondents indicated either Agree or Tend to Agree to “I would enjoy a job in technology”, 44.1% were Neutral. The tendency toward agreement (Agree and Tend to Agree combined) was indicated by 57% to the statement “Working in technology would be interesting”. The responses to the statement "I would

enjoy a job in technology" trended toward a modal value of Neutral, 44.1%, although a greater percentage trended more to agreement than disagreement. The male respondents were clearly in the trend toward disagreement with the statements "I do not understand why anyone would want a job in technology" (62.4%), and "I am not interested in technology" (55.2%).

Four questions were used to develop the hobbies and interests categories (see Table 14). Over half the male respondents indicated Disagree or Tend to Disagree to the "I am not interested in technology" statement. Male participants responded 42.1% Disagree or Tend to Disagree compared to 5.4% Agree or Tend to Agree (with 45.17% Neutral) to “A technology hobby is boring”. In response to the statement, “I enjoy repairing things at home”, there was greater agreement than disagreement, but no clear trend. More than half of the respondents indicated some form of disagreement with the statement “I think machines are boring”. Male participants did not seem much interested in technology or machines as evidenced by their responses.

Male focus group results. Three male eighth-grade students participated in the focus group. The male participants' career aspirations included physical therapist, scientist, and undecided. The male participants used a variety of technological devices for academic and personal use: computers, laptops, iPads, desktops, phone, Google Drive, Edmodo, and promethium boards. The male participants also addressed the use of technology and its impact on society. One male participant paid tribute to the role youth play in technological advances "from our bright and creative generation that I do believe that our technology would advance and will create better and new things since ideas

would be developed.” Another male participant reported mixed feelings about the benefits of technology with

> Yes and no because with everything there is a consequence. So if we use things, if you use technology to help make things easier for ourselves, since construction we can make something that technology does to help the economy but it can also be a bad thing.

Male participants did not consider themselves to be someone who knows technology well. They elaborated the statement with comments such as, "I might have maybe a medium level or a good handful of knowledge about it but I don't do stuff like creating programs and things." All of the male participants mentioned an interest in learning more about technology and continuing to develop their skills. None of the participants thought there was a difference between genders when it came to using technology. A male participant stated, "I honestly think that girls, males and females can know the same amount of things with technology cause they can learn them.” Another male participant stated, "I don't believe that males are better than female in technology because we… it doesn't even matter about the type of gender it just matters about the type of knowledge that you have.”

Research Question 3

What are the differences in perceptions towards interactive technology between males and females?

In Table 3, female and male participants combined indicated that approximately 40% of their fathers' jobs were Much or Very Much technology related, and in Table 5, about the same percentage of their mothers' jobs were indicated as Much or Very Much technology related. A slightly greater percentage of male participants' fathers (63.1%) than female participants' fathers (55.7%) jobs involved technology a Little or Nothing.

The percentage of participants' mothers jobs involving technology differed between males and females as evidenced by about 70.2% of male participants responded Nothing or Little to the question while 60.1% of female participants responded Much or Very Much to the question.

According to Table 6, the percentage of males was about 2.5 times the percentage of females who had technical workshops at home. Almost twice the percentage of male participants as compared to female participants had technology toys (Table 6). The high percentages of female and male participants who indicated that they had computers in the home were virtually the same (Table 6).

Participants were asked about personal and family professional aspirations and career choices related to technology (see Tables 7 and 8). About half of female participants indicated Yes, they considered getting a technology-based job in the future, while only one third of male participant considered future employment in this field. Access to technology education was similar for males and females. Slightly more than one quarter of female participants and about one fifth of male participants had a sibling with a job in the technology field.

Four questions were used to interrogate the participants' general perceptions about technology (see Table 9). The results for all male and female participants mirror each other for three of the four questions. Almost half of male respondents were more positive about “Everyone needs technology” as compared to only one third of females responding in a like manner. The differences between male and female responses to “Technology makes things work better”, “Technology is very important in life”, and “The world would be a better place without technology” were minimal.

Four survey questions were used to create the cognitive ability needed to use technology theme (see Table 10). High percentages of both male and female participants responded with a combined Disagree and Tend to Disagree to the following questions: "To study technology you have to be talented" (10 percentage points higher for females than males), "Technology is only for smart people" (virtually identical for both genders), and "You can study technology only when you are good at both mathematics and science" (10 percentage points higher for males than females). Both male and female participants responded with almost the same percentage of combined Agree and Tend to Agree to the "You have to be smart to study technology" statement.

More male and female participants responded in the same manner to questions about gender perceptions and technology education. The survey included four questions pertaining to gender perceptions (see Table 11). Male and female participants agreed "A girl can become a car mechanic". Participants of both genders overwhelmingly disagreed with the (responded Disagree or Tend to Disagree) "Boys are able to do practical things better than girls", "Boys know more about technology than girls do", and "Boys are more capable of doing technology jobs than girls" statements.

The technology education category was comprised of three questions (see Table 12). Neutral was the mode for each of the three questions for male and female participants. About half of both male and female participants responded Disagree or Tend to Disagree to the "I would rather not have technology lessons at school" question. Male and female participants agreed about the importance of technology education as evidenced by about half of the participants from both genders responding Agree or Tend to Agree to the "technology lessons are important" question. Similar percentages of male

and female participants responded Agree or Tend to Agree to the "There should be more education about technology" question.

Five questions were used to create the technology career interest category (see Table 13). The responses were mixed between male and female participants. Slightly less than half of male participants and female responded Disagree or Tend to Disagree to the "Most jobs in technology are boring" statement. Similar percentages (slightly more than half) of male and female participants responded Disagree or Tend to Disagree to the "I do not understand why anyone would want a job in technology" and "I am not interested in technology" statements. Slightly more than half of both male and female participants responded Agree or Tend to Agree to the "Working in technology would be interesting". While more than half of the female participants agreed (responded Tend to Agree or Agree) with "I would enjoy a job in technology" statement, slightly more than one quarter of male participants responded the same way.

