PARENTS OF AUTISTIC CHILDREN AND THEIR EXPERIENCES WITH ASSISTIVE TECHNOLOGY

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Abstract

Assistive Technology (AT) has become an important tool used by special needs children for improving their quality of life by empowering their abilities, therefore improving their personal independence. The purpose of this Interpretative Phenomenological Analysis (IPA) study was to closely examine the experiences and meaning-making of parents, of children with Autism Spectrum Disorder (ASD), using assistive technology. Specifically, this study will examine parental experiences using assistive technology in support of the ASD child, using the framework of expectancy value theory (Atkinson, 1957) and the tenants of Ardelt and Eccles’s (2001) parental self-efficacy theory to understand the dynamic interplay between the personal, behavioral, and environmental influences (Bandura, 1997). Using an Interpretative Phenomenological Analysis (IPA) within the parental expectancy-value theory framework, this study will investigate the following research question: *How do parents of autistic children make sense of their experiences with assistive technology?* The findings indicate that although parents find value in their everyday use of technology, they do not perceive technology as being critical for their disabled child at home. The findings of this study may lend new meaning and understanding in supporting children’s academic success, while conclusions drawn could be used to inform, create dialogue, and aid in the development of ways to support parents of children diagnosed with an autism spectrum disorder.

Key words: autism, assistive technology, self-efficacy, IPA
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Chapter I: Introduction

The bright white building of The Education Cooperative (TEC) in Walpole, MA sits high on a hill surrounded by green pine and oak trees, flowers, and an adaptive playground being built jointly by teachers and parents. The building is well lit and all the doors and windows are decorated with vibrant colors and designs. Student created artwork is highlighted and displayed throughout the school to support the cooperative theme: “Learning for All”. During any school day, the Cooperative, best known as TEC, operates in a busy environment, much like that of a beehive of worker-bees getting to the task of their daily work.

Although the environment is busy, it operates as a cover of the highly structured, complex, and challenging work that takes place in each classroom. TEC is a school that specialized in students who have a variety of physical, social, and emotional needs. The majority of students are diagnosed with a form of autism. Autism is a spectrum disorder, meaning that there are many variations in how it affects students. These disorders are closely related however they affect people differently. Students diagnosed with Autism Spectrum Disorder often struggle to communicate, have problems with social skills, and engage in restrictive activities and interests (Simonoff, Pickles, Charman, Chandler, Loucas, & Baird, 2008). Every child on the autism spectrum has these problems to varying degrees. However, the level of disability and combination of severities vary tremendously from child to child. Teaching children diagnosed with ASD requires flexibility, ingenuity, patience, and persistence.

As you traverse the hallways of the TEC Cooperative, the classrooms and halls are littered with a variety of assistive technologies. There are access and environmental controls to help people get around the school, assistive listening devices, augmented communication devices to help students communicate, computer-based instructional systems to aid and promote
learning, mobility equipment to benefit student movement, positioning aids to support student position, as well as visual aids. Assistive technologies are generally described as anything that can be used to improve the functional capabilities of a child with a disability.

Although the use of assistive technologies is intended to enhance, augment, and advance student learning in the special education environment it can hindered it, often by parents who are overwhelmed with the technologies (Brosnan, Parson, Good, & Yuill, 2016). Even newly trained teachers to TEC are often overcome by the vast array of assistive technologies that are used in their classrooms (Shepard, Fowler, McCormick, Wilson, Morgan, 2016). So, it is not surprising that parents are often confused and frustrated by the infinite number of technologies to choose from or how to use them in support of their ASD child. It is not uncommon to hear the following during Parent/Teacher conferences: *What is the best technology for my child? Why? How do I use it? When do I use it?* The frustration level for parents with children with diagnosed with ASD using assistive technology is very high because they want the best for their children.

At a recent Parent/Teacher conference, a student’s mother spoke with tears in her eyes. She wants to help her son use the assistive technology at home. When she does, her son becomes so frustrated with the technology he bangs his head on the table. She told me she just wanted to help him, so she took the device from his hands in an effort to show him how to use it. She began to cry more stating it was so confusing. She told me she got so frustrated she began to cry in front of her son and walked away. She looked with tears in her eyes and said: *How can he learn it if I can’t? How can I learn this? When do I have time? Is there a class, a manual I can read or can you teach me? How do I know that this is right for my son? Why is everything so*
hard? The frustrations, confusion, and exasperation that my student’s parent felt is typical of many parents of ASD children trying to support their child.

Statement of the Problem

Assistive Technology (AT) has become an important tool used by parents and teachers for improving the quality of life for children with disabilities. Lewis (1998) defines AT using the Individuals with Disabilities Education Act of 1990 as “any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of a child with a disability” (20 U.S.C. 1401 [25], Sec. 300.5; Individuals with Disabilities Education Act, 1990). As defined, it is no surprise the potential AT has for empowering disabled children’s mainstream inclusion and personal independence.

Studies have shown that student use of AT in disabled student’s daily activities has increased their understanding of their learning (Jeffs, Behrmann, & Bannan-Ritland, 2006; Nelson & Manahant, 2014; Scherer, 1996; Wehmeyer, 1999) and has demonstrated improvements in work quality and measured learning outcomes (Dodd, 2014; Cheung & Slavin, 2013). Other studies have shown the importance of the role of the family when implementing assistive technologies with their disabled child (Aronson & Orr, 2014; Dawe, 2006; Haq & Elhoweris, 2013; Judge, 2002). Further, parental involvement has been shown to be a critical factor in determining the effectiveness of assistive technology in student learning (Alzrayer, Banda, & Koul, 2014; Clark, Austin, & Craike, 2014). Despite the evidence, empirical data examining the level of understanding that parents have about assistive technology, however, is lacking. Therefore, the objective is to understand the phenomena.
Exploring how parents of autistic children make sense of their experiences with assistive technology is important because parents often act in the role of educator, teacher, and caregiver for their children who may be unable to communicate the advantages or disadvantages of their own experiences (Charlop-Christy, Carpenter, Le, LeBlanc & Kellet, 2002; Wetherby & Prutting, 1984). Understanding these parental experiences using assistive technology may shed light on the effectiveness of the technologies and, by extension, the value assistive technology plays in assisting children diagnosed with autism spectrum disorders. Furthermore, examining the phenomena through the lens of parental self-efficacy (Hastings & Brown, 2002; Jones & Prinz, 2005), may also reveal more about how parental understanding of their experiences with AT may affect their child’s experiences and development.

The purpose of this Interpretative Phenomenological Analysis (IPA) study was to understand how parents of autistic children make sense of their experiences with assistive technology. Specifically, this study examined parental experiences with assistive technology using the frame work of expectancy value theory (Atkinson, 1957) and the tenants of Ardelt and Eccles’s (2001) parental self-efficacy theory to understand the dynamic interplay between the personal, behavioral, and environmental influences (Bandura, 1997). The following question guided this research: How do parents of autistic children make sense of their experiences with assistive technology?

The topic. Despite unpromising life prospects, autistic children are able to rise above the personal limitations of their disability. Parent’s determination and efforts likely to play an important role in their child’s achievement, particularly in education (Charlop-Christy, Carpenter, Le, LeBlanc & Kellet, 2002). The traditional answer to how autistic children succeed centers on the family and the role of parents. In theory and empirical research, achievement is
sponsored by nurturing parents who maintain high standards of excellence and discipline (e.g., Clark, 1983; Eccles et al., 1993; Lesch et al., 1997) and involve themselves in their child’s education (Charlop-Christy, Carpenter, Le, LeBlanc & Kellet, 2002; Wetherby & Prutting, 1984). Typically, what is left out of the picture are the efforts of the family and more specifically, the parent, is to understand how they make sense of their experiences with the technology in support of their child. Therefore, the focus of this research was to understand how parents make sense of assistive technology in support of their child diagnosed with ASD.

**Research problem.** The United States is nearing a crisis in public education due to the rising numbers of students with Autism Spectrum Disorders (ASD). Autism is the fastest-growing developmental disability in the U. S. (Center for Disease Control and Prevention, 2014). Today, more than 3.5 million Americans live with a diagnosis of an autism spectrum disorder (Buescher et al., 2014). The frequency of autism in U.S. children has increased 119.4% from 2000, where 1 in 150 children were diagnosed, to 1 in 68 in 2010 (Center for Disease Control and Prevention, 2014). Although ASD differs significantly in oddity and severity, it does not discriminate between the genders or ethnic and socioeconomic groups. Unfortunately, there is no known cure for autism (Autism Society of America, 2014; Center for Disease Control and Prevention, 2014).

Research has revealed how families who orient themselves with assistive technology, experience greater success in their child’s communication, in turn giving the child increased control over their lives (Dunst, Trivette, Gordon & Starnes, 1993; Trivette, Dunst, Boyd & Hamby, 1996; Trivette, Dunst, Hamby & LaPointe, 1996). These studies highlight the importance of the role of parents and their understanding of assistive technology (Dawe, 2006; Bailey, Parette, Stone, Angell & Carroll, 2006; Judge, 2002). Jeffs, Behrmann, and Bannan-
Ritland (2006) report how when parents and children use assistive technology to meet the child’s learning needs, the technology enhanced opportunities for interaction and engagement while allowing parents and the child to learn from each other.

With technology as one of the driving forces in society, as well as the preferred tool used for children with ASD (Mineo, Ziegler, & Salkin, 2009), the use of an assistive technology is a logical step for parents (Bosseler & Massaro, 2003). Although assistive technologies have multiple uses, some such as the iPad, iPod, and iPhone can be easily adapted to address the individual needs of an ASD child with little effort by the user (Lin & Nzai, 2014; Silver & Oakes, 2001). The effectiveness and use of these touch communication devices for ASD students is well documented (Cheung & Slavin, 2013; Dodd, 2014), while other studies have shown the importance of the role of the family when implementing these assistive and iPad technologies (Dawe, 2006; Judge, 2002). However, a close examination of the experiences and meaning-making activities of parents, of ASD children, has not been fully studied.

The phenomena addressed in this study is the understanding of how parents with children diagnosed with ASD make sense of their experiences using assistive technology. Parents often rely on their own understanding of how to implement assistive technology to understand how their child with ASD makes sense of the factors influence the use of at assistive technology at home (Brotherson, Cook & Parette, 1996; Dawe, 2006; Jeffs, Behrmann & Bannan-Ritland, 2006). Parental reliance on their own understanding of assistive technology is explained by McNaughton, Rackensperber, Benedek-Wood, Krezman, Williams & Light (2008) who identified a lack of training, (Krantz, 2000), a lack of confidence (Bernheimer & Weisener, 2007; Callahan, Heson, & Cowan, 2008), as well as an undeveloped competency in the use of the assistive device (Paul & Frea, 2002), as major obstacles in the use of AT. Other studies (Angelo,
Kokosa, & Jones, 1996; Goldbart & Marshall, 2008), have provided details on the benefits and challenges that children have using the technology as perceived by their parents. At present, there is only limited information concerning parent’s experiences with assistive technology in supporting their ASD child. Therefore, the purpose of this study was to understand the phenomena acutely using an IPA methodology.

**Justification for the research problem and deficiencies in the evidence.** Although there have been studies identifying the increasing gap between teachers and parent’s perceptions of the implementation of assistive technology (Bernheimer & Weisener, 2007; Callahan, Heson, & Cowan, 2008; Paul & Frea, 2002), there has been little if any, research conducted on how parents experience and make sense of and use assistive technology applications. Most recently, studies have directed their research towards the need for training and support to parents in implementing the use of tablet devices (Grave, Glessner, Chiasson, & Johnson, 2014), the attitudes of parents and professionals toward the utilization of iPads in the classroom (Clark, Austin, & Craike, 2014), and the impact of tablet-based devices on the skills of individuals with autism (Alzrayer, Banda, & Koul, 2014).

Although studies about parent implemented applications of assistive technology is limited, Grave et al. (2014) identify how iPads are expected to be utilized by special education teachers to meet the needs of their students. The study explored the perceptions of 28 special education teachers/graduate students and the need for parental training and support on individual student’s use of iPads (Grave et al., 2014). Teacher and student perceptions were compared to both teacher and parent reports of related iPad services to their actual practices and utilization of iPads (Grave et al., 2014). The majority of subjects agreed that both professionals and parents should be provided training and support in all aspects of iPad use to the needs of individuals with
disabilities. However, the study also identified that the majority of subject disagreed with declarations that the needs of students were being met in practice (Grave et al., 2014).

Clark, Austin, and Craike (2014) explored professional and parental attitudes toward assistive technology with students within Autism Spectrum. This study conducted a survey of parents and professionals’ anxiety and self-efficacy, attitude toward assistive technologies (Clark, Austin & Craike, 2014). Findings report that both parents and professionals had positive attitudes toward assistive technology use for ASD children, but failed to specify parental experiences using the devices (Clark, Austin & Craike, 2014). Although parents reported high use of assistive technology by their children (Clark, Austin & Craike, 2014), education professionals reported limited use of such technologies by parents in support of the curriculum (Zapf, Scherer, Baxter & Rintala, 2016). These findings suggest that assistive technologies are not being used by parents because parental experiences may be limited through a lack of exposure or use (Clark, Austin & Craike, 2014; Zapf, Scherer, Baxter & Rintala, 2016).

To improve student learning, educators, and technologists have attempted to design and develop assistive technologies that meet the social, physical, and academic needs of ASD students (Clark, Austin & Craike, 2014; Grave, Glessner, Chiasson, & Johnson, 2014). Past studies on the use of assistive technologies have focused on student use of these tools to improve student learning (Bosseler & Massaro, 2003; Mineo, Ziegler, & Salkin, 2009). There are few studies that examine parental use of these assistive technologies in support of their ASD children (Grave et al., 2014), there are no studies found about how parents make meaning of their experiences with assistive technology. The value from understanding this phenomena may be used to other parents, educators, and caregivers the importance of assistive technologies in the
developmental learning of ASD students. The results of this study will also be helpful to fill the
deficiencies in understanding AT practice within the literature.

The lack of research studying the specific lived experience of parents using assistive
technologies to support their ASD child illustrates a gap in the research base and provides a
rationale for studying this problem of practice using the tools and methods of an Interpretative
Phenomenological Analysis. IPA highlights studying people as individuals and how they are
making sense of the world around them (Creswell, 2013). Each individual is different with
unique values and therefore it is the researcher’s goal to generate a rich and detailed descriptions
of how individuals are experiencing the phenomena under investigation (Pietkiewicz & Smith,
2014). The IPA approach provides the researcher a deeper understanding of how parents are
making meaning of assistive technology. The richness of the themes that the researcher
cautiously exudes from the detailed stories each parent participant brings to the study, will
further advance the development of assistive technologies by allowing insight into parental
involvements with the devices (Smith & Osborn, 2008). Comprehending parents’ experience
with assistive technology and more importantly how they make meaning of that experience, is
critical to developing better technologies and ways of sharing technologies with parents and
children who use the devices.

Further, understanding parental experiences with AT is important because of the impact
that AT has on increasing children’s skills (Alzrayer, Banda & Koul, 2014). Alzrayer, Banda,
and Koul, (2014) revealed the impact and effectiveness of assistive technologies with individuals
with Autism and other developmental disabilities were highly effective in increasing the
communication skills of these individuals. In their analysis, a total of 15 studies were reviewed
and found that participants were able to continue their use of the iPad App at a higher level
allowing them to use them in the contexts of a novel (Alzrayer, Banda & Koul, 2014). The study further finds that parents and caregivers of disabled children have a positive perception towards devices that improve the quality of life of children with Autism and other developmental disabilities. However, none of the studies reviewed identified the experiences of the parents using these devices, nor did they discuss whether parents worked with their child using the devices.

With the rising number of children with ASD who need individualized education there is a critical need for researchers to explore how parents of children with ASD make sense of their experiences with assistive technology. In an effort to achieve that goal, this study seeks to understand how parents make meaning of their use of assistive technology and how their understanding may support the social, emotional, and academic development of the child. By highlighting these experiences, the findings of this study may inform parents, educators, policy makers, public education administrators, and social workers as they implement assistive technology into specialized programs such as school initiated Individual Education Plans (IEP) and home intervention plans.

**Relating the discussion to audiences.** Autism is found amongst people all over the world, failing to discriminate between all racial, ethnic, and socioeconomic groups. According to the Centers for Disease Control and Prevention (CDC, 2014), between 1 in 100 and 1 in 300 – with an average of 1 in 150 – children in the United States have been diagnosed with Autism. The disorder occurs four times more often in boys (usually the first-born) than in girls, with one in every 94 boys diagnosed with autism (CDC, 2014). Unfortunately, girls with the disorder generally have grater intellectual impairment and suffer from more severe symptoms (CDC, 2014).
Today, government statistics indicate that 1.5 million Americans are being identified with a form of autism, with the rate rising between 10 and 17 percent each year. Of particular interest is the fact that more people than ever before are being diagnosed annually. According to the Center for Disease Control, of the four million infants born every year in the U.S., 24,000 will ultimately be diagnosed as autistic. New and broader definitions of ASD’s and concentric targeting efforts of diagnoses may account for the increases (Buescher et al., 2014). Although these types of changes may account for some of the statistical increases, another may be that there has been an actual increase in the number of people with an ASD (Buescher et al., 2014). Authorities in the field believe that the explanation is likely found in a combination of these factors (Bosseler & Massaro, 2003; Clark, Austin & Craike, 2014; Grave, Glessner, Chiasson, & Johnson, 2014; Mineo, Zieglar, & Salkin, 2009. Although these factors are important and require further research, this study will help to understand how parents of children with Autism Spectrum Disorder (ASD) perceive the value of their child’s use of an assistive technology application. In addition, clarity of how parents make meaning of their own experiences with assistive technologies can inform others parents and professionals about the value of these technologies for a child’s development.

Significance of Research Problem

In 1975, the responsibility of educating children with ASD and other disabilities became the responsibility of public schools, as part of the Education of All Handicapped Children Act, which is currently referred to as IDEA or the Individuals with Disabilities Education Act (Murdick, Gartin, & Crabtree, 2002). Although public schools hold the primary responsibility, collaborative schools, which offer the same educational programs, are becoming a more popular alternative because they can provide the services as a savings for public school systems (Shaul &
Ganson, 2005; Yell & Drasgow, 2000). This is important because the majority of children with ASD need costly, highly specialized interventions at home until adulthood. This need must match the rate of the rising numbers of children enrolling each school year.

The current standards set by No Child Left Behind Act of 2001 (NCLB) and IDEA, create urgency for successful treatment interventions. NCLB requires every state to create assessments, for all children that are aligned to that state’s academic standards including students with disabilities. Student performance in each subgroup must reach the benchmarks established under NCLB. Schools failing to achieve Adequate Yearly Progress (AYP) are subject to serious consequences, including a withholding of funding (NCLB, 2001). This is problematic, because the rising number of students with ASD scores are reported along with those without disabilities. This forces schools to adopt innovative curricular methods that help to increase schools’ overall scores (National Research Council, 2001).

There are further financial tolls on taxpayers associated with the rising numbers of students with ASD. IDEA provides that children with autism be guaranteed a free and appropriate public education, which will not inhibit their learning. When public schools do not provide and implement interventions with proven efficacy, the U.S. court system becomes involved. Court procedures are costly and even though the courts may force public schools to provide costly private school alternatives, it may force them to assume court associated costs as well (Yell & Drasgow, 2000). Chasson, Harris, and Neely (2007) report the estimates for educating a student with autism in a private placement can range from $22,500 to over $75,000 per annum, while Jacobson, Mulick, and Green (1998) report the expected annual course is from two to six years. As the diagnosis’ of autism increases, the amount of money that public-school
Given the rising number of children with ASD enrolling in public education, the exponential costs of educating children with autism in both private and private placements (Chasson, Harris, & Neely, 2007; Jacobson, Mulick, & Green, 1998), the cost to taxpayers, and the need for schools to provide children with a guaranteed free and appropriate education that does not inhibit their learning, the urgency for this line of research becomes evident. There is, however, little research on how parents of children with Autism Spectrum Disorder (ASD) may best support their child through the use of assistive technology. Emerging research suggests that factors such as a lack of specific training on the needs of students with autism (Cohen, Amerine-Dickens, Smith (2006), financial restraints (Lord, Rutter, Couteaur, 1994) and the dearth of enough qualified Autism professionals, teachers, and support staff are some of some of the challenges that hamper the adoption of assistive technology based programs that are supported in the home (Boe, Cook, & Sunderland, 2008). This study will add to the current research by adding clarity of parental understandings of their use of assistive technology which may influence their child’s learning.

**Research Central Question**

Given the increased diagnosis of ASD, the need for intervention programs both at home and in school, and the dearth of literature exploring what factors influence individuals understanding of assistive technology, hamper the impact of tablet-based devices (iPads) on individuals with autism, this study seeks to understand how parents of children diagnosed with ASD, make sense of their understanding of assistive technology. One broad question will guide this research:
1. How do parents of children diagnosed with Autism Spectrum Disorders make sense of their experiences using assistive technology?

Towards achieving this goal, the researcher intends to study an Autism Spectrum Disorder (ASD) program in an education collaborative in the Northeast United States, who already have adopted assistive technology based programs for their students with autism.

**Theoretical Framework**

In the face of discouraging life prospects, many autistic children succeed in rising above the personal limitations of their disability. Parental perceptions and efforts on behalf of their autistic children likely play a vital role in their child’s achievements, particularly in education (Lesch, 1997). Traditionally, how autistic children succeed centers on the parents, the family and the school. Empirical research reveals that achievement is sponsored through nurturing parents who expect, demand, and maintain high standards of excellence and discipline (Clark, 1983; Eccles et al., 1993; Lesch, 1997). The focus of this empirical research has been on environmental and social factors as well as what parents do within the household. Typically, what is left out of this research are the efforts of the family and more specifically, the parents’ efforts to maximize opportunities, while minimizing risks to their children. Therefore, this study is exploring and attempting to make sense of how participants make meaning of their experiences with assistive technology by exploring their parental efficacy beliefs and attitudes towards assistive technology.

**Parental Expectancy-Value Theory.** For this study, a theory that incorporates parental attitudes is of key importance. The researcher has chosen to employ parental expectancy-value theory as a framework for the study because parental expectancy-value theory examines how...
parental experiences are developed and modified based upon their beliefs and values of how they make meaning of AT (Eccles et al., 1993). In terms of assistive technology, parental beliefs and values about the effectiveness of the technology on their learning, influence the applications effectiveness, thus making parental expectancy-value theory an appropriate framework for this study. The parental expectancy-value theoretical framework aligns this study with other studies of the same discipline by facilitating parent’s self-efficacy beliefs, how they make meaning of of the experiences using assistive technology.

Ardelt and Eccles (2001) report how promotive parenting strategies are defined as activities that are calculated to encourage children’s interests, skills, and talents to prevent the manifestation of negative events and experiences (Furstenberg, Cook, Eccles, Elder, & Sameroff, 1999). For example, parents who use promotive strategies might encourage their children to develop their personal talents and skills by enrolling them in out of school programs, while involving their children in positive activities both inside and outside of the household (Ardelt and Eccles, 2001). Therefore, it becomes even more important to understand how parents make meaning of their experiences with AT because of the effect it may have on their child’s learning.

Ardelt and Eccles (2001) report how parents are more likely to engage in promotive strategies if they have the confidence that their strategy will indeed have a positive effect on their child. In contrast, parents who sense they have little or no control over their children’s lives are less suitable to engage in promotive strategies on behalf of their children (Eccles et al., 1993; Furstenberg, 1993). Bandura (1997) supports this argument by stating “Perceived self-efficacy refers to beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (Bandura, 1997, p. 3). Using these arguments as guidelines, Ardelt and Eccles (2001) define parental efficacy as the parent’s beliefs in their own ability to influence
their child and/or the child’s environment to nurture the child’s development and success. Both, promotive strategies and parental efficacy are related to the developmental success of children diagnosed with autism through the parent’s own sense of self-efficacy. In theory, a parent’s sense of efficacy would affect the developmental success of that child indirectly through promotive strategies as well as directly through their support using assistive technology. The generality of the links between promotive strategies, parental efficacy, and a child success (Ardelt and Eccles, 2001) is typically measured in terms of how much support is given and in the case of this study would be through assistive technology.

**Seminal theorists.** There are a variety of constructs used by motivational theorists to explain relationships between motivation, choice, determination, and performance. In this tradition, theorists assert that the amount of energy a person is willing to spend on a task is the product of that person’s expectation to succeed at the task and the degree to which the person values the task and their potential success on the task (Green, 2002). To measure this relationship, Fishbein and Ajzen (1975) introduced the expectancy-value theory to explain and predict individual's attitudes toward objects. Fishbien and Ajzens work furthered the seminal work of Atkinson (1957), who researched expectancies and values. Atkinson (1957) originally defined expectancies as a person’s belief that performance is followed by failure or success, while value is a person’s relative interest in succeeding or failing on the task. Recent theorists (Eccles et al., 1983; Eccles & Wigfield, 1995; Feather, 1982, 1988, 1992) have extended Atkinson’s (1957) definition to include concepts concerning individual’s expectations for success and motivation achievement beliefs. Eccles et al. (1983) applied these expectations and beliefs to create a model that is used in educational research to explore relationships between student attitudes and interest (Eccles and Wigfield, 1992; Eccles, Wigfield and Schiefele, 1998).
Expectancy-Value theory of achievement motivation and its model. The expectancy-value model of achievement choice (Eccles et al., 1983) is a method of investigation designed to understand children’s achievement beliefs and values and their relation to achievement behaviors. The model posits an individual’s achievement performance, persistence, and choice of tasks can be predicted by using the person’s expectation for task success and the value the person attaches to the success of the task (Eccles et al., 1983). According to Eccles et al. (1983) a person’s expectancies are determined by other achievement related beliefs. These related beliefs include an individual’s perception of social attitudes and expectations, an individual’s interpretation of past events, an individual’s goals, an individual’s perception of the task value, and how the individual organizes concepts in their mind (Eccles et al., 1983). The model asserts when a person’s achievement beliefs are examined through the lens of their achievement behaviors, an explanation can be offered as to how well they will do on the activity and how much they value the activity. This model has since been modified to include student’s ability beliefs, expectancy items and interest items (Wigfield and Eccles, 1992).

Wigfield and Eccles (1992) expanded the expectancy-value model to include students’ beliefs about the degree of confidence they have in accomplishing an academic task and the degree to which they believe the academic task is worth pursuing. Wigfield and Eccles (1992) identified these tasks as two key components for understanding student’s achievement behaviors and academic outcomes because they found that student confidence and performance may directly influence their interests in performing the task (Liem, Lau, Nie, 2008). The model was further expanded when Eccles and Wigfield (1995) incorporated students’ impulse control and their management of short-term desires (Zimmerman, 2002) into the model. Eccles and Wigfield (1995) found that impulse control is a factor in managing desires about performing and
succeeding in a task (Zimmerman, 2002). These impulses are driven by the individual’s internal goals and are influenced by social experiences that have influenced their attitude towards performing and succeeding in a task (Zimmerman, 2002). The additional factors integrated into the existing models in 1992 and 1995 morphed the expectancy-value theory of achievement choice into the model of the expectancy-value theory of achievement motivation.

Eccles and Wigfield (1995) found that they were able to predict the relative value attached to a goal by an individual based upon where that person placed the goal in their own hierarchy of importance. Eccles and Wigfield (1995) used the individual’s placement as a measurement of the likelihood that the person will try to attain that goal. To develop the predictive component further, Eccles and Wigfield (1995) placed a greater emphasis on goals rather than values because goals were determined to have a greater role in leading people to action. By doing so, Eccles and Wigfield (1995) were able to further develop the predictive constructs of their model to place values to goals, people’s placement of goals in their hierarchy, and values to the likelihood that the individual will try to attain the goal. The most recent full scope of the model is depicted in Appendix A. The model of expectancy-value theory of achievement motivation can be used to identify interview questions as to how parent’s make meaning of their experiences with assistive technology.