There were four questions that were used to develop the hobbies and interests categories (see Table 14). Slightly more than half of both male and female participants responded Disagree or Tend to Disagree to the "I am not interested in technology" and the "I think machines are boring" statements. Twenty percentage points more female participants responded Disagree or Tend to Disagree to the "A technology hobby is boring" statement compared to their male counterparts. Responses were almost evenly split among both male and female participants to the "I enjoy repairing things at home" statement.

Combined focus group results. The three male and three female focus group participants provided similar responses to the questions. All of the participants stated that they liked technology and used a wide variety of technological devices for personal and academic use: computers, tablets, laptops, iPads, desktops, phone, and promethium boards. All of the participants stated their belief that technology is beneficial to society. The participants indicated that technology can be used to "save lives" and technology "makes things easier." The participants discussed the pitfalls or challenges associated with technology. They recognized the benefits of technology and how it can also adversely impact society. Five of the six participants did not consider themselves as persons who know technology well and expressed an interest in learning more about technology. None of the participants thought there was a difference between genders when it came to using technology.

Summary

About half of female participants' parents and one third of their siblings had jobs that involved technology. Almost all of the female participants had computers in their homes even though far less of them had technical workshops or technology toys. Their interest in technology careers was mixed. Female participants found technology a valuable asset to society. Even though they did not think people had to be smart or good at math or science to study technology, female participants thought technology education was important and should be available. They did not think boys could do things better than girls. Female participants had mixed responses in regards to their perceptions of technology jobs and interests; however, they seemed to think technology was interesting. All of the female participants used multiple forms of technology and enjoyed doing so

but also understood the downfalls of technology. They considered themselves as people who knew technology well and wanted to learn more.

More than half of male participants' parents had jobs that had little or nothing related to technology. Almost all of them had computers at home and less than half of them had technology toys or technical workshops. About half of male participants did not receive technology education and less than one fifth of them were interested in pursing technology careers. A high percent of male participants thought technology had a positive impact on the world. They did not think people had to possess special cognitive skills to use technology or that boys were better versed at technology and practical activities compared to girls. Male participants thought technology lessons were important and were interested in receiving additional technology education. The responses were mixed in regards to whether they would enjoy a technology career in the future even though they disagreed that technology jobs are boring. Male participants did not seem interested in technology or machines. All of the male focus group participants used several forms of technology. Two of the three male focus group participants considered themselves well-versed technology users and all of them wanted to learn more about technology. None of the participants thought there was a difference between genders when it came to using technology.

Female participants seemed to have higher percentages of family members with jobs that involve technology compared to their male counterparts. A higher percentage of male participants than female participants had technology toys and technical workshops at home even though a slightly higher percent of female participants had computers at home. About half of female participants considered a technology career in the future

compared to about one third of male participants. Both male and female participants thought technology was important even though they did not think everyone needed technology. Male and female participants seemed to think people did not need special skills to study technology and girls could do the same things as boys. Participants of both genders were interested in technology education. The responses about technology career interests, hobbies, and interests varied between participants based on gender. All of the focus group participants enjoyed using technology and use various devices. They recognized the benefits of technology and how it can also adversely impact society. All of the focus group participants, with the exception of one, thought they had high technology skills and all of them wanted to learn more about technology. None of the participants mentioned gender differences impacting how people would use technology.

Male and female participants provided similar responses to each of the survey and focus group questions. The results of the questionnaire and interviews are included in this chapter. The survey and focus group participants shared their perceptions and behaviors in regards to technology. The participants were well versed about the role technology plays in society and the career options in the field. The researcher could analyze the data by question or review it to develop themes. Using themes and categories gave the researcher the opportunity to convey more useful results. The following themes emerged during the data analysis process: general perceptions about technology, cognitive abilities needed to use technology, gender perceptions, technology education, technology interests, and hobbies and interests. The overall finding was there was little difference between male and female participants' attitudes about gender differences in technology

aptitude and cognitive skills needed to understand technology. However, clear differences were evident in regards to technology toys and workshops.

Chapter 5: Discussion

The research questions, data collected and analyzed, and results will inform the content of this chapter. The data alone do not set the tone or provide significant insight about technology perceptions among middle school students at a Title I school in the southern region of the United States. The purpose of this chapter is to discuss the results, conclusions, and limitations of this dissertation. Additionally, recommendations for future research and educators will also be provided. The researcher put the results in context of contemporary education and provided examples of how to apply the results to the academy and professional practice.

Introduction

Using the mixed methods approach, this dissertation provided insight about technology use and perceptions of middle school students attending a Title I school in a suburban school district in the southern region of the United States. The results of this study can be used to influence future research studies and provide recommendations for professional practice. The purpose of this chapter is to discuss the results, offer suggestions for future research, and propose recommendations for practice (Creswell, 2013). The discussion of the results is an interpretation of the findings. Using this dissertation as a springboard, the section about future research provides guidance about prospective studies relative to technology education, perceptions, and use (Wang & Noe, 2010).

The purpose of this dissertation was to investigate technology use and perceptions among middle school students. In addition to examining these concepts for middle school students in general, the researcher also wanted to study male and female students

separately. Moreover, the researcher explored the degree to which similarities or differences existed based on gender. The following research questions informed this dissertation:

1. What are the perceived experiences of female students in a Title I middle school regarding the use of interactive technology?
2. What are the perceived experiences of male students in a Title I middle school regarding the use of interactive technology?
3. What are the differences in perceptions towards interactive technology between males and females?

This discussion will address each of the three research questions.

The researcher developed themes based on the survey and focus group interview questions to reveal a more compelling assessment of the data collected (Creswell, 2013). Instead of addressing each individual question, the researcher will discuss the following themes: parents' occupation, technology available at home, participants and family technology profession and education, participants' probability of getting a technology job, participants' general perceptions about technology, cognitive ability needed to use technology, gender perceptions, technology education, technology career interests, and hobbies and interests.

Results

The results of each research question were presented in detail in Chapter 4. However, the purpose of this section is to make connections to the data analysis to previously conducted studies and scholarly literature. Moreover, the connection between existing literature, whether contradictory or complementary, is also provided.