**Applying the expectancy-value model using the parental expectancy-value.** This research study will explore parental experiences and perceptions of their use of assistive technology using an Interpretative Phenomenological Analysis (IPA) study that is guided by the expectancy–value theory of achievement motivation using the parental expectancy-value theory. The theory will provide the structure to examine the extent to which a parent makes sense of and
make meaning from their experiences with assistive technology. Data collection will include interviews conducted by the author.

The use of the parental expectancy-value theory of achievement motivation is the best theoretical framework to examine and ultimately gain a better understanding of this phenomenon because it emphasizes parental values as a measurement in determining how their interests affects their ability to succeed using assistive technology (Ardelt & Eccles, 2001). For this study, the emphasis on parental interests was a useful tool in measuring the extent to which their interest affects their ability to achieve using assistive technology. A second component of the expectancy-value theory of achievement motivation asserts that different goals may be more or less useful or interesting to the individual. In this study, measuring each parent’s interest in assistive technology is a critical element that must also be considered as part of the inventory interests. A third component of the theory is found in how Eccles and Wigfield (1995) distinguish between expectancies and ability beliefs. Eccles and Wigfield (1995) define expectancies as beliefs about the future, while ability beliefs are perceptions about a person’s current perception of their ability. This distinction is an important element of this study because parental expectancies are predictive, while an ability belief represents how the parent’s current perception of their ability, meaning that the parents experiences can be given a value that can be explored (Ardelt & Eccles, 2001).

The use of Eccles and Wigfield’s (1995) expectancy-value model of achievement motivation using Ardelt and Eccles (2001) parental expectancy-value theory examined the extent to which expectancy and task values may influence parental achievement choices in this study. Additionally, the expectancy and task values may influence performance, persistence and effort given parental experiences using assistive technologies. For this study, the measurement of these
constructs was important to determine the degree to which a parent’s perception of an assistive technology task, when considered difficult, may negatively influence the parents’ attitude towards a specific iPad application. This distinction was necessary in order to measure expectancies and ability beliefs within the constructs of the parental expectancy-value model of achievement motivation. To measure these constructs, the study adapted the Eccles and Wigfield’s (1995) *Items used to Assess Children’s Ability Beliefs and Subjective Task Values* to formulate interview questions. The items included ability belief items, expectancy items, and usefulness, importance, and interest items that all are used to convey the author’s interview questions. These constructs appear in Appendix A.

The parental expectancy-value theory of achievement performance and choice and the expectancy-value model of achievement motivation offer the proper framework for exploring how parents of children diagnosed with Autism Spectrum Disorders make sense of their experiences with assistive technology. Additionally, the expectancy-value theory offers a lens through which to gain a better understanding of how parent’s make-meaning of their experiences with assistive technology. Finally, the framework provides insight into how parental experiences with assistive technologies contribute in support of their child diagnosed with an autism spectrum disorder.
Chapter II: Literature Review

Introduction

Technology has become a common tool used in today’s society. It is being used with young children, in every setting, to improve quality of life and student learning. While all children should have access to various technologies in the learning environment (Manca & Ranieri, 2013), it has become a vital tool for children with severe disabilities who rely on it for communication, learning, and everyday life (Dodd, 2014; Holder-Brown & Parette, 1992). Assistive Technology (AT) is frequently used by disabled students to expand their learning opportunities both at school and home (Dodd, 2014; Cheung & Slavin, 2013, Wetherby & Prutting, 1984). To assist in understanding how parents of children with autism spectrum disorder make sense of their experiences with assistive technology, a review of the literature outlines the basic legal and medical principles that constitute an individual with a disability and their legal entitlements. Factors that influence, complicate diagnoses’, or help to define assistive technology in the classroom and at home is also be reviewed.

In an effort to understand the complexities associated with diagnosing and understanding the rights of individuals with Autism Spectrum Disorder (ASD), the following topics have been reviewed: Autism Spectrum Disorders consisting of indicators and early onset of ASD; Classification of ASD Impairments involving factors relating to impaired behavioral flexibility, communication and social behaviors; the 3 Categories of ASD; Intervention Measures for ASD; and a review of Family Empowerment. This review begins with the legal considerations regarding the legislative history of individuals with disabilities and assistive technology are defined and how the rights of these individuals are guaranteed under federal law.

Legal Considerations
To understand how assistive technology has been legally implemented in special education, within the home, and within the special education classroom, an outline of the basic legal principles that underlie the provisions allotted to individuals diagnosed as having a disability is reviewed. The review also includes legal requirements within the special education classroom and how assistive technology has become a legal device used during family-centered services. Additionally, federal public laws, educational acts, as well as amendments to both the laws and the acts are examined. The review provides not only the history of laws concerning individuals with disabilities but also defines legal terms and the rights and responsibilities of all who are affected by these laws.

The 1975 Education for the Handicapped Act. The 1975 Education for the Handicapped Act (EHA – P. L. 94-142) originally defined the requirements of special and regular education. EHA outlined provisions applicable for children with disabilities, while guaranteeing a Free and Appropriate Public Education (FAPE) to disabled children (Treppa, 1988). Further, EHA identified the need for supported parental involvement in the education of their children with disabilities ages 5-21, while prescribing the requirement for an Individual Education Plan (IEP). Further, it mandated that children be educated in the Least Restrictive Environment (LRE) possible. The law was amended in 1986 to include services younger children ages 0-5 with special needs.

Education of the Handicapped Act Amendments of 1986, Part H. Under the Education of the Handicapped Act Amendments of 1986, Part H underscored the need for greater family involvement in special education service delivery (Parette, Brotherson, Hourcade & Bradley, 1996). In 1997; Part H was renamed Part C under Public Law 105-17 and continued emphasizing family directed and centered services. Parette and Angelo (1996) define family-
centered services as those services that assist “families to maintain or acquire a sense of control over their family life and attribute positive changes to their own strengths, actions and abilities” (Parette & Angelo, 1996, p. 80).

**Individuals with Disabilities Education Act.** In 1990, an amendment changed the name of EHA to the Individuals with Disabilities Education Act (IDEA). Included in this change were provisions that extended eligibility to children with autism, defined assistive technology devices, and listed services that could be included in a student’s IEP (Sze, 2009). A further amendment in 1997 authorized the use of AT devices and services in the IEP, while granting families’ authorization to use the devices purchased through the school at home (Sze, 2009; Treppa, 1988). In 2004, a supplemental amendment defined assistive technology as any device or system that improved, increased, or maintained the functional capability of an individual with a disability (Myles, Ferguson, & Hagiwara, 2007). In addition to defining AT, the amendment also designated some of the characteristics of student learners with autism, while identifying the leadership responsibilities of educators in the assimilation of AT in support of students with autism (Myles, Ferguson, & Hagiwara, 2007).

**Categories of Assistive Technology.** Kroth and Edge (2007) identify three categories of assistive technology as being high, mid-level, and low, reporting that all of these devices can be used to improve learning of students with Autism Spectrum Disorder (ASD) (Kroth & Edge, 2007; Myles, 2009). High-level assistive technology includes computers, videotaping, iPods, iPads, “power wheelchairs, computer-based communication devices, environmental control units, robotics, and electronic spell checkers” (Inge & Sherpard, 1995, p. 4). Mid-level AT includes less complex devices that may operate under battery power such as calculators, overhead projectors, and tape recorders (Myles, 2009). Low-level assistive technology includes
visual supports such as highlighters, photographs, check lists, pictorial schedules and picture communication symbols (Myles, 2009). The significance of the implementation of all these devices are reported by Lin and Nzai (2014) who found that all types of AT devices offer more educational opportunities for special need learners.

Other topics regarding assistive technology and special education have been developed over time and through incentives derived from various federal legislations. In 1986, the Education of the Handicapped Act (EHA) Amendments required that comprehensive services be provided for children with disabilities, while providing economic incentives to states who comply with the act (Stahlman, 1994). EHA mandated that if services are provided to a student, they must incorporate a family-centered component (Aron & Loprest, 2012). Other incentives are found in The Individuals with Disabilities Education Act Amendments of 1990 (IDEA), P.L. 101-476, which encouraged states to provide programs for children with developmental disabilities and at risk children and their families through financial incentives, while allowing punitive fines be levied against states that did not comply with the law.

**Learning Disabilities-Defined.** Providing assistive technology services to students with disabilities takes expertise in both assistive technology and special education (Bausch, Ault & Hasselbring, 2015; Flanagan, Bouck & Richardson, 2013). According to Edyburn (2006), mild disabilities are considered to be learning disabilities, emotional/behavioral disorders, and mental retardation. Edyburn (2006) defines these disabilities using the definitions as provided in the Individuals with Disabilities Education Act (IDEA) IDEA ‘97 Final Regulations (§300.7 Child with a disability). This provision describes learning disabilities as a condition where one or more of the basic psychological processes involved in understanding, whether spoken or written, that may impair the ability to listen, think, speak, read, write, spell, or to do mathematical
Examples of learning disabilities include perceptual disabilities, brain injury, dyslexia, and developmental aphasia. IDEA (1997) does make the distinction between learning disorders and learning problems, where learning problems are the result of “visual, hearing, or motor disabilities, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage” (Authority: 20 U.S.C. 1401(3) (A) and (B); 1401(26)). It should be noted that although the term mental retardation is used in these regulations, the words have been replaced with the term “intellectual disability: as defined by a federal statute in the United States Code (Public Law 111-256, Rosa’s Law as cited by Degeneffe, & Terciano; 2011).

Emotional disturbance is defined under the provisions of IDEA (1997) as a condition that affects a child’s educational performance over a long period of time (Edyburn, 2006). IDEA outlines these conditions as an inability to learn that is not explained by intellectual, sensory, or health factors. These factors include an inability to make or sustain interpersonal relationships with peers and teachers, inappropriate behavior or feelings during normal circumstances, moods of unhappiness or depression, and/or a tendency to develop physical or emotional symptoms directly related to personal or school problems (Aron & Loprest, 2012; Buchanan, Nese & Clark, 2016; IDEA, 2007). The medical condition of schizophrenia is included in the definition however the term does not apply to children who are socially maladjusted (Authority: 20 U.S.C. 1401(3) (A) and (B); 1401(26)). IDEA (1997) defines mental retardation as being “significantly sub-average general intellectual functioning, existing concurrently with deficits in adaptive behavior and manifested during the developmental period that adversely affects a child’s educational performance” (Authority: 20 U.S.C. 1401(3) (A) and (B); 1401(26)). Finally, the
law makes no distinction between an individual’s disability and their access or use of assistive technology.

Since technology has become a common tool used in today’s society and has been legally mandated to be used with young children, in every setting, to improve quality of life and student learning (Ayres, Mechling & Sansosti, 2013), it becomes important to identify how it may be used with the various types of autism disorders. Since Assistive Technology (AT) is frequently used by special educators to expand learning opportunities for all students (Holder-Brown & Parette, 1992). To understand how assistive technology is used with Autism Spectrum Disorders (ASD), a review of the literature will be used to explain the various types of disorders. The review will also include a summary of the basic principles that underlie the legal provisions of special education in the classroom as well as how assistive technology is used during family-centered services.

**Autism Spectrum Disorders**

The population of people with ASD is as varied as the disorder itself. Individuals in the spectrum vary in their intellect, cognitive ability, language ability, and motor skills (Tsai, 2005). Bregman (2005) identifies that within the autism spectrum, several classifications of disorders exist: Rett’s Disorder, Asperger’s Disorder, Pervasive Developmental Delay – Not Otherwise Specified (PDD-NOS), Autistic Disorder, and Disintegrative Disorder with each classification having its own particular characteristics and behaviors. Bregman (2005) also identifies that there are common deficits within communication, social skills, and among restrictive and repetitive behaviors. Therefore, it is not uncommon for persons in the autism spectrum to be of below average intelligence, while possessing specific skills that would classify them as a genius within a narrowly defined spectrum (Tsai, 2005). Tsai (2005) reports these narrowly defined spectrums
encompass activities including musical or artistic talent, pattern recognition, computation or memorization. Conversely, some individuals within the autism spectrum may also be below average in all spectrums, while being diagnosed as being mentally retarded (Tuominen-Eriksson, Svensson & Gunnarsson, 2013). Although a diagnosis of autism sets the stage for specialized support, diagnosing ASD is further complicated by medically established symptom indicators (Shore, 2006).

**Indicators of ASD**

Students diagnosed with autism typically need individual language, behavioral, and social skills support (Bregman, 2005; Tsai, 2005), however considerations for a diagnosis include specific symptoms (Shore, 2006). There are twelve specific symptoms appear with an ASD diagnosis (Shore, 2006). Order to be diagnosed with ASD, a person must demonstrate a minimum of six symptoms in the following categories of impairments: behavioral flexibility, communication, and social behaviors (Newschaffer et al., 2007). Although not a specifically required, they should demonstrate at least one symptom in the communication and behavioral flexibility categories and a minimum of two symptoms social behavior category (CDC, 2010a; Newschaffer et al., 2007; O’Brien & Daggett, 2006; Shore, 2006; Stillman, 2008). Being that ASD is a categorical spectrum disorder, so, too, are the categories of impairment (Shore, 2006). Classification is dependent upon factors that include the severity of each impairment within the classification measured at the individual level (Shore, 2006).

Autism is one of five disorders defined under Pervasive Developmental Disorders (PDD) (Diagnostic and Statistical Manual of Mental Disorders, 2000). The term pervasive development disorders, denotes a group of circumstances that involve delays in the development of various basic skills including the capability to socialize with others, to communicate, and to use one’s
imagination (Prelock & Nelson, 2012; Mitchell, 2013). The four other sub-categories of PDD are Asperger’s Disorder, Childhood Disintegrative Disorder (CDD), Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS) and Rett’s Disorder (Diagnostic and Statistical Manual of Mental Disorders, 2000; Exkorn, 2005). Bruey (2004) reports that the most common forms of PDDs are autism, PDD-NOS, and Asperger’s Disorder, while individuals diagnosed with any of the five disorders often are disorganized in their logical thought and have problems understanding the world around them.