Research Question 1. What are the perceived experiences of female students in a Title I middle school regarding the use of interactive technology?

Female participants completed the questionnaire (*N = 115*) and were interviewed in the focus group (*N = 3*). The presence of potential technology role models as evidenced by a parent or sibling working in the field was almost evenly split for female participants with about half of their parents (mother and/or father) having technology-related jobs. About one quarter of the female participants' siblings were working in the technology field. There seemed to be a contradiction in the responses about female participants' perceptions about a career in technology would be boring and working in technology would be interesting. Papastergiou (2008) reported similar findings: middle school females thought technology careers would be dull and female participants were mixed about their desire to pursue the field in the future. The female participants were also neutral about their thoughts of anyone else wanting to pursue a career in the technology sector. By the same token, the female participants disagreed with the statements that a technology hobby was boring and they were not interested in technology, which was also reported in a study that included middle school female students by Vekiri and Chronaki (2008). You wouldn't think someone would want to pursue a career they thought was boring. Their interest in the technology field may be attributed to other factors not evident on the questionnaire or in the interview such as females' lack of self confidence and self efficacy as they relate to their performance in technology related tasks or careers (Zeldin, Britner, & Pajares, 2008). These responses could be informed by comments they hear from their family members about the field.

Females base their interest in a technology career on their perceptions about their parents' professional rewards and success (Schroder, Schmitt-Rodermund, & Arnaud, 2011).

About three quarters of female participants were interested or neutral about pursuing a technology job in the future and their access to technology education was almost evenly split. Female participants may not think they are receiving technology education even though they receive instruction via Promethean Boards and submit assignments and access their grades electronically. Instead of a course labeled technology, technology instruction is incorporated into most of their courses. Other authors reported similar findings in regards to the use of technological devices to deliver instruction to students off all levels, including the middle school level (Chatoney & Andreucci, 2009; Fiorini, 2010; Greenfield, 2009). The focus group participants also mentioned that they use technology in school in a variety of formats, indicating that they were quite aware that they were explicitly aware of the incorporation of technology in their courses. The uses of technology expanded greatly within the past decade. For example, cellular phones were used for calls at the turn of the 20th century and at the time of this writing students use them to access the Internet, conduct research, play games, and video chat (Goldin & Katz, 2009). The technology and career projections occurred in similar percentages as the number of female participants with parents in the technology field. This seems to suggest that females with technology-using role models are also interested in the field personally as evidenced by Papastergiou's (2008) study.

Even though the female participants who completed the survey agreed (50% responded Agree or Tend to Agree) that technology made things better and was important in life, the most frequent response among participants were neutral in regards to everyone

needing technology. This suggests that while there was some uncertainty in their professed belief about whether technology is needed by everyone, the group tilted toward the idea that this was likely true. These responses on the questionnaire mirror the responses in the focus group. These responses could be attributed to the females using the Internet as a communication method and females using technology frequently when it suits their personal interests. Crocco, Carmer, and Meier (2008) found the same trend in their study with middle school female participants. All of the female focus group participants enjoyed using technology, which could influence their thoughts about the benefits of technology, and mentioned using several forms of technology. Youth in this age group use technology to communicate with others easily and build relationships. According to Agosto and Abbas (2010), the relationships developed and maintained by female teen-aged students are not limited to their peer groups; female teens use technology as a preferred mode of communication with family members and teachers. Their preferences and access could influence their perception that technology makes things better. Female teens consider electronic communication more personal and accurate. They also think they can control the information and not over-communicate or over-share when using technology instead of face-to-face interactions. Moreover, as Farber, Shafron, Hamadani, Wald, and Nitzburg (2012) illustrate, they think face-to-face communication can lead to misunderstandings or feeling misunderstood.

The female participants were either neutral or disagreed that exceptional cognitive skills were needed to use technology. The most frequent response about needing to be talented to use technology and technology is only for smart people were Disagree. The female survey participants were evenly split about disagreeing, being neutral, or agreeing

in regards to needing to be smart and good at both mathematics and science to study technology. These responses could be informed by the uses of technology mentioned by participants such as accessing class assignments and social media. Television, video games, and the Internet are types of technology people in this age group frequent use without special training or expertise. Since the question was posed in a general fashion, the students could consider the most elementary uses in one respect; however, their knowledge about more challenging uses or creating technology could have shifted their response in regards to the connection between mathematics and science knowledge and studying technology. How females use technology seemed to influence their perception about cognitive ability needed. Likely, they thought little training or experience was needed to navigate basic technological equipment and software but knew more education was necessary to create or produce the devices they used (Greenfield, 2009; Vekiri & Chronaki, 2008; Zeldin, Britner, & Pajares, 2008).

Research Question 2. *What are the perceived experiences of male students in a Title I middle school regarding the use of interactive technology?*

The focus group included three male participants, and 111 males completed the questionnaire. Male participants did not have immediate family members with technological jobs as evidenced by between one fifth to half and of their mothers, fathers, or siblings having jobs in the field. Slightly less than half of them considered getting a technology job in the future. Some research suggests that the lack of role models may impact their interests in the field as adults. Interest in a profession, particularly technology-related industries, is impacted by youths' perception about their parents' interests, compensation, rewards, and experiences in the field (Papastergiou, 2008;

Schroder, Schmitt-Rodermund, & Arnaud, 2011). Even though a large majority of male participants had computers in their homes, only a quarter had designated workspaces. These results are consistent with Fiorini's (2010) findings that computers are present in more than 70% of households and children begin using technology at young ages.

Male participants had a positive perception about technology as evidenced by over 70% of them agreeing or tending to agree that technology makes things better and that technology is very important in life. In addition, almost half of them agreed that everyone needs technology, Moreover, over three quarters of participants disagreed or tended to disagree that the world would be a better without technology. These statements are consistent with other research, which suggests that technology is a prominent component of students' lives and they consider technology an asset (Goldin & Katz, 2009; Greenfield, 2009).

The male participants were indecisive about the cognitive skills needed to study technology. On the one hand, about half of them disagreed (Disagree and Tend to Disagree) that people needed to be talented and good at both mathematics and science to study technology. On the other hand, they were evenly split among disagreeing, agreeing, and being neutral about needing to be smart to study technology. Almost four fifths of them disagreed (Disagree and Tend to Disagree) that technology was only for smart people. These students, like other young people, seem to understand that people do not need to acquire special skills to technology for routine tasks such as social media, class assignments, research, and gaming. Some research suggests that such students are also aware specialized skills are needed to develop technology or work in the field (Greenfield, 2009; Goldin & Katz, 2009; Vekiri & Chronaki, 2008).

Gender bias did not seem present based on male participants' responses to comments that rate the technological ability of boys above girls. These data are in conformity with studies by Papastergiou (2008), Tsai and Tsai (2010), and Vekiri and Chronaki (2008). The questionnaire responses mirror those shared during the focus group interviews. The male participants associated ability with access to knowledge instead of gender, a point of view which mirrors the results of studies by Papastergiou (2008), Tsai and Tsai (2010), and Vekiri and Chronaki (2008).

Male participants who completed the survey reported mixed responses about technology education. Almost half of them were on the agreement side of the importance of technology lessons and that there should be more technology education at school. More than half of them disagreed with the idea of not having technology lessons at school. If one were to make sense of this, there seems to be significant uncertainty about tech lessons at school. Yet around half of the students did indicate a preference toward their inclusion. Even though these answers may seem contradictory, evidence exists to support both statements. On the one hand, technology is easily accessible and intuitive for these digital natives. Digital natives do not need training to use social media, complete class assignments, or gaming (Bennett & Maton, 2010; Bennett, Maton, & Kervin, 2008). According to Hargittai (2010), students' interest in more technology education could include coding and building computers. On the other hand, as in other studies (Bennett, Maton, & Kervin, 2008), the participants appeared to understand the vast array of information available related to technology and additional skills needed to perform more difficult tasks such as creating technology or programming.

Research Question 3. *What are the differences in perceptions towards interactive technology between males and females?*

This discussion will address each of the three research questions.

Similar and different themes emerged among male and female participants responses. Literature exists to in support of and contradicting these similarities and differences. A large percentage of both male and female participants had access to computers at home. Several authors (Crocco, Cramer, & Meier, 2008; Fiorini, 2010; Vekiri & Chronaki, 2008) documented the prevalence of computer (and other technological device) ownership and usage among youth. They use technological devices in their daily lives and may be considered reliant on technology to perform routine tasks such as communicating with others and gathering information (Greenfield, 2009; Vekiri & Chronaki, 2008). Unlike teens from previous generations, 21st century youth, including those in the researcher's study, do not exhibit gender bias in regards to technological career choices or ability (Papastergiou, 2008; Schroder, Schmitt-Rodermund, & Arnaud, 2011). They also understand widespread use of technology does not require special skills and more specified uses may necessitate higher order skillsets (Ardies, DeMaeyer, & Gijbels, 2013).

Male and female participants who completed the survey revealed similar responses pertaining to Internet use and confidence. They frequently used the Internet and were confident in their abilities. Contradictory research is evident in this area. Tsai and Tsai (2010) and Warschaure and Matuchniak (2010) reported similar findings to those unveiled in the researcher's study: male and female youth use the Internet regularly and have high levels of self confidence in their abilities to use technological devices. On

the other hand, contrary to the results of the researcher's study, Vekiri and Chronaki's (2008) earlier study found male youth to be more confident in their technological skills than their female counterparts.

Even though Tsai and Tsai (2010) reported both male and female youth using the Internet at the same rate, they also indicated that the type of Internet usage varied by gender. Females were more likely to use the Internet to communicate, while males used it for research and to explore. These results are different than what was reported by survey and focus group participants for this study.

Conclusions

Peshkin (1993) advises that the outcome of applied research should include advancing the field and informing scholars and practitioners. Additionally, Creswell, Plano Clark, Gutmann, and Hanson (2003) propose that the researcher should recognize areas to improve in order to avoid pitfalls of the process for each individual study. After collecting and analyzing the data and connecting the results to other research, this researcher will provide conclusions, limitations, suggestions for future research, and recommendations for professional practice.

As previously stated, the researcher intends that the results of her research be used to develop conclusions about the population in which the participants represent, advance, support, or refute scholarly literature; and/or provide additional insight into a situation (Creswell et al., 2003). The purpose of this study was to investigate the technology use and perceptions of middle school students who attend a Title I school. Additionally, the study aimed to explore these themes based on gender to determine to what degree male and female students were similar or different in their perceptions and attitudes. Overall,

there were not many differences between male and female participants. The most frequent responses for male and female participants were the same in many cases. Moreover, in instances when the mode for the responses varied between male and female participants, the most frequent responses were usually an adjoining reply (e.g., if the female mode was Disagree, the male mode was Tend to Disagree). Even though all of the participants mentioned that family members (e.g., mother, father, or siblings) work in the technology field, a higher percentage of female participants had family members working in technological jobs. All participants reported having computers at home but more males had technical workshops. Both female and male respondents also agreed that technology was a useful tool in their lives as they used it for personal and academic reasons. Participants also had access to multiple devices such as desktop and laptop computers, telephones, and tablets. Even though most of the participants mentioned being able to grow in their technology skills and pursuing a career in technology, the responses were mixed in regards to their access to and interest in technology education.

Limitations

As with all research studies, this dissertation has limits. Three limitations to this study affecting generalizability include the sampling technique, using self-reported information, and the length of time used to collect and analyze data. The researcher used a convenience sample to identify and recruit participants. This method is used to easily access participants but is not a statistically valid practice in regards to generalization (Farrokhi & Mahmoudi-Hamidabad, 2012). In order to be confident that the data can be generalized to the entire population, random sampling should be used (Collingride & Gantt, 2008). The participants for this study attended a Title I middle school in the

southern region of the United States. The research cannot be confidently applied to all Title-I middle school students. The data were collected from survey responses of participants and the researcher did not verify or use other sources to authenticate the self-reported information (Tourangeau & Yan, 2007).