Characteristics of PDD disorders are demonstrated as severe with determined gaps in several areas of development (Bruey, 2004). Higgins, Bailey and Pearce (2005) identified these deficits in an individual’s social interactions and communication skills, as well as displaying distinctive non-typical behaviors which are not displayed in a normal child’s development (Volkmar, Siegel, Woodbury-Smith, King, McCracken & State, 2014). Gearhardt and Holmes (1997) recognized these unique behaviors as repetitive body movements or patterns of behavior, such as hand flapping, spinning, head banging and rocking back and forth (Higgins et al., 2005). Individuals with autism, especially younger children, may resist changes in routines and develop unusual interests in objects (Higgins et al., 2005). Apart from these distinctive behavioral characteristics and underdeveloped language skills, children with autism do not possess any separate characteristics from those of an average developing child (Gearhardt & Holmes, 1997; Higgins et al., 2005; Vanegas & Davidson, 2015).

**Early onset of ASD.** Early detection of the onset of autism is identified as occurring along two opposing patterns (Ozonoff, Heung, Byrd, Hansen, & Hertz-Picciotto, 2008). In the first pattern, children show irregularities in social and communicative development throughout the first year of life (Ozonoff et al., 2008). Initial literature on the onset of autism reported that
the most common sign of autism was recognized by parents as being a delay in speech development (De Giacomo & Fombonne, 1998). However, more recent studies suggest that delays in social and nonverbal communication precede language anomalies and are now used as leading indicators of a diagnosis development (Moh & Magiati, 2012; Werner, Dawson, Osterling & Dinno, 2000; Wodka, Mathy & Kalb, 2013;). These indicators are orienting to name, looking at the faces of others, joint attention, affect sharing, and imitation (Baranek, 1999; Osterling & Dawson, 1994; Stone et al., 1994, 1999; Werner et al., 2000; Wetherby et al., 2004). Studies suggest symptoms can be detected before the first birthday (Sacrey, Zwaigenbaum, Bryson, Brian, Smith, Roberts & Vallancourt, 2015; Werner et al., 2000), however, they do not differentiate children with autism from those who are developmental delayed (Narzisi, Carlderoni, Maestro, Calugi, Mottes & Muratori, 2013; Werner et al., 2005). Consequently, studies conducted on the second year of life provide more reliable and consistent patterns of the early onset of autism (Narzisi, Carlderoni, Maestro, Calugi, Mottes & Muratori, 2013; Palomo et al., 2006).

The second pattern of the onset of autism is referred to as regressive autism and was first reported in the 1970s by researchers in Japan (as cited in Kobayash & Murata, 1998). Regressive autism purports that autistic children appear to be developing typically for the first year (Landa, Gross, Stuart & Faherty, 2013), however in the second year of life, they lose previously acquired skills that appear with the onset of autistic symptoms (Hoshino et al., 1987; Kurita, 1985; Volkmar & Cohen, 1989). Volkmar and Cohen (1989) report that regressive autism affects the development areas of communication and social abilities.

A diagnosis of an autistic disorder requires that specific criteria outlined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5®, 2013) be met. In all diagnoses, a
significant impairment in communication and social interaction must be evident in addition to a
restriction range of activities and interests (Brock, Jimerson, & Hansen, 2006; Grinker, 2010). In
most cases intellectual disability is present, as is an uneven development of cognitive abilities
(Brock et al., 2006; Grinker, 2010). Often symptoms of unusual behavioral symptoms are
present, ranging from hyperactivity to severe temper tantrums to self-injurious behaviors (DSM-
5®, 2013). Seizure disorders are present in approximately 25% of children with the diagnosis as
well as sleep and eating difficulties (Brock, Jimerson, & Hansen, 2006; Grinker, 2010; Mannion,
Leader & Healy, 2013). The following classification of impairments are used as a guide for
measuring the severity of each individual’s diagnosed case of autism (Shore, 2006): Impaired
Behavioral Flexibility; Impaired Social Behaviors; and Impaired Communication.

Classification of ASD Impairments

Autism spectrum disorders (ASDs) are characterized by shortages in joint social
interactions, qualitative deficiencies in communication, and the presence of limited and/or
repetitive interests and behaviors (Simonoff, Pickles, Charman, Chandler, Loucas & Baird,
2008). ASD are classified into 3 categories: autistic disorder, Asperger’s Disorder, and
pervasive developmental disorder-not otherwise specified. Psychiatric, neurologic and
developmental disorders frequently co-occur in children with autism spectrum disorders,
impacting the identification, treatment, functional status, and progress of children with ASD
(Simonoff et al., 2008). Medically, the term “co-morbid condition” is to describe associated
medical and developmental disorders (Levy et al., 2010). However, the term suggests a
condition that is separate from the disorder itself, which may not be the case for conditions
associated with an ASD (Levy et al., 2010). Billstedt, Gillberg, and Gillberg (2005) suggested
using the more neutral term “co-occurring” because this term infers a less apparent connection
rather than suggesting a common source. Examples of these types of impairments include: Impaired Behavioral Flexibility (IBF), Impaired Communication (IC), and Impaired Social Behaviors (ISB).

**ASD - impaired behavioral flexibility.** Kanner (1944) first identified the characteristics of impaired behavioral flexibility as a resistance to change and the insistence on sameness or no change at all. Turner (1999) examined insistence on sameness or repetitiveness and resistance to change among individuals with autism finding commonalities in behavioral flexibility. Turner (1999) first reported the following characteristics of the symptoms of impaired behavioral flexibility between autistic individuals as being: over-arousal; an inability to manage unpredictability; a lack of central rationality or executive dysfunction; obsessive-compulsive disorder, or a desire for self-stimulation (as cited by Green et al., 2007).

These characteristics were further examined by Wahlberg and Jordan (2001) who used them to define behavioral flexibility in terms of an individual’s ability to acclimate and respond to change. Wahlberg and Jordan (2001) identified how an individual with autism has not developed coping skills to respond to change and therefore is commonly considered as being extremely inflexible. However, Glazebrook and Wallace (2015) found that the definition did not consider the degree to which an individual can tolerate change and their ability to regulate minor disturbances in their lives (Glazebrook & Wallace, 2015). However, Cashin and Barker (2009) did find that behavioral flexibility ranges in its severity from individuals who are unable to tolerate any change to individuals who can bear modifications in their routines when they are forewarned and/or given coping supports for anxiety (Cashin & Barker, 2009; Twoy, Connolly, & Novak, 2007). In order to be diagnosed, an individual must demonstrate at least one of
behavioral flexibility symptoms as well as one of those identified in the categories of impairments in communication and social behaviors (Shore, 2006).

**ASD - impaired communication.** Lord, Cook, Leventhal, and Amaral (2000) identify how autism is a behavioral and dimensional developmental disorder that is characterized by shortfalls in social exchanges and communication and by unusual restricted repetitive behaviors. Language is defined by Zhoa and Bitchener (2007), as the aptitude to communicate and express information, ideas, and sensations among human beings. Happé, Ronald, and Plomin (2006) report how insufficient language skills and the ability to communicate are defining aspects across all Autism Spectrum Disorders (ASD), which according to Chawarska, Paul, Klin, Hannigen, Dichtel, and Volkmar, (2007) are core deficits that require services across the ASD continuum.

Symptoms of impaired communication consist of (1) delays in or a lack of spoken language in persons with a verbal aptitude, (2) a clear impairment of conversational abilities, (3) a repetitive use of language, and (4) a lack of age-appropriate societal imitative play (Daggett, 2006; O’Brien & Shore, 2006; Stillman 2008). At least one of these symptoms must be exhibited in conjunction with those identified in the categories of impairments in behavioral flexibility and social behaviors to be diagnosed with ASD (Shore, 2006).

**ASD – impaired social behaviors.** The essential symptom of autism that differentiates it from other conditions and/or disorders is an impairment regarding social interaction (Frith, 1989). Dawson and Lewy (1989a, 1989b) suggested that autism includes a lack in attentional functioning, from which, Courchesne, Chisum, and Townsend (1994) theorized how this deficiency negatively impacts early social exchanges because social exchanges require a rapid shift of attention between different objects or people (Dawson & Lewy, 1989a,1989b).
Previously, Dawson (1991) proposed that social exchanges, such as gestures, speech inflections, and facial expressions are complex, varying, and unpredictable. Therefore, children with autism have trouble processing and representing such social exchanges and consequently are not naturally drawn to such social exchanges (Dawson, 1991; Edmiston, Merkle & Corbett, 2015).

The lack of attention to social exchanges diminishes an autistic child’s opportunity to participate in critical early social practices that are the basis for social exchanges (Dawson, 1991; Edmiston, Merkle & Corbett, 2015). Since diagnostic markers are used to designate commonalities among individuals with autism, a diagnosis requires an impairment in communication, social skills, and behavioral flexibility (Barbaro & Dissanayaki, 2013). As no medical test can be performed to designate the existence of autism, the diagnosis is based upon the presence or absence of specific behavior(s) (Shore, 2006).

Categories of ASD

Autistic Disorder (AD), Asperger Syndrome (AS), and Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS) are the three main types of ASD all of which include multiple symptoms and are varying in severity (Prelock & Nelson, 2012; Mitchell, 2013).

**Autistic disorder.** Autistic disorder, often referred to as classic autism, is demonstrated by significant language delays, unusual behaviors, and social and communication deficiencies, which may be displayed in conjunction with other learning difficulties and below-average intelligence (Chawarska, et al., 2007). A child with at least six of 12 symptoms of deficiencies in behavioral flexibility, communication, and social behaviors is identified as having classic
Autistic Disorder (Shore, 2006). In most cases, the onset occurs before the age of three (Channon, Crawford, Orlowska, Parikh & Thoma, 2014).

**Asperger Syndrome.** Shore (2006) identifies that Asperger Syndrome (AS) is categorized by symptoms that are less in severity than those with classic autism. Frequently, individuals with AS are considered higher-functioning, displaying no history of delayed speech, exhibiting normal intellectual abilities (Channon, Crawford, Orlowska, Parikh & Thoma, 2014). However, there are social challenges and unusual behaviors revealed in reading body language, humor, figures of speech, and empathy towards others (Channon et al. 2014). Some individuals have unique or gifted skills requiring logic, memory, and creativity, such as computer science, music, and math, while displaying noticeable uncommon social behaviors (Channon et al., 2014). Reynolds (2007) identifies that individuals with AS are preoccupied with specific subject areas, although he identifies cognition and odd speech as areas of concern.

**Pervasive Developmental Disorder Not Otherwise Specified.** Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS) is also known as "atypical autism" (Towbin, 1997). It is categorized as atypical because these individuals meet some of the criteria for autistic disorder or Asperger syndrome, but not all (Juul-Dam, Townsend, & Courchesne, 2001). Symptoms may include similarities to those who are or Autistic Disorder or Asperger’s syndrome, but signs are typically milder and less inclusive (Juul-Dam, Townsend, & Courchesne, 2001). Often, individuals with PDD-NOS, may exhibit social and communication challenges (Matson, Hess & Mahan, 2013).

Autistic Disorder (AD), Asperger Syndrome (AS), and Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS) include multiple symptoms and are varying in
severity (Prelock & Nelson, 2012; Mitchell, 2013). Children with ASD may concurrently have other problems such as attention deficit hyperactivity disorder (ADHD) (Yerys, Wallace, Sokoloff, Shook, James & Kenworthy, 2009), Tourette's syndrome or other tic disorders (State, 2010), dyspraxia (developmental co-ordination disorder) (MacNeil & Mostofsky, 2012), epilepsies etc. (Baron-Cohen, Scahill, Izaguirre, Hornsey, & Robertson, 1999).

Autism can also be separated into syndromal and non-syndromal autism (Cohen et al., 2005). Syndromal autism is aligned with profound mental disabilities or congenital features such as tuberous sclerosis (Cohen et al., 2005). Non-syndromic autism is used to describe occasions where autism is the primary diagnosis and is not secondary to an existing condition caused by a genetic variant, such as Rett syndrome, Fragile X syndrome, tuberous sclerosis, and Smith-Lemli-Opitz syndrome (Blake, Hoyme, & Crotwell, 2013). Finally, autism may also be of the regressive type where children are diagnosed with autism based upon the loss of language or social skills, in opposition to a failure to make progress between 15 to 30 months of age (Cohen et al., 2005), which have been identified as the most important ages to begin intervention measures (Brookman-Frazee & Koegel, 2004).

Understanding how Autism Spectrum Disorders (ASD) are categorized into three main types: Autistic Disorder (AD), Asperger Syndrome (AS), and Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS) demonstrates the complexities associated with diagnosing the disorders (Prelock & Nelson, 2012; Mitchell, 2013). Diagnoses’ are further complicated due to multiple symptoms, regressive disorders, which may be both syndromal and non-syndromal (Cohen et al., 2005), all of which are varying in severity. Once the complexities associated with an individual’s case are identified and there is a proper diagnosis, intervention measures become
critical in improving not only the diagnosed individual’s quality of life, but the quality of life of the family as well.

**Intervention Measures for Autism Spectrum Disorder**

Brookman-Frazee and Koegel (2004) report that when families are included goal setting and who agree on intervention implementation techniques exhibit less familial stress, while demonstrating more confidence in dealing with their child diagnosed with ASD. Additionally, individuals with ASD in this type of environment show improved behaviors (Brookman-Frazee & Koegel, 2004). Therefore, it has been asserted that this type of family intervention coupled with training in individual assistive technology intervention design (Nicolson, Moir & Millstead, 2012), may positively empower families of children with ASD to articulate and influence changes during an intervention evaluation (Karst & Van Hecke, 2012). Milshtein et al. (2010) examined how the elements of intervention encompasses a range of qualities and attributes that add to the success of an intervention program. Milshtein et al. (2010) found that positive interventions improve family satisfaction with a training program, resulting in improved satisfaction within the family unit.

Furthermore, Koren et al. (1992) identified how these elements increase a family’s perceived response to intervention, decreasing familial stress, and positively impacting the quality of relationships between all interested parties. Matson (2007) reported how the measurement of these key fundamentals are vital for the success of any intervention program. Moreover, Matson (2007), reported how an understanding and measuring these key components are an essential in testing the validity of any research study. This study seeks to do just that by gaining further insight into how parents of children with a diagnosed ASD make meaning of
their experiences with assistive technology education strategies, empowerment, social validity and/or satisfaction.