Recommendations for Future Research

Recreating the wheel is not necessary when developing future research studies. Dissertations are an opportunity to springboard or inspire future research. This study pricked the surface in regards to technology and gender. Moreover, this type of study in respect to Title-I middle school students is barely covered in the literature.

The presence of family members working in the technology industry was mixed among male and female participants. Future research in this area can address the types of positions the family members assume, what information children learn about technology careers from their family members, and their level of understanding of the workplace (Schroder, Schmitt-Rodermund, & Arnaud, 2011; Zeldin, Britner, & Pajares, 2008). Even though computers were evident in a majority of the households, future research could address how and with what frequency the computers are used. With technology as a growing sector in domestic and international commerce, more information is needed about what impacts students' thoughts about being interested or disinterested in pursuing technology careers (Ardies, DeMaeyer, & Gijbels, 2013).

Both male and female participants indicated that gender did not influence their perceptions about cognitive ability or technology use and knowledge. Future research in this area could address how the students developed these assumptions. The participants provided mixed responses about the need for technology education. This may be due to

their perception of technological education as a course dedicated to technology or computing instead of integrating technology in their academic experiences (Bennett & Maton, 2010; Farber, Shafron, Hamadani, Wald, & Nitzburg, 2012; Goldin & Katz, 2009). Studies could address what type of technology training was present, what specific technology education they received, types of technology classes that would interest them, and how they would apply technology education (Chatoney & Andreucci, 2009; Greenfield, 2009).

Recommendations for Stakeholders

In addition to informing future research, the results of this dissertation can be used to create recommendations for educators, parents, and caregivers. Consider the indications that female participants, much more than males, were interested in pursuing technology careers and had more family members with careers in the technology field. Schools can create mentoring programs or sponsor career days with people working in various technology fields. This could give both male and female students access to technology role models, and such exposure may change their perceptions about pursuing a career in the field. Parents and caregivers can also forge relationships between responsible adults with technology careers and their children. Career exploration could include traditional roles such a programmer or emerging fields such as cyber-security. They can also get their children involved in technology clubs and expose them to other uses of technology aside from aimless surfing of the Internet or gaming. Other uses of technology, such as art, music, theatre, or videos, should be fostered. Students should be exposed to and educated about the vast uses of technology. This will expose children to the field and may impact their future professions. School leaders should include

technology education, at varying levels, in the curriculum (Papastergiou, 2008; Schroder, Schmitt-Rodermund, & Arnaud, 2011; Zeldin, Britner, & Pajares, 2008).

Participants who completed the questionnaire mentioned that they did not need additional education, and five out of the six focus group participants mentioned that they had novice technology knowledge and abilities. Based on their comments, the focus group participants seemed amenable to learning more technology skills if the opportunity presented itself. They also realized the value of technology training and education for future education and professional endeavors (inside and outside of the traditional technology sector). Offering technology training and courses in schools can be a means to prepare students for higher education and the workforce (Chatoney & Andreucci, 2009; Goldin & Katz, 2009).

Fewer than one fifth of all participants who completed the survey had a technical workshop at home. More parents and caregivers should consider creating an isolated workspace for computer use. Creating a technical workshop can increase academic outcomes and help establish study habits (Fiorini, 2010; Straker, Pollock, & Maslen, 2009).

Summary

The discussion of the results of this dissertation provided a context for the data collected. Various themes emerged that informed suggestions for future research and recommendations for educators, parents, and caregivers. Even though the study was conducted using students who attended a Title I middle school as participants, the discussion and recommendations can be applicable to students in other grade levels. If

implemented the recommendations can positively impact student achievement, further develop technology skills and knowledge, and impact possible career choices.

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Appendix A

Pupils' Attitudes Towards Technology Instrument

1. Are you a boy or a girl?

   Boy

   Girl

2. How old are you?

   13

   14

   15

   16

3. If your father has a job, indicate to what extent it has to do with technology.

   Nothing

   Little

   Much

   Very Much

4. If your mother has a job, indicate to what extent it has to do with technology.

   Nothing

   Little

   Much

   Very Much

5. Do you have any technical toys, like Lego, Tinkertoy, or Erector Set at home?

Yes

No

6. Is there a technical workshop in your home?

Yes

No

7. Is there a personal computer in your home?

Yes

No

8. Do you think you will choose a technical profession?

Yes

No

9. Do you have brothers or sisters that have a technical profession?

Yes

No

10. Are you taking or have you taken technology education?

Yes

No

11. I will probably get a job in technology.

    Disagree

    Tend to disagree

    Neutral

    Tend to Agree

    Agree

12. Technology makes things work better.

    Disagree

    Tend to disagree

    Neutral

    Tend to Agree

    Agree

13. You have to be smart to study technology.

    Disagree

    Tend to disagree

    Neutral

    Tend to Agree

    Agree

14. A girl can become a car mechanic.

    Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

15. Technology is very important in life.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

16. Technology is only for smart people.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

17. Technology lessons are important.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

18. Boys are able to do practical things better than girls.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

19. Everyone needs technology.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

20. I would rather not have technology lessons at school.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

21. I do not understand why anyone would want a job in technology.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

22. I would enjoy a job in technology.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

23. Boys know more about technology than girls do.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

24. The world would be a better place without technology.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

25. To study technology you need to be talented.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

26. I would like a career in technology later on.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

27. I am not interested in technology.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

28. Boys are more capable of doing technological jobs than girls.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

29. You can study technology only when you are good at both mathematics and science.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

30. There should be more education about technology.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

31. I enjoy repairing things at home.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

32. Most jobs in technology are boring.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

33. I think machines are boring.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

34. Working in technology would be interesting.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

35. A technological hobby is boring.

Disagree

Tend to disagree

Neutral

Tend to Agree

Agree

36. Type your student ID number: _____

Appendix B

Focus Group Interview Questions

Introduction:

Welcome! I would like to thank both you and your parents for making this meeting possible. I want to start off by informing you on the reason as to why you were chosen to participate in this discussion.

I am Miss Teague, an 8th special education teacher. I am also a student at Nova Southeastern University and I am working towards a doctoral degree that focuses on Instructional Technology and Distance Education. This focus group interview is part of the dissertation process and will help our school find ways to ensure student needs and experiences are included in the technology integration selection process. As students you provide this study with unique experiences and perceptions about using interactive technology such as cell phones, blogs, iPads, and desktop computers. I would like to get to know your reasons behind the way you use the technology that is available to you both at home and at school. Your voice will be recorded through the use of this digital device (note the mobile phone); however, I will be the only person that will ever hear this file to transcribe it (explain transcription), and I will be changing your names while I write. Your identities will remain confidential. If at any point you feel uncomfortable with a question or a statement, please feel free to omit, or say skip, your response.

Before we get started, do you have any questions?

(Pause for questions, continue if none, address questions as necessary).

Questions:

1. Please begin by stating your name, grade level, and a brief statement about what you would like to do as a profession (what do you want to be when you grow up?).

2. What kind of technology do you have at school?

3. How much do you like using technology?

4. Generally, what is your main purpose for using technology during school?

5. Do you use any technology at home? If so, what kind?

6. How much do you like using this technology?

7. What is your main purpose for using technology at home?

8. Do you run into issues or problems when using technology and if so, what do you do?

9. Do you believe that you are benefiting or will be benefiting in the future from the use of technology? If so, what are they?

10. Do you believe that you are not benefiting or will not be benefiting in the future from the use of technology? If so, what are they?

11. Do you think of yourself as a person that knows technology well? Why or why not?

12. What are some things that would make you want to use technology?

13. What are some things that would make you not want to use technology?

14. Do you believe that boys (males) are better at using technology than girls (females)? Why or why not?

15. Did you think of anything else about technology that I did not go over?

Concluding Remarks

Thank you once again for being here! I appreciate your time and honest answers. I am looking forward to reviewing the conversation that we had and including it in my research.

Appendix C

Focus Group Interview Transcripts

Participants
Participant 1 (girl – 8th grade)
Participant 2 (boy – 8th grade)
Participant 3 (girl – 8th grade)
Participant 4 (girl – 8th grade)
Participant 5 (boy – 8th grade)
Participant 6 (boy – 8th grade)

Researcher
Good afternoon everyone. As you know, I'm Ms. Teague and I'm in my last semester of graduate school. I will graduate with a degree: a doctorate in instructional technology and distance education. And the purpose of this group interview is to get your perspectives and your thoughts about the use of technology. As I explained to you before it is often times that they purchased technology for you all and they don't know you what you really like. So the purpose of this interview will be for you all to give insight of what you think about technology. And I want your honest opinions and I want you know that your names will not be used in the research. You comments will not be shared with anyone except the person who is transcribing the interviews. Alright? So whatever is said in this room, stays amongst us but it will be used to help the technology department. Any questions before we start? Any thoughts?

Participants
No

Researcher
Are you sure?

[Head nods from participants]

Okay

Researcher
I will assign each of you a number. Please state your number staring with you [points to student].

Participant #1
One

Participant #2
Two

Participant #3
Three

Participant #4
Four

Participant #5
Five

Participant #6
Six

Researcher
Remember we are going in order of your number. When I ask you the question, give me your input. Alright? So number one is *Please begin by stating your name, grade level, and a brief statement about what you would like to do as a profession. It's basically what do you want to be when you grow up?). Number One*

Participant #1:
So we do our name and then our grade and then what we want to do?

Researcher
Umm hmm

Participant #1:
Okay

Researcher
Very loud

Participant #1:
Okay

Participant #1:
Umm [name]. I'm in the eighth grade and when I get older I want to become FBI.

Participant #2:
[name]. I'm in the eighth grade and when I become older I want to become a physical therapist.

Participant #3:
[name] and I'm in the eighth grade. Gamer.

Participant #4:
My name is [name] and I'm in the eighth grade and I want to be a teacher when I grow up.

Participant #5:
I'm [name]. I'm an eighth grader. When I'm older I want to be a scientist.

Participant #6:
[name]. I'm in the eighth grade. I don't know what I want to become when I'm older.

Researcher
Number two: what kind of technology do you have at school?

Participant #1:
Umm in our school.

Researcher
Say your number.

Participant #1:
Number 1. In our school we have computers, umm we can use our devices if we have some. We have laptops, iPads, and excreta.

Participant #2:
Number 2. In our school we have laptops, desktops, iPads, other devices and um promethium boards.

Participant #3:
Number 3. In our school we have iPads, laptops, desktops, and promethium boards.

Participant #4:
Umm, number 4. We have a laptop computers, bluesticks.

Participant #5:
Number 5. At our school we have laptops, desktops, iPads, promethium boards, and BYO devices.

Participant #6:
Number 6.

Researcher
Alright. Number three. *How much do you like using technology?*

Participant #1:
Number 1. I like using technology a lot.

Participant #2:
Number 2. I like using technology. It makes things easier for me.

Participant #3:
Number 3. I like using technology a lot. It helps with school work and project.

Participant #4:
Number 4. Technology helps me entertain myself and entertain myself.

Participant #5:
Number 5. I like using technology.

Participant #6:
Number 6. Using technology is fun.

Researcher
Question number 4. Generally, what is your main purpose for using technology during school?

Participant #1:
Number 1. Doing research for projects and stuff. I like cuz um, some teachers they assign us homework on line. We can do it at home if we don't have time at school and stuff.

Participant #2:
Number 2. My most use for technology is for assignments. I most useful thing for technology is Emodo.

Researcher
What is Edmodo?

Participant #2
Edmodo is a, it's like a, resource that we use. It teaches you to manage assignments. There's like a group code. You join that group and like for a class period or something and put up class assignments and stuff and you turn em in.

Participant #3:
Number 3. Um. [clears throat]. Can you repeat the question?