**Empowerment**

Milshtein et al. (2010) identifies that the concept of empowerment can be defined using two specific dimensions. First, is the level of the empowerment: family service system and/or community/political, and the second refers to how the empowerment is expressed knowledge, attitudes, and behaviors (Milshtein et al., 2010). Using these concepts, it has been found that an empowered ASD family’s attitudes, knowledge, and behaviors will possess a confidence and effective outcome within the home and school condition (Weiss, MacMullin & Lunsky, 2015). Vested families demonstrate how an effective partnership with service providers allows them to readily obtain services for their child (Weiss, MacMullin & Lunsky, 2015), while being advocates who may obtain improved services (Ryan & Cole, 2009). Empowered families are involved in their children’s wellbeing on a much greater scale than those families who may not feel empowered (Dunst et al., 1998; Milshtein et al., 2010). More so, empowered families are apt to use existing programs, support networks, and medical and educational professionals (Krantz, 2000) because they feel they are part of a team where they are adding to the treatment routine decisions of their children (Hilton, Hunt & Petticrew, 2007). It must also be noted that the notion of empowerment is “associated with other concepts such as choice, involvement, participation and partnership” (French & Swain, 2000, p. 570).

Schreibman (2000) found that disempowered families may alternatively depend on others in the ASD community to make important decisions that affect their child’s education and daily life rather than acknowledging their own capabilities as their child’s primary caregiver (Schreibman, 2000; Weiss, MacMullin & Lunsky, 2015). Families need to value their own
experiences and rely on their knowledge the family’s situation to avoid feeling a sense of vulnerability, isolation, and defeat (Weiss, MacMullin & Lunsky, 2015). However, within the literature, the concept of a disempowered family is constructed on a lack of accessibility to evidence-based empirical research (Schreibman, 2000). Additionally, a lack of best practices (Krantz, 2000), a gap between research and practice (Bernheimer & Weisner, 2007; Callahan et al., 2008), and a lack of collaboration as the primary theme for family-implemented interventions (Paul & Frea, 2002) also contribute to family disempowerment.

Whether a family is empowered or disempowered, the role the family plays is critical in the success of a child with a disability. For a child diagnosed with ASD, family empowerment enhances their child’s wellbeing on a much greater scale than those families who are not or who may not feel empowered (Weiss, MacMullin & Lunsky, 2015). For this reason, it is important to understand how parents of children diagnosed with autism spectrum disorders make sense of their experiences with assistive technology in their home. This study seeks to do just that by trying to understand how parents of children with ASD make sense of their experiences with assistive technology, while maintaining focus on the elements identified in the literature as the measures of determining successful strategies, family empowerment, social validity or satisfaction, and responses to assistive technology.

**Conclusion**

The purpose of this literature review was to understand how assistive technology has been implemented in special education and in the home, using elements identified in the literature, while outlining the basic legal and medical principles that constitute an individual with a disability and their legal entitlements. The review also identified factors that influence and complicate diagnoses’, while defining assistive technology both in the classroom and at home.
The review identified the complexities associated with diagnosing and understanding the rights of individuals with Autism Spectrum Disorder (ASD), which includes: Autism Spectrum Disorders consisting of indicators and early onset of ASD; Classification of ASD Impairments involving factors relating to impaired behavioral flexibility, communication and social behaviors; the 3 Categories of ASD; Intervention Measures for ASD; and a review of Family Empowerment. This review began with the legal considerations regarding the legislative history of individuals with disabilities and assistive technology as well as how the rights of these individuals are guaranteed under federal law.

Assistive technology allows all individuals but especially those with both cognitive and physical impairments to independently contribute actively in all areas of their lives (Porayska-Pomsta et al., 2012). Jukes, McCain, and Crockett (2010) and Porayska-Pomsta et al. (2012) report that the benefits of AT devices to individuals with disabilities are vast, however, Porayska-Pomsta et al. (2012) further warns that the constant daily use of the device necessitates collaboration and training so the device does not become over relied upon in the classroom or at home. Equally important is how the devices are used at home and at school and whether home usage reinforces school-based approaches. With this said, little research has been conducted establishing how assistive technology may empower parents of children ASD (Paul & Frea, 2002) or reinforces school based educational practices (Jukes, McCain, & Crockett, 2010), while no literature could be found on how parents make sense of their experiences using assistive technology.

Although family-educator partnerships using an Assistive Technology (AT) based intervention design is an important piece of intervention success that may allow interventions to be intensive yet not in a stressful way, while occurring over multiple environments (O’Brien &
Daggest, 2006), it does not take into consideration how those who use the technology make meaning of their experiences with it. It is similarly as important that families and educators have training in intervention creation and manipulation (Bloomfield, 2007), especially using assistive technology (O’Brien & Daggest, 2006), so that assistive technology interventions can be modified to meet the needs of each individual and thus be successful in not only treating symptom-specific behaviors in individuals with ASD, but also enhance their learning (Bloomfield, 2007; Whitbread et al., 2007). With the introduction of new iPad AT devices and applications, which claim to address symptom-specific behaviors and outcomes, it follows that research into how parents make meaning of these collaborative assistive technologies, will not only assist in generalizing desired behaviors and individual learning, but it will further empower families, schools, and communities with individuals with ASD (Brookman-Frazee & Koegal, 2004).
Chapter III: Research Design

Introduction

Assistive Technology (AT) has become an essential means of improving the quality of life for students with disabilities. This technology and its applications are used by teachers and parents as a means of understanding children with autism (Aronson & Orr, 2014). Assistive technology has been defined by Lewis (1998) as “any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of a child with a disability.” 20 U.S.C. 1401 [25], Sec. 300.5 (Individuals with Disabilities Education Act, 1990). This definition outlines the potential the potential AT has for enabling student’s mainstream inclusion as well as enabling personal independence. Although AT enables inclusion and independence, Aronson and Orr (2014) as well as Haq and Elhoweris (2013) have identified how educators use and apply AT in their daily activities based on their own understanding of how they believe it should be implemented. This is often implemented without the consultation of parents (Aronson & Orr, 2014; Haq & Elhoweris, 2013). Other studies have revealed how important the role of the family is when implementing assistive technologies (Dawe, 2006; Judge, 2002). Therefore, if the role of the parent is influential in a child’s use of assistive technology, then examining how parents make sense of their own use of assistive technology becomes critically important to understanding the phenomena.

While there has been a wide a range of evaluations conducted on the use of assistive technology (AT), these studies have concentrated on measuring the quality of learning or on learning outcomes (Cheung & Slavin, 2013; Dodd, 2014) signifying that there have been few, if any, studies that focus on how parents of children with ASD make sense of their experiences
with assistive technology. Understanding this occurrence is important because Judge (2002) revealed the importance of family involvement in determining the effectiveness of assistive technology in student learning, while Dawe (2006) found it was a critical factor in student success.

Exploring how parents make sense of their own experiences with assistive technology is important because many children diagnosed with autism disorders are unable to communicate the advantages or disadvantages of their own experiences (Charlop-Christy, Carpenter, Le, LeBlanc & Kellet, 2002; Wetherby & Prutting, 1984). Understanding these experiences using assistive technology may shed light on the effectiveness of the technologies and, by extension, the value assistive technology plays in assisting children diagnosed with autism spectrum disorders. Furthermore, examining the phenomena through the lens of parental self-efficacy (Hastings & Brown, 2002; Jones & Prinz, 2005), may also reveal more about how parental experiences may be used in supporting their child’s development.

The purpose of this Interpretative Phenomenological Analysis (IPA) study was to understand how parents of autistic children make sense of their experiences with assistive technology in terms of their ability to comprehend and make-meaning of the technology. Specifically, this study examined parental experiences using assistive technology via the lens of the frame work of expectancy value theory (Atkinson, 1957) and the tenants of Ardelt and Eccles’s (2001) parental self-efficacy theory to understand the dynamic interplay between the personal, behavioral, and environmental influences (Bandura, 1997). The following question was used to guide this research: How do parents of children diagnosed with Autism Spectrum Disorders make sense of their experiences with assistive technology?
With this question as a guide and in an effort to understand how parents make sense of their experiences with assistive technology, this study employed an Interpretative Phenomenological Analysis (IPA) research methodology. An IPA study was selected because it highlights the diversity of parental accounts by revealing central themes that emerge from the participants’ talk (Jarrett et al., 1999). The analysis conducted assists in the process of meaning-making that are embedded in multiple contexts including the parent’s social and cultural environments (Smith, 1996). This is important because participants’ meaning reflects the embodiment of cognitive parental self-efficacy (Brocki & Wearden, 2006) that subsequently embodies their understanding of assistive technology and ultimately help to support their ASD child.

This chapter reviewed how an Interpretative Phenomenological Analysis (IPA) study can be used to comprehend how parental self-efficacy is used by parents of children diagnosed with autism spectrum disorder to understand their experiences with assistive technology. It begins with a reflective positionality statement that involves reviewing how the researcher’s own beliefs complicate his own understanding of the phenomenon. Once established, the research design and research traditional are explained. Participant recruitment and access are discussed as well as how these human subjects are protected. Next, factors concerning data collection, data storage and data analysis are elucidated. Finally, reviews of the trustworthiness and limitations of the study are reviewed.

**Purpose Statement**

The purpose of this Interpretative Phenomenological Analysis (IPA) study was to understand how parents of autistic children make sense of their experiences with assistive technology. Specifically, this study examined parental experiences use of assistive technology
using the frame work of expectancy value theory (Atkinson, 1957) and the tenants of Ardelt and Eccles’s (2001) parental self-efficacy theory to understand the dynamic interplay between the personal, behavioral, and environmental influences (Bandura, 1997). The following question was used to guide this research: How do parents of children diagnosed with Autism Spectrum Disorders make sense of their child’s experiences with assistive technology? In doing so, the study pursued to understand how parental experiences with their use of assistive technology could be grouped to advance clarity of this phenomena. However, before an IPA study could be conducted, it was necessary to provide a positionality statement that identifies and describes how the author’s biases and perspectives may influence the study and problem of practice.

**Positionality Statement**

Carlton Parsons (2008) writes: “positionality is a concept that acknowledges the complex and relational roles of race, class, gender, and other socially constructed identifiers in being” (Carlton Parsons, 2008, p. 1129). Brookman-Frazee and Koegel (2004) and Kaiser, Hancock, and Nietfeld (2000) acknowledged that the role parents of autistic children in the education setting as being especially complex because the parameters of context are not clearly defined. This may be explained through an abnormality and inferiority that is oriented in positionality, which Briscoe (2005) designates as an “othering.” Briscoe (2005) identifies how dominant groups informally represent non-dominant or minority groups as being inferior not normal others, while advancing at the same advantaging their own social identities (Briscoe, 2005). These dominant groups include parents (Brookman-Frazee & Koegel, 2004; Kaiser, et al., 2000) as well as educators (Lerman, Vorndran, Addison, & Kuhn, 2004) and researchers (Briscoe,2005). Briscoe’s (2005) review of othering prompts a reflection of how the
researcher’s understanding of *othering* may influence an internal desire to maintain a dominate position or influence how this researcher understands and views *others* as subordinate positions.

This researcher is a white male parent of a normally developing twelve-year-old daughter, who has been working as a special education teacher responsible for the design and implementation of an intensive special education high school transition program for severely disabled students ages 17-22 at a private school a private non-for profit school in Walpole, Massachusetts for the past 3 years. The researcher is also responsible for administering student assessments and the transition to adult review process. It is the observations of the researcher, concerning no identifiable differences between parental attitudes toward assistive technology within the school setting and their child diagnosed with ASD, which first informed the selection of this topic for a study. Moreover, it was the researcher’s specific observations concerning a lack of parental involvement concerning assistive technology in the final transition (17-22 years old) that further prompted this study.

Understanding the researcher’s own personal beliefs (and potential biases) towards individuals diagnosed with autism and their use of assistive technology coupled with parental experiences that are used to make sense of assistive technology, that were essential to this study because the results could be influenced by the researcher’s own beliefs. The researcher has observed children with autism and has drawn preconceived conclusions about how parents may or may not use assistive technology. These preconceived conclusions, along with daily observations, may have allowed the researcher to have drawn conclusions that may be incorrect. After all it was these initial observations, which sparked interest in documenting and investigating how parents of children diagnosed with ASD make sense of their experiences with assistive technology.


Research Design

The interactions between a child diagnosed with ASD and their parents are complex and well documented in the literature (Dunn, Burbine, Bowers & Tantleff-Dunn, 2001; Schieve, Blumberg, Rice, Visser & Boyle, 2007). Also, well documented in the literature are studies relating to ASD students use of assistive technology as an intervention device (Desai, Chow, Mumford, Hotze & Chau, 2014; Mechling, 2007; Mirenda, 2001). However, how parents make meaning of their experience with assistive technology has yet to be fully examined. With increasing acceptance of the importance of an Autism Spectrum Disorder (ASD) child’s learning, greater clarity must be given towards the parent/child dynamic using assistive technology as an intervention device as well as the resulting outcome (Aronson & Orr, 2014; Haq & Elhoweris, 2013; Knight, McKissick & Saunders, 2013). The impact of the role of the parent when implementing assistive technologies is deemed as an intricate component of ASD children’s learning (Dawe, 2006; Judge, 2002), while parent’s own experiences and understanding of assistive technology needs further consideration (Cheung & Slavin, 2013; Desideri, Stefanelli, Bitelli, Roentgen, Gelderblom & DeWitte, 2014; Dodd, 2014;).

A number of studies of parental self-efficacy on behalf of their child have found with some consistency that certain parental characteristics predict student academic success (Clark, 1983; Eccles et al., 1993; Lesch, 1997). However, a growing body of research has suggested that the role of parents, while relevant, has been identified as one component of their child’s academic success, while the role of assistive technology by educators has been given greater attention because parents often acquiesce this responsibility to their child’s school and the devices used there (Alzrayer, Banda, & Koul, 2014; Clark, Austin, & Craike, 2014; Grave et al., 2014). It is likely that an interaction of factors, including the ways in which the parents
experience their ASD child’s use of assistive technology is most pertinent to student learning (Aronson & Orr, 2014; Cheung & Slavin, 2013; Dodd, 2014; Haq & Elhoweris, 2013; Knight, McKissick & Saunders, 2013). The majority of these studies share recommendations that research into the use of assistive technology should be given greater consideration between all parties who contribute to an ASD student’s learning. It is also suggested that the perspective of the parent may be of particular interest and relevance in gaining an understanding of the aspects that they themselves have found to help or hinder the learning development of their child with ASD. Hence engaging parents in a discussion of their experiences with assistive technology, to include assistive technology and its applications is required (Alzrayer, Banda, & Koul, 2014; Clark, Austin, & Craike, 2014; Grave et al., 2014). To this date, such a research study has not occurred in child development or education literature.

Within special education in particular, the importance of a parent’s perspective on behalf of their child with ASD has been recognized (Alzrayer et al., 2014; Aronson & Orr, 2014; Chawarska et al., 2007). In order to encourage parents to freely reflect freely on both the positive and negative aspects of their child’s educational experience using assistive technology, a qualitative methodology was used in order to gain a rich, deep, and potentially more accurate understanding of parental experiences that include their attitudes, opinions, and perceptions of assistive technology (Alzrayer et al., 2014; Lancioni & Singh, 2014; Sze, 2009). Exploring parent’s experiences in this manner provided an increased potential for revealing new and unpredicted insights. This is evident within Gall, Gall, and Borg’s (2014) study which concluded that theoretically-defined variables, measured quantitatively, are not equally relevant when identifying critical features that are perceived within working relationships within the
parent/child relationship. To better understand these relationships, a hermeneutic or interpretivism paradigm approach was used in this study.

The hermeneutic movement began in the first century A.D. during the Greek Enlightenment period as a result of theologian’s struggles with biblical text. More recently, the hermeneutical movement was most influenced by the German philosophers Frederich Schleiermacher (1768-1834) and Wilhem Dilthey (1833-1911). Mariña (2005) identified how Schleiermacher is best noted for his work concerning the hermeneutical praxis method of interpretation and understanding. Crouter (2005) reports how Dilthey, a culture philosopher, identified the distinction between natural and human science using Schleiermacher's hermeneutical praxis because this interpretive lens adds a broader scope of clarification and understanding. DeMul (2004) posits that understanding is a complex process that focuses on parts where each reflects and impacts the whole.

The interpretivism or the constructivist approach to research was used as the paradigm that best represents the method to gain the desired results using parental self-efficacy framework to understand how parents, on behalf of their child diagnosed with Autism Spectrum Disorder (ASD), may make sense of their experiences with assistive technology. The interpretivist researcher understands that the natural sciences are different from the social sciences and that human beings can interpret their environment and their impact on the environment; whereas an inanimate object cannot (Onwuegbuzie & Tiddle, 2000). Human beings by their very nature will have an impact on the results of their research, whether intended or not, because their values and prejudice cannot be separated from their experience (Elliot & Lukes, 2008).
The interpretivist paradigm or hermeneutic approach recognizes that any person, including the researcher, bring their values into the research and therefore should attempt to suspend prior cultural suppositions (Mackenzie & Knipe, 2006). Ponterotto (2005) identified how “this ontological distinction is critical to understanding the basic differences between positivism and postpositivism (chiefly quantitative methods) and constructivism-interpretivism (chiefly qualitative methods)” (Poneerotto, 2005, p. 129). Critics of interpretivism contest that it encourages the study of a small number of participants that may not apply to the whole population (Onwuegbuzie & Tiddle, 2003). However, McMurray, Pace and Scott (2004) argue that interpretive inquiry allows insight into various perspectives and events that may not have been observed with a more traditional paradigm.

Using the interpretivist methodology and applying it to this research phenomena required the collection and analysis of data on the needs, attitudes, and contextual variables associated with understanding how parental self-efficacy framework to understand how parents, on behalf of their child diagnosed with Autism Spectrum Disorder (ASD), may make sense of their experiences with assistive technology. As an interpretivist researcher, the objective was to rely on the analysis of parental experiences, both positive and negative concerning their experience using assistive technology by means of the circulatory process of hermeneutics.

For this study, the circulatory process of hermeneutics was used to explore the phenomena. The hermeneutical circulatory process is a continual relationship between the reader and the text, where understanding the meaning of a whole text and its parts are interdependent activities (Schwandt, 2001). The discourse about parental experiences lend new meaning and understanding in preparing parents of children with special needs, educators, and mainstream parents use of assistive technology in supporting and enriching children’s
experiences. Additional conclusions drawn will be used to inform, create dialogue, and aid in the development of innovative research designed to address the advancement of special needs students.

This study, utilizing an IPA qualitative methodology aimed to illicit a conversation with a purpose of understanding the richness of parental experiences and how parents make sense of those experiences concerning their use of assistive technology. With this stated, it is not the language and phrases used by parents that were of interest in this study, but it is the significance, richness, and essence of their experiences, as it is told by one and interpreted by another that was of the greatest importance. Hence, an Interpretive Phenomenological Analysis (IPA) was the best means to capture information in this way and is consequently the best and chosen method of analysis for the study. IPA based studies allow for the exploration of how participants make sense of their experiences, while identifying that the researchers own ideas are required in order to make sense of the private world being studied (Larkin, Watts, & Clifton, 2006; Chapman & Smith, 2002; Smith, 2004). Therefore, IPA was employed to encourage parents to reflect on aspects of assistive technology in their life, their perception of how they support their child, and the role of this relationship in their child’s learning experience.

Research Tradition

An Interpretative Phenomenological Analysis (IPA: Smith et al. 1999) was used in this study because it offered an idiographic component, allowing for participants make sense of their experiences, where the goal is to allow researchers is investigate how people make sense of their own experiences. To examine this IPA process, the researcher drew upon the fundamental principles of phenomenology, hermeneutics, and ideography (Pietkiewicz & Smith, 2014). Phenomenology concerns itself with identifying the elements of an experience or phenomena
that makes them unique or discernable from others (Pietkiewicz & Smith, 2014). By focusing on how people perceive and talk about events or objects, the researcher was able to ‘Bracket’ parents own preconceptions, allowing for the phenomena or experience to speak for itself (Pietkiewicz & Smith, 2014). Hermeneutics concerns itself with the mindset of the person who experienced the phenomena and the language they use to translate the message (Freeman, 2008). Through the eyes of the participant, the researcher was able to make meaning of the individual’s experience, while allowing the researcher to decode how the participants engage in meaning making (Freeman, 2008). The third orientation of an IPA study is ideography. Unlike nomothetic beliefs, which focus on groups and populations, ideography concerns itself with the particular instead of the collective (Pietkiewicz & Smith, 2014). This allows the research to make specific statements about the participants because the analysis is focused on detailed case exploration.

The IPA approach to research is best suited as this qualitative research methodology because it allows the researcher to deliberately capture the essence and diversity of contributors’ accounts by illuminating central themes that surface from the participants’ talk concerning their child’s experiences with assistive technology (Jarrett et al., 1999). Although in psychological IPA research, the process of meaning-making is considered implanted in numerous contexts including the social and cultural environments (Denzin, 1995), this study identified how the participants’ meaning echoes the embodied and cognitive-affective of the individual (Smith et al., 1999). Because IPA uses small, purposively selected, and carefully placed participants (Smith, 2004), that includes a sample size of five to eight participants that are somewhat homogenous, it was the best methodology to understand this research phenomena identified in this study. However, it should be noted that because participants should be recruited on the basis that they are ‘experts’ in the phenomenon under investigation (Reid, Flowers, & Larkin, 2005),
in this study, parents were the participants and were considered to be experts of their own experiences (Cheung & Slavin, 2013; Dodd, 2014).

With this as a basic and inevitable component, credibility of emerging themes must be ensured (Larkin, Watts, & Clifton, 2006; Smith, 2011; Smith and Osborn 2008). To achieve this goal, multiple researchers are often involved to verify that themes are internally lucid and grounded within interview transcripts (Larkin, Watts, & Clifton, 2006; Smith, 2007; Smith and Osborn 2008). Other validations, such as consulting with participants on the accuracy of interview findings, discussions within a research team, peer reviews, and the use of a personal journal (Smith, 2003), can be used to assure the consistency and quality of outcomes (Smith, 2011; Smith 2003; Smith and Osborn 2008,). For this study, data analysis was validated through triangulation using all forms of communication between all parties. Member checking was used as a process to ensure the accuracy of interview findings, and an external audit, by a third reader was used as a credibility check.

Participants, Recruitment, and Access

The participants for this research project were solicited from The Education Cooperative (TEC), which is an approved public special education day school (502.4i) in East Walpole for students ages 3-22. TEC is an Educational Collaborative formed through a partnership between the School Committees of the towns and regions of Canton, Dedham, Dover, Dover/Sherborn, Framingham, Holliston, Hopkinton, Medfield, Millis, Natick, Needham, Norwood, Sherborn, Walpole, Wayland and Westwood, Massachusetts in accordance with M.G.L. c. 40, §4E. The Education Cooperative provides a continuum of educational services aligned with the special needs of students from the member districts. The program provides a personalized environment specifically designed to meet each student's individual learning, social-emotional, and health
needs, with the goal of promoting individual independence. The cooperative has a student population of 100 students with various disabilities including students with Autism Spectrum Disorders (ASD).

The participants were selected by a criterion based survey provided to the TEC parental community prior to the selection process. Criterion selection was employed to purposefully select six participants, who have children ages 10-22, who have been diagnosed with ASD, who attend the TEC School, and who have used iPad technology for the past three years. The selected participants were not personally identified in the data collection process, while all were provided the opportunity to elect to remain to be anonymous. While their identities were known to me, participants were given pseudonyms and the researcher refrained from disclosing any information that would identify them, their children, their child’s specific diagnoses’ or the grade level at the school.

The researcher did not have any specific relationship with the study population other than working at the school. Participants were selected based upon no previously established relationships with the researcher; however electronic invitations and correspondences were used to invite various school administrators and parents to participate in or authorize the study. These correspondences and any information related to the participation in the study was clearly identified as voluntary and will permanently remain confidential. No other incentives, other than participating in further academic research, was offered to the population or those assisting in the research study.

Protection of Human Subjects
Ethical issues in this study were addressed in each section of this chapter to include the previously mentioned researcher’s non-population contact. In compliance with Northeastern University’s Institutional Review Board (IRB), permission to conduct the research was obtained. A formal request that provided information about the researcher, the research project, the methods, procedures, the research site, sources of funding, the number and site of participants was provided in the request to conduct the interviews.

An informed consent was provided to all participants’ parents and/or guardians detailing participants guaranteed rights concerning confidentiality and right to decline participation in the study was detailed and affixed to the interview questions (Appendix B). The questions were conducted in such a way that confidentiality was protected. Confidentiality was included during the safeguarding of all non-reporting demographic information to include socioeconomic status, school of attendance, individual names and other associated information to the particular school, and respondent answers. All data was published in aggregate form.

Although the participants may have been vulnerable based on their child’s age and attendance at their school, anonymity of participants was protected by numerically coding each interview. Numbers replaced names and no personal information was used in the interview questions. All data, whether electronic or in paper format was protected using a 128-bit digital encryption software package has been stored on a hard drive and locked in a safe with any paper produced products at the researcher’s residence. This information will be destroyed after a reasonable period of time that will be determined by the publishing date. The respondents and guardians were advised that summary information could be disseminated within the professional community and there was no foreseeable way to trace information.
**Data Collection**

Minimizing possible threats to internal validity during the process of data collection must be evaluated (Fraenkel et al., 1993). Factors that could affect this researcher’s ability draw valid inferences from the results are data-collector characteristics and data-collector bias, the conditions at the testing location, and the expectation of participants (Creswell, 2011). To minimize bias and expectations, participants were given the opportunity to elect to remain anonymous. Although known to me, pseudonyms were provided for them and no information was disclosed that may identify them, their child, their child’s diagnoses, or the grade level of their child. All interviews were recorded audibly using a laptop and Skype recording applications. The recordings were password protected and uploaded to the researcher’s personal computer, which is also password protected. During the interviews, field notes were obtained and gathered secured in a locked file cabinet. Any written materials that were generated as a result of interviews did not disclose the identity of participants or the physical location of the interview. All interviews were transcribed from the original audio recordings and maintained under specific files that were also be password protected. Any field notes that contain any type of identifying information were redacted and will remain in researcher’s custody under lock and key.

Using Smith et al. (2009) and Pietkiewicz and Smith (2014) as guides, the researcher collected data by audio recording during all of the interviews as well as scripting answers of the participants. Data was collected through a series of semi-structured interviews. Two thirty-minute interviews, were conducted of each participant because according to Seidman (2006) a three-interview structure includes structures enhance an IPA study and aids with reliability and validity. There were ongoing informal connections with the participants in the form of phone
calls and emails throughout the research process and notes were taken during these calls. All notes and emails were in print form and were used to ensure trustworthiness in the study.

DiCicco-Bloom and Crabtree (2006) reported on how rapport involves trust and respect for the interviewee as well as the information sharing. Therefore, prior to the interview, I engaged each participant in casual conversation to build rapport and trust. Essentially, this was used as a means of establishing a safe and comfortable environment that allowed for the sharing of personal experiences. In talking casually with the participants, the goal was to identify with each individual as an educator, parent, and researcher who has them and their child’s best interests in conducting this study. After a casual rapport was established, a conversation, with a purpose of understanding the richness of their parental experiences in making sense of their child’s use of assistive technology, was initiated. This approach also helped in establishing further trust and confidence (DiCicco-Bloom & Crabtree (2006).

To guide the interview process, the researcher first began by welcoming the participant. At that time, the researcher reminded the participant about the purpose of the study as well as informing them that they could terminate participation in the study at any point. The central questions of the study – How do parents, of children diagnosed with ASD, make sense of their child’s experiences with assistive technology? – was used to help guide the interviews. In order to identify the impact of parental experiences pre-determined interview questions served as a foundation for these interviews (See Appendix B).

After informing the participants that the interview sessions would be audio taped using Skype recording technology and written notes would be taken for the purposes of transcription, the researcher again assured each participant that the interviewee’s privacy would be protected.
Additionally, the researcher informed each participant that all transcribed records, audio recordings, and field notes would be securely stored for the period of this study. Prior to the interview, the participants were provided the questions for the meeting in an attempt to allow the speaker to speak more freely and openly about their experiences with assistive technology. Through active listening, content reflection, and the guided questions, the participants were able to address many of the issues involved in this research study.