[laughter]

Researcher
Generally, what is your main purpose for using technology during school?

Participant #3:
Umm. My main purpose for using technology during school is probably looking at research and turning in homework.

Participant #4:
Number 4. I use technology to help with my assignments like looking for stuff and turning in work.

Participant #5:

Number 5. I use technology in school to do group work, turn in in assignments, and research.

Participant #6:
Number 6. About 70 or 75 percent of the time I'm on programs such as Microsoft Windows, Board, and Google.

Researcher
Alright. Ready for the next question? *Do you use any technology at home? If so, what kind?*

Participant #1:
Yes, Number 1, yes. I use technology at home. I use um a tablet, um my phone, um a laptop I have at home.

Participant #2:
The technology I use at home. Like I use, I use my computer tablet, my phone. I use Google Drive and Edmodo – things like that.

Participant #3:
Number 3 at home we - I have a computer and my phone. I usually use those two to do homework and and personal networking and entertainment.

Participant #4:
Number 4. I have a desktop and a laptop at home and my phone and I use it for, for, I use it for research for school.

Researcher
You need to speak up even louder. Can you come closer please? We need to make sure we can capture all of your answers. Use your outdoor voice like you're outside with your friends.

[laughter]

Participant #5:
Number 5. I have a desktop and a laptop. I use my phone for education purposes.

Participant #6:
Number 6. At home I have a laptop, my phone, and my video game console, that so I can use for entertainment and educational reasons.

Researcher
Okay. Very good.

Do you know what's funny? Is I'm listening to the answers and it is going back to what research says. Students your age use technology for social reasons.

Sorry guys. It's the tech geek coming out.

[laughter]

Alright. Ready?

Number 6. *How much do you like using this technology?*

Participant #1:
Number 1. I like using technology. I like using technology um a lot. It's very helpful in many ways like explaining you're explaining you're bored or with education and projects and stuff.

Participant #2:
Number 2. I enjoy using technology a lot. It's very helpful.

Participant #3:
Number 3. I like using technology a lot. It's helpful with schoolwork. It helpful for entertainment and keeping me occupied when I'm bored.

Participant #4:
Number 4. A I like, I really like using technology because I can use it or researcher for purposes and a using it for entertainment. I can also use it for find it if I need to use it to find a place. I can use it like a map.

Participant #5:
Number 5. I really like technology because it helps in the real world. It helps us do real world things.

Participant #6:
Number 6. I have personally always loved using technology. Umm it has been something that has always helped me with different things. Um so it's very useful.

Researcher
I need to you all to speak very loudly. We have about six more questions and we need to make sure everything is recorded.

[laughter]

Alright so here we are. Number 7. You may have answered part of this question already. *What is your main purpose for using technology at home?*

Participant #1:
Number 1. My main purpose for using technology at home is to help me with projects at

home with projects for school if I didn't finish it at school or like just for fun.

Participant #2:
Number 2. My main purpose for using technology at home is probably entertainment.

Participant #3:
Number 3. My main purpose for using technology at home is for reading.

Participant #4:
Umm Number 4. My main purpose for using technology is probably research and entertainment.

Participant #5:
Number 5. My main purpose for using technology is social media.

Participant #6:
Number 6. Um usually when I'm at home, I am on when I'm on technology, I'm doing entertainment like Instagram and Snapchat.

Researcher
Number 8. Do you run into issues or problems when using technology and if so, what do you do?

Participant #1:
Number 1. Yes, I run into issues when it comes to technology because sometimes um it doesn't work and it doesn't allow me to do things.

Researcher
So what do you do?

Participant #1:
Um I usually restart it or just turn shut off the computer and turn it back on.

Participant #2:
Number 2. Um yes I do encounter problems when I use technology. It's usually when I get problems I just take a break to see if I can figure it out later.

Participant #3:
Number 3. Yes, I do run into problems using technology. Most of the time I just put it away or ask my brother.

Participant #4:
Number 4. Yes, I run into problems with technology. Usually they are like typing errors so like I use autocorrect so every time I typing something it messes it up so I don't bother with it.

Participant #5:
Number 5. I do um have issues with using technology and what I would do is ask my brother or sister or try to figure it out myself.

Participant #6:
Number 6. Um I will occasionally run into a problems with technology such as software glitch, outdated software, or the ordinarily virus. If any other those happen I will restart the device.

Researcher
Number 9. Do you believe that you are benefiting or will be benefiting in the future from the use of technology? If so, what are they?

Participant #1:
Number 1. I um. I believe that in my view a lot of stuff, like a lot of new stuff will be coming out and that will help me.

[pause]

Researcher
Number 9. Do you believe that you are benefiting or will be benefiting in the future from the use of technology? If so, what are they?

[pause]

Participant #2:
Number 2. Yes I feel like I benefit from technology. As we evolve more and more technology cuz we like adapt to each new step.

Participant #3:
Number 3. Yes, I do believe that I benefitting from using technology. Um technology evolves it's more advanced and the more advanced technology makes people more advanced.

Participant #4:
Number 4. I, I think, I believe that we are benefitting from technology because technology technology is evolving each and every day and it is helping us with resources and stuff. And helping us research and stuff. Doctors probably use technology to save people's lives.

Participant #5:
Number 5. From our bright and creative generation that I do believe that our technology would advance and will create better and new things since ideas would be developed.

Participant #6:

Number 6. Yes and no because with everything there is a consequence so if we use things if you use technology to help make things easier for ourselves since um construction we can make something that technology does to help the economy but it can also be a bad thing.

Researcher
Do you believe that you are not benefiting or will not be benefiting in the future from the use of technology? If so, what are they?

Participant #1:
Number 1. Um [pause] like [name] said – sorry- there is consequences to everything. Those are different for everything. Some people use technology for bad stuff like hacking and like going into people's account and stuff and more bad people.

Participant #2:
Number 2. Um I don't know if we benefit. As they advance more they will make us to rely on it more.

Participant #3:
Number 3. In the future we probably won't be benefiting from technology as much because we are going to end up being lazy and stupid and that is sad.