Upon concluding all the interviews, the recordings were reviewed several times by listening to them. The initial review was conducted to ensure that each Skype interview had been correctly chronicled, without any malfunctions in the technology, or the recording itself. Once confident that the sessions had been recorded properly, the files were sent electronically to a transcription service. Once transcribed, the files were verified that the company transcribed the interviews verbatim by listening to the recordings while reading the transcripts. For an additional verification, a copy of the transcribed interviews, were sent to each of the participants as a PDF file. At this time, the participants were requested to clarify anything in the transcriptions they felt was not accurate or need further clarification. The transcribed interviews were kept under a password protected file on the researcher’s computer.

Data Storage

The participant interviews were audio recorded using a laptop computer with Skype recording technological capabilities and then uploaded to the researcher’s personal computer. Both the files and the computer were password protected. Field notes were kept in a securely locked file cabinet in the researcher’s residence. All written materials generated as a result of the interview process did not disclose the identity of the participants, the location of the interviews, or any other identifier that could be traced to the participants. After successful transcription, the
original audio recordings were maintained under the password-protected file on the researcher’s computer and the filed notes were stripped of any identifying information and will remain in the researcher’s custody under lock and key until this study is published. At the completion of the study, all electronic recordings will be removed and a government wipe of the files will be conducted.

Data Analysis

Data analysis in qualitative studies differs among studies, however in an IPA study it is unique in that when compared to other qualitative research, it does not attempt to size the findings within a given framework. Smith et al. (2009) identifies how IPA studies are centered on the human lived experience with the goal of enabling an examination of that lived experience through self-expression of the participants instead of through “predefined category systems” (Smith et al., 2009, p. 33). Additionally, Smith et al. (2009) recommends using several strategies because there is not a prescribed single method for analyzing data, especially in an IPA study. For this study, a version of the Stevick-Colaizzi-Keen method, as outlined in Creswell (2007), was used to analyze data. Creswell (2007) modifies Moustakas (1994) six steps, which are quoted from Creswell (2013) and applied to this study below:

1. First describe personal experiences with the phenomenon under study. The researcher begins with a full description of his or her own experience of the phenomenon. This is an attempt to set aside the researcher’s personal experiences (which cannot be done entirely) so that the focus can be directed to the participants in the study.

2. Develop a list of significant statements. The researcher then finds statements (in the interviews or other data sources) about how individuals are experiencing the topic, lists
these significant statements (horizontalization of the data) and treats each statement as having equal worth, and works to develop a list of nonrepetitive, nonoverlapping statements.

3. Take the significant statements and then group them into larger units of information call “meaning units” or themes.

4. Write a description of “what” the participants in the study experienced with the phenomenon. This is called “textural description” of the experience-what happened-and includes verbatim examples.

5. Next write a description of “how” the experience happened. This is called “structural description,” and the inquirer reflects on the setting and context in which the phenomenon was experienced.

6. Finally write a composite description of the phenomenon incorporating both the textural and structural descriptions. This passage is “essence” of the experience and represents the culminating aspect of a phenomenological study. It is typically a long paragraph that tells the reader “what” the participants experienced with the phenomenon and “how” they experienced it (Creswell, 2013, p.193-194).

As identified by Creswell (2013), this approach follows the guidelines for phenomenological analysis and representation by allowing the researcher the ability to analyze the data to identify significant words and phrases, develop meanings that can be assembled into themes, while presenting an accurate description of the phenomenon.
An Interpretative Phenomenological Analysis (IPA: Smith et al. 1999) was used in this study because it offered an idiographic emphasis, allowing for participants make sense of their experiences. To examine this IPA process, the researcher drew upon the fundamental principles of phenomenology, hermeneutics, and ideography (Pietkiewicz & Smith, 2014). To achieve the essence of the information gathered during interviews in this IPA research study (Creswell, 2007), portions of the language based data was allocated words and phrases or codes that “symbolically assign a summative, salient, essence-capturing, and/or evocative attribute” (Saldaña, 2015, p. 3) to the language. Saldaña (2015) ascertains how initial coding is a starting point that provides analytical leads which give direction for further exploration, while Charmaz (2006) asserts that coding is the essential link between collecting data and explaining meaning of data in a qualitative study.

During the First Cycle coding process, initial coding or “Open Coding” (Charmaz, 2006), was used to break down the data into discrete parts which will allow for an examination, comparison, and identification of similarities and differences, while being open to all conceivable theoretical directions based on the “readings of the data” Charmaz, 2006, p. 46). Initially, a reading of transcripts while reviewing audible recordings was initially conducted so that the participant, not the interviewer remains the focus of the study (Smith, Flowers, Osborn, 1997). This procedure allowed the researcher to record and bracket his/her initial responses, while the repetition allows the researcher to identify connections, discrepancies, and commonalities of the narrative accounts of the participants. This was accomplished by coding quickly and spontaneously while paying close attention to the “rich dynamics of data through line-by-line coding” (Saldaña, 2015, p. 103) otherwise described as ‘splitting’ (Saldaña, 2015, p. 103), sentence-by-sentence coding, and paragraph-by-paragraph coding. Code was placed into
parentheses and question marks so they could be further explored during recoding. During this first cycle and subsequent recycle coding, a search for “processes – participant actions that have antecedents, causes, consequences, and a sense of temporality” (Saldaña, 2015, p. 103) was conducted and reviewed to determine whether they need to be further explored during second cycle coding. Additionally, a search for the “properties and dimensions of categories – conceptual ideas that bring together similarly coded and related passages of data (Saldaña, 2015, p. 103) was conducted to infer meaning from the data. Finally, a “reality check” or personal debriefing was conducted by the researcher during and after the initial decoding to ensure that a written reflection of the process is maintained. This was used to reflect on why there is a range and variance in the data.

When reviewing the data, it is likely that the researcher will transition between Creswell’s (2007) modification of Moustakas (1994) six steps of an IPA data analysis. During this first step process, the researcher stays true to the IPA process by highlighting “significant statements, sentences, or quotes that provide an understanding of how the participants experienced the phenomenon” (Creswell, 2013, p. 82). It is important to note that although this study does prioritize and honor the voice of the parent. Therefore, the use of In Vivo coding or Process Coding in the first cycle would not be as effective as Initial Coding because of the wide variety of data forms being used. Hence, the Initial Coding analysis would best preserve the reliability of the framework and methodology used in this study.

Once completed, pattern coding was used during the Second Cycle coding method. According to Saldaña (2015) pattern codes are descriptive or inferential codes that detect an evolving “theme, configuration, or explanation” (Saldaña, 2015, p. 210). Miles and Huberman (1994) identified pattern coding as “a way of grouping those summaries into a smaller number of
sets, themes, or constructs” (Miles and Huberman, 1994, p. 69). In this study, pattern coding allowed for the development of major themes from the data, while searching for causes and explanations within the data (Saldaña, 2015). Additionally, and specifically for this study, pattern coding was used to identify patterns of human relationships, especially those between parents and their children, while attempt to detect theoretical constructs and processes from the data (Saldaña, 2015).

During this Second Cycle pattern coding, the researcher used a CAQDAS Computer Assistive Qualitative Data Analysis to collect similarly coded passages from the data to assess commonalities and assign them various pattern codes. The researcher used NVIVO –CAQDAS analytical program to identify pattern coding. These pattern codes were used to develop a statement that describes a major theme, a pattern of action, a network of interrelationships or a theoretical construct from the data. Since “many codes – especially pattern codes – are captured using metaphors” (Saldaña, 2015, p. 212) to fuse large blocks of data into a single “trope” (p. 212). Although many pattern codes may be developed during the Second Cycle, Miles and Huberman (1994) assert that “pattern codes are hunches: Some pan out, but many do not” (Miles & Huberman, 1994; as cited by Saldaña, 2015, p. 212).

First and Second Cycle coding methods were repeated with each participant’s interview. Cautious consideration was given to each individual transcript in order to adhere to the third theoretical underpinning, Ideography, where the focus is on the particular instead of the collective (Pietkiewicz & Smith, 2014). Once all data sets were analyzed using the First and Second Coding methods, the researcher searched for patterns of emergent themes, configurations, and/or explanations across each data set to identify data shared across each interview. This process allowed the researcher to remain within the interpretative nature of IPA
by presenting an in-depth analysis that identifies the elements of an experience that makes it unique or discernable from others, while supporting and strengthening and supporting the theoretical foundation of the IPA methodology.

**Trustworthiness**

This study was limited to a very small sample population of parents who have children diagnosed with ASD, at a public school in the Commonwealth of Massachusetts. The purpose of this study was to provide a description of the facts as obtained from the participant’s experiences within the context of their ASD diagnosed child’s use of assistive technology. Creswell (2007) identifies validity in phenomenological research as a concept that is “well-grounded and well-supported” (Creswell, 2007, p. 215). Validity also concerns itself with the fact that the data from the instrument is measuring what it is intended to measure (Creswell, 2011). Creswell (2011) also identifies that validation in qualitative research includes making sure that that the researcher has made every attempt to assess the findings.

To ensure validity and trustworthiness, four approaches were incorporated in this study. First, by using Seidman’s (2006) three interview structure, the researcher was allowed time and the opportunity to verify internal consistency of comments and clarification of participant’s experiences, while increasing researcher/participant trust. A second approach is triangulation. According to Creswell (2011) triangulation involves a researcher corroborating evidence from different individuals, data types, and through data collection (Creswell, 2011, p. 259). This study used multiple participants and multiple forms of communication i.e. interviews, emails, note taking, and phone calls to establish triangulation from the data. The third approach includes member checking, which Creswell (2007) indicates enhances the validity of a study. In this study, participants were given the transcribed interviews to review as a means of ensuring
trustworthiness of the interview process and the information gathered. These member checks included the participant’s views on the credibility of the transcripts and researcher interpretations. Any changes during the drafting process or any alternative language was so recorded.

Finally, the researcher engaged in an external audit, which Creswell (2011) identifies as using a person outside of the study to “different aspects of the study” to comment on the strengths and weaknesses of the study (Creswell, 2011, p. 260). I obtained the services of a colleague in the Northeastern University College of Professional Studies doctoral program to review the audio and transcribed interviews. This process did not contain any identifying information about the participants, their children, or their child’s diagnoses. This colleague also performed an external check providing feedback and their perceptions on my interpretation of the interviews.

**Limitations**

The researcher’s approach to the topics of autism and assistive technology, particularly my methodological strategies, will allowed the researcher to generalize findings, however it also limited the application of findings to a larger scale. Due to the small scale, case study format, insight was gained into topics such as disability, trust, culture, gender, ethnicity, fairness, and spirituality, however the group will be diverse in education, academic background, social economic status, living experiences, how they raised their children, and how they managed the day-to-day responsibilities of having a child diagnosed with autism. In essence, this study required the researcher to immerse himself into the data to make sense of the phenomena, while at the same time interpreting it using concepts and theories to understand the research problem. This required the researcher to move between the emic and etic perspectives, which according to
Pietkiewicz and Smith (2014) “requires patience and openness to see the world through someone else’s eyes and the ability to control a temptation to priori impose conceptual categories” all of which are subject to interpretation (Pietkiewicz & Smith, 2014, p. 13).

Another limitation of this study comes in the form of the family-systems point of view of Fisman, Wolf, Ellison, and Freeman (2000) where sibling familial environment influences the sibling relationships. In this study, such influences were not address and may directly influence an individual’s ability to use an iPad more effectively. Although positive parent child relationships are associated with positive sibling exchanges (Brody, 1998), sibling interventions with children with an ASD may deliver a more effective support network (Finegan and Carr 2002). Parents can be supported in providing the children with an ASD with appropriate information, parents may reframe their experiences with assistive technology to be more positive, which may change the outcomes of this study (Petalas et al. 2009).

**Summary**

Chapter three provided an outline of the design process used for this phenomenological study, while being used to understand how parents of autistic children make sense of their experiences with assistive technology. Specifically, this methodology allowed for a deep and through examination of the richness of parental experiences use of assistive technology using the frameworks of expectancy value theory (Atkinson, 1957) and the tenants of Ardelt and Eccles’s (2001) parental self-efficacy theory to understand the dynamic interplay between the personal, behavioral, and environmental influences (Bandura, 1997). A reflective positionality statement reviewed how the researcher’s own beliefs can complicate the understanding of the phenomenon. The research design and research tradition are explained in detail as well as how participant recruitment and access and protection of human subjects were conducted. Finally, data
collection, data storage, and data analysis were reviewed in terms of trustworthiness and limitations of the study.
Chapter IV- Findings and Analysis

The purpose of this study was to understand how parents of autistic children make sense of their lived experiences with assistive technology in their everyday lives. The researcher explored the challenges and adaptability behaviors that contributed to how the participants’ make sense of their experiences with assistive technology. Their accounts were analyzed from parental self-efficacy theory and the expectancy value perspective. More specifically, the participants’ accounts were explored as part of a process that analyzed them within their home environment.

Six participants were interviewed, and each individual provided detailed accounts of their unique experiences with assistive technologies. The participants were six parents who were interviewed and each provided detailed accounts of their own experiences and perspectives with assistive technology. Participants were a parent(s) of a child diagnosed with special needs. Five mothers, Mary, Peggy, Connie, Jeannie, and Diana participated, while one father; Charles participated. It should be noted that all of the participant’s children have been using high-technology devices in the classroom for the past three years, while their exposure may have been earlier at home.

The analysis of the data collected led to three super-ordinate themes and nine subordinate themes. The three super-ordinate themes resulted from equal or similar statements made by all participants (see Table 1), while at least three participants contributed to the subordinate themes. The super-ordinate themes and subordinate themes analyzed are presented in Table 1 and are discussed after a synopsis of each participant is presented to provide a contextual understanding of each of the participants. This synopsis is intended to give a more in-depth introduction to each parent participant who is presented using pseudonyms. Additionally, any names of third parties, their titles, age or locations mentioned by participants or used to converse or interpret
participant’s conversations (one participant was deaf requiring a translator), were changed or
removed to protect privacy.