Researcher
Okay. Tell us how you really feel.

[laughter]

Participant #1:
The movie Wally is like that.

Participant #2:
Yeah, it is.

Participant #6:
They use technology to do less. It's a good movie. It came out a few years ago.

Participant #1:
I think it's a Disney movie.

Researcher
I'll have to watch that one.

Many Participants
Yes, you should.

Participant #4:
Number 4. Okay. Number 4. I don't think we won't be benefiting from technology that much because other places can use technology against America cause they can like listen to whole conversations or other stuff.

Participant #5:
Number 5. Cause like 6 said in the other question. I do agree that the unemployment rate would go down because we tend to get lazy and let technology do it.

Participant #6:
Number 6. Um as we start advancing technology at the rate that we have been doing for the past 30 40 years. Um it will start to make certain people obsolete as people who don't go through an education won't have as many jobs such as plumbing, construction, or engineering. Um for example, and that'll put a major clog in commerce. Um I think that is it.

Researcher
Wow. Alright. You said things that I would not have thought of. You shared a lot of stuff.

Let's see. The next question.

Do you think of yourself as a person that knows technology well? Why or why not?

Participant #1:
Number 1. As a person I don't really consider using knowing a lot about technology even though I use it a lot. I use it for simple things. I don't go overboard like some people like the most.

Researcher
What's the most though?

Participant #1:
Like building games and like creating games and stuff. I just like how to do you do that. I don’t do that so I'm not like that.

Researcher
Okay, number 2. We're ready for number 2. *Do you think of yourself as a person that knows technology well? Why or why not?*

Participant #2:
Number 2. Um. I don’t' think of myself as knowing technology well. Um I might have maybe a medium level or a good handful of knowledge about it but I don't do stuff like creating programs and things. I just do like simple stuff like stuff that I just have to turn it on or look up what things mean.

Participant #3:

Number 3. I do not consider myself someone who knows a whole lot about technology. I know types of technology but most of the time I don't know how to use it.

Researcher
Number 4.

Participant #4:
Number 4. Well I think I do know a lot of technology compared to other people because my parents, they are not from this country so they for technology they don't really know how to use it so I help them.

Participant #5:
Number 5. In my point of view I do consider myself. I don't consider myself someone who knows technology well because I basically know how to turn it on and off.

[laughter]

Researcher
Number 6.

Participant #6:
Number 6. I have personally always thought of myself as someone who is a technology geek so I do consider myself more skilled in technology than some of my peers. I can definitely learn more because I want to understand more but I definitely consider myself skilled in technology.

Researcher
Okay. Great. Alright. Let's see. Here we are. We're almost down to the wire you guys. *What are some things that would make you want to use technology?*

Participant #1:
Number 1. Some of the things. Some of the things. [giggle]

Researcher:
What are some things that would make you want to use technology?

Participant #1:
Some of the things that would make me want to use technology would be um [pause] um like new games and stuff like Flappy Birds. That would be one. And like some type of entertainment like new stuff. Like you can print out pictures and stuff and they come out really clean and stuff.

Participant #2:
Number 2. Things that would make people want to use technology more maybe tutorials on how to like use it effectively and like be able to use to where you can use it in everyday life and stuff like that.

Participant #3:
Number 3. Um thing that would make you use technology would be games and social media.

Participant #4:
Number 4. A things that a would make me want to use technology more is like advertisement or to see my if other people have this type of technology that I would use so I can get into it.

Participant #5:
Number 5. Things that would make me want to use technology more would be like exciting, social stuff like games that entertain me.

Participant #6:
Number 6. Um [pause] peer pressure probably would have a lot to do with it as when you see various friends use other things and then you are going to be wanting to have it to play it or be a one of the cool people that have it.

Researcher
What are some things that would make you not want to use technology?

Participant #1:
Number 1. Some thing that would not make me want to use technology is that there is people that hack. Like I said before they can hack and steal people's information and stalk you and stuff. Um you have to be careful with technology at times because you never know what could happen in situations and you don't know what you would get yourself into.

Participant #2:
Number 2. Um something that thing that would make you not want to use technology is how some things don't work or are slow.

Participant #3:
Number 3. What makes me not want to use technology is viruses.

Participant #4:
Number 4. What make me not want to use technology is like errors that can happen and other people sending stuff over the net that I don't want.

Participant #5:
Number 5. Things that would make me not want to use technology is the danger that some people can know where you live and know where you are.

Participant #6:

Number 6. Um with how dependent we are on technology and people who are willing to hack and find out exactly where you are. It leaves room for personal outbreaks that you don't want to have public.

Researcher
Last question. Do you believe that boys (males) are better at using technology than girls (females)? Why or why not?

Participant #1:
Number 1. Um no I don't believe that males are better than females because as some say that if males can do it females can do it as well and I mean girls find out things more quickly than males but guys don't realize that.

[laughter]

Us girls can basically do anything too.

Researcher
Girl power!

Participant #2:
Okay um. Number 2. Um I honestly think that girls, males and females can know the same amount of things with technology cause they can learn them.

Participant #3:
Number 3. I do not believe that males are better at technology than females because they can – some males can be better and females can be better as well.

Participant #4:
Um Number 4. Well I think of a male and females cause use technology at the same stature because it only matters to what they experience and what you have with that technology.

Participant #5:
Number 5. I don't believe that males are better than female in technology because we it doesn't even matter about the type of gender it just matters about the type of knowledge that you have.

Participant #6:
Number 6. Um it all depends on the person because if you have a waitress in a bar and but you have then she's not going to know as much as let's say um someone in college that is getting their Master's degree. Um but then again in past years there has also been a winner of a Nobel Peace Prize er I can't remember what award it was but um she won an award for her amazing math skills and it was a woman. So it all depends on the person not the gender.

Researcher
Any other comments or anything? Any other thoughts you want to share? Did you think of anything else about technology that I did not go over?

[silence]

Thank you everyone. Very good. Thank you for the information. You all did an awesome job!