Participants

Mary. Mary is a mother in her mid-forties. She has been married to her husband for 23
years and they have two children, Sean who is an eighteen-year-old “who’s on the autism
spectrum” and attends a cooperative school setting, and Tim who is a 15-year-old and attends the
local public school “and he’s a typically developing kid.” Mary works as an executive at a high-
tech firm and lives in a middle-class suburban town outside of Boston with her family. Her
financial status is upper-middle class. Family, community, and friends are important to Mary.
When describing her family, she stated: “I think we are a family, it’s a normal thing for us to
have a special needs child but…our normal is not everyone’s normal.” As for the community
and her friends she described how each year they have a family cookout, which now has turned
into a huge community celebration. Mary stated how the cookout has turned into a network for
her as well as her son Sean. The cookout and subsequent friendships have allowed her son to be
“very accepted and he has had a good run, he has his separate life at school but he also has a nice
community here at home…even though he doesn’t have his own individual friends” he has a
neighborhood of family friends that “embrace him and really like him.”

Mary describes what is like to be a parent of an autistic child as: “Challenging. People
will say, "Oh, you must be patient." I'm like, "Oh god, no." I would have described myself
probably as very impatient before I had Sean.” She stated that Sean has changed her as a person.
She believes that “I was tough as a kid, as a teenager. Not tough in really a totally bad way but a
little judgmental, a little quick to decide who I liked and who I didn't like. I'm not so much like
that anymore, not as much anyway. I think an autistic child makes you I think see the world differently.”

I don't, as I said about judging other people and other families, when I see that kid on the playground misbehaving I don't automatically think it's just bad behavior. I wonder why he's behaving that way and sometimes in the end it is bad. It's just a kid who doesn't have any limits and the parents handling things all wrong but other times it's, you can totally see it's a kid on the spectrum and it's totally something they can't control and that they want to keep, I'm using a Sean example, kicking those wood chips, kicking those wood chips, kicking until, when he was a child, picking him up and removing him to someplace where there were no wood chips because he couldn't shut it off. It's interesting. It's a little different. It somewhat can be isolating. Yet you find a network amongst people, other people with kids with special needs who get it.

Mary believes that Sean as an autistic child has changed her and the people she calls friends. She recalled that “I think I have different friends than I would have had, had Sean been a typical child. I think my network of friends are different and probably better I say, I often say that the nicest people I've ever met are the parents of special needs kids.” She went on to describe other families of autistic children as “kind and good people”, adding “I don't know if that made them that way or if that's just, there was a grand plan and that's why those kids ended up where they ended up.”

Jeannie. Jeannie is a divorced mother of two children. She and her ex-husband live together in the house with both of her children. They reside in a middleclass neighborhood in the suburbs of Boston. Their financial status is lower middle class. She is currently unemployed and is deaf. Her twenty-one-year-old daughter, who works with special needs children,
translated her words for the purposes of the interviews. Her son Derick is an autistic seventeen-year-old young man. Jeannie describes her family as “very happy”, “very outgoing”, and “very close.” She stated that the family has the motto: “don’t worry be happy.” She stated that they were “a different family, but we are in it together.” Jeannie stated that the journey with her son Derick has been difficult. She stated that they tired taking him out when he was younger but he was “screaming, kicking, punching himself” so she stopped until he improved. Now she is able to take him to restaurants, the grocery store, and other community outings (personal communication, October, 15, 2016). She affirmed that because Derrick’s behavior was so disruptive, it and the fact that she is deaf, limited her ability to make friends and network with other families of autistic children (personal communication, October, 15, 2016).

Jeannie said that she does have some friends but they are “not in the picture in terms of parenting” (personal communication, October, 15, 2016). She said these friends are also deaf and the deaf culture is so different than the hearing world (personal communication, October, 15, 2016). She stated that many in the deaf world believe that every person in the world should learn sign (personal communication, October, 15, 2016). She stated: “you would think that my deaf friends would be more understanding” but they do not understand Derrick (personal communication, October, 15, 2016). As a result, Jeanne said that she has ended up raising Derrick without the help of the deaf community, friends, and the professionals in the field (personal communication, October, 15, 2016). She stated: “I would rather do it myself.”

**Connie.** Connie is a Korean-American married mother of three children. She has two girls aged twenty-two and sixteen and one son, Jack aged twenty-one, who is autistic. Connie and her husband just celebrated their 25th wedding anniversary and when asked to describe what it is like to be a parent of an autistic child, Connie said: “I think I, to be honest, have an atypical
experience only because of what I know from other families. I'm lucky in that my husband and I see eye to eye on virtually everything when it comes to Jack.” She further commented: “I just know he's a dad that's always going to be there for him and not all parents and not all dads are like that. A lot of dads have trouble coping with the diagnosis. That's one thing I have going for me is a husband that I know we're on the same page.” Connie then added: “Another thing to be honest is...We don't have financial stress. I have kids that adore their sibling. Not having marital stress, not having financial stress, not having sibling rivalry or jealousy, it makes my situation look very easy.”

Connie made a point about how important it was to her not to have to deal with sibling rivalry and/or jealousy. She stated that Danielle, who attends MIT “is very logical and mathematical, while Sydney is very musical and into drama” (personal communication, October 12, 2016). Her description is represented during the interview when Connie gave the following example of how Jack’s siblings feel about their brother: “Danielle, when she was looking to go to colleges, her dream was to find a cure for Autism. Sydney at the time when she found that out said no, I don't want Jack to be any different. They both think Jack is just perfect and idolize him.”

When describing her son, Connie stated “Jack also is atypically autistic in that when he does things that are routine and predictable, his brain is on autopilot and he's lost in his head, he's stimming and doing verbal stims.” She added: “He'll go through the motions of whatever the task is but because it's so predictable for him, he's just not really engaged.” Connie identified that “When he does things that are new and different and novel he's more alert. Traveling is one of those things. We go to a new place; he's alert and looking around. He likes cities.” Connie described her family as one that travels together. She stated: “We travel as one unit. We do
everything together and everybody knows us that way. We’re very close.” She went on to say: “We discovered a handful of years ago that when Jack moves his body, he's less Autistic...Because of that, we try to do a lot of outdoor activities. We ski, we go to the beach, we travel.” Finally, she stated: “We try to center our lives basically around Jack.”

**Peggy.** Peggy is a middle-aged divorced mother of two children, Ben who is thirty and Tony who is seventeen years old and diagnosed with autism. During the interviews, Peggy did not speak of or make reference to her marriage. Peggy stated that her son Ben is working and that at his current age “he does not enjoy doing anything with us.” “Brandon kind of goes off on his own. He works full time so he's not around a lot. He's a truck driver. He's not around a lot. Most of the outings are just Tony and I.” She added: “Tony loves going to Target, any store that has videos in it he will go. If I want to say, "Lets go to Home Depot, I will get nothing but grief." I would say any kind of store with videos or music and food. Other than that...That's all he wants to do.”

When asked to provide a story that describes her family Peggy provided the following vignette:

Well, did you need a story about each of them? I'm full of stories. All right, Tony was probably twelve years old ... Maybe twelve years old, because he had already been away. Anyway, my mom and I took him to Stop and Shop figuring between the two of us we could handle this. When he got in the door of Stop and Shop he bolted on us. He usually used to go to the cereal aisle. I could always find him, because he has bolted multiple times. This wasn't a first. He wasn't there. I heard a woman screaming, "Oh my God! Oh my God!" I followed the voice and I found Tony standing in the stand-up freezer facing out looking at this poor woman and
she's screaming, "Oh my God, Oh my God!" I just opened the door. When I asked Tony why he was standing in the freezer, he told me, "It was hot so he went in the freezer to cool off." He's very logical.

Peggy found that being a parent of a special needs child has changed her. She stated that it was not the fact that she had a child with special needs that changed her but the need to become her child’s greatest advocate (personal communication, November 12, 2016). Peggy began by stating: “I use to be a nice person.” She stated that she was very quiet and “if a doctor would say something I would, "Yes, yes, yes," and believe every word they said because they are a doctor. I'm not quite like that anymore. I think being a special needs parent ... You change.” Peggy said: “it's just that you come to terms ... At least I did in my case ... Come to terms with these doctors don't know everything." Peggy ended by stating: “I have no sympathy. That's just me. I'm not the nice person I used to be.”

Charles and Diana. Diana is a middle-aged married mother of three children, Caroline who is twenty-one and presents with Rhett Syndrome, Brian who is eighteen, and Michael who is fifteen. Diana is married to Charles who also is a participant in this study and they live in a house in the suburbs of Boston. Diana describes her family as outgoing who “just try to keep things as normal as they can be and just participate in as many, bring Caroline to as many things as we can.” This is especially true in the summer where their house is a meeting point for family and friends. “We enjoy hanging by the pool. We enjoying going to New Hampshire.” My in-laws live on Winnipesaukee. We really like going up there. Caroline and I and the boys when they were younger...we love going to Castle Island.”
Diana describes being a parent of a special need child as putting “a lot more pressure on you logistic-wise day-today.” For her, she must take it “day by day”, explaining “If I didn’t I would get too overwhelmed. You have to juggle a lot more things.” She further explained: “Even with my new job, for instance, you'd think I have a twenty-one-year-old I wouldn't have to worry about how is she going to get changed in the morning? Who's going to get her off the bus?” Diana continued: “making her lunch and changing her and those kinds of things. It definitely puts a lot more pressure on you.” To sum up her feelings about being a parent of a special needs child, Diana stated: “You never get beyond that your kids grow up and move on.” She offered the example: “Like this weekend, the boys are at Notre Dame. You think, wow. You still always have to make sure one of us is here to watch her or get somebody to come and that kind of stuff.”

Charles, who is Caroline’s father, offers a different perspective of being a parent of a special needs child. His concern centers on trust, trusting others to care for his daughter. Charles recalled: “I remember having conversations at some of her IEP’s and having a difficult time trying to express to the teachers, we’re entrusting her to your care.” Charles then clarified: “Here's a girl who can't, if something happened to her during the day, she can't come home and tell us, ‘I had a bad day. Somebody was mean to me. Somebody may have harmed me’." Charles added: “We have no way of knowing.” Though Charles added: “We've never had a teacher that we ever had a concern about. They were always outstanding.”

When asked about how they felt about Caroline being diagnosed with Rhett’s Syndrome, both Diana and Charles stated they were relieved. Diana stated: “I think we were kind of happy to at least have a diagnosis and know what it was.” Diana added: “Between getting tested for it and getting the results, I had been in touch with the Rhett Syndrome Group of Massachusetts.
We had started to get involved. I think it was better than not having a diagnosis at all.” Diana stopped and reflected: “I think, too, prior to the blood test a lot of times it was the much more severely affected girls that were diagnosed. Now knowing that there was going to be a larger spectrum of girls.” Diana appeared relieved when she added: “She's always been on the higher end of it which is good.” I think having a diagnosis, for me at least, was much better than not knowing at all because you had a support system.” Charles further added: “The geneticist was great and Peter Jones was great in terms of the doctors that we were working with at Children's.” In speaking of the doctors, he smiled stating: “They were very kind and gave us an outlook of what the future may be, but did it in a kind way which put you at ease a little bit.”

**Transcript Analysis**

An analysis of transcripts yielded three superordinate themes and nine nested subthemes that captured the ways in which participants made sense of their experiences with assistive technology. These themes were formed through careful interpretation of the data that emerged within each individual transcript. All three superordinate themes surfaced from interview data that occurred within the transcripts and through personal communications with the participants. In this chapter, superordinate and nested sub themes that emerged during cross analysis will be described and discussed. Verbatim quotations, researcher observations, and descriptions of participants’ perceptions, and reflective thoughts are included as supportive evidence. It should be noted that all of the participant’s children have been using high-technology devices in the classroom for the past three years, while their exposure may have been earlier at home.

Pseudonyms have been used for all participants. Each themed section will conclude with a summative analysis. The combined superordinate themes and their nested themes were: 1) Experiences with Technology (1.1 communication/social, 1.2 academic, 1.3 entertainment); 2)
Barriers or Obstacles to Technology (2.1 access to technology, 2.2 affordability of technology, 2.3 functionality of technology, 2.4 frustration with technology); and 3) Personal Value/Enlightenment (3.1 value of technology, 3.2 concerns with technology). Themes are additionally displayed and characterized in Table 1.

Table 1.

Superordinate and subordinate themes.

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<tr>
<th>Experiences with Technology</th>
<th>Barriers/Obstacles to Technology</th>
<th>Personal Value/Enlightenment</th>
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<td>1.1 communication/social</td>
<td>2.1 access to technology</td>
<td>3.1 value of technology</td>
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<td>1.2 academic</td>
<td>2.2 affordability of technology</td>
<td>3.2 concerns with technology</td>
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<tr>
<td>1.3 entertainment uses</td>
<td>2.3 functionality of technology</td>
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<td>2.4 frustration with technology</td>
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**Experiences with Technology.** This first superordinate theme that emerged through data analysis *Use of Technology* relates to participant’s experiences with assistive technology in terms of communication or making meaning how they use technology. In response to questions about how technology integration made them feel, or what the integration process had or has been like for them and their family, participants revealed desirable personal feelings that affected their ability to use technology in their everyday lives. Across transcripts, participants described their use of technology with a sense of dependence in their everyday lives, while they described their need and reliance through their own experiences as not a tool of communication with their child. Additionally, they related that technology had its greatest impact concerning their daily communications and their ability to socialize with friends and family. Participants identified
they personally are less likely to use assistive technology for academic and entertainment purposes. However, all participants spoke of assistive technology, even when not asked, in terms of how technology affected their disabled child’s ability to use it. With this said, three nested themes were therefore identified within this superordinate theme. These were: communication/social uses; academic uses; and entertainment uses.

**Communication/social.** To varying degrees, technology in the participant’s lives produced welcomed feelings concerning communication and social use for most interviewees. While some participants experienced initial fears, others expressed feelings of embracement, while still others felt discouraged by a perceived lack of application for their disabled child. While some interviewees expressed their appreciation for academic technology services, a majority felt that these services should be limited to the school as they did not adequately meet their needs as parents nor meet the needs for their disabled child’s quality of life. It was the perception of this researcher that most parents felt uncomfortable requiring their child to use technology as a family directive, and that feelings of dependence on the technology hindered their efforts to provide happiness, security, and safety at home.

It was also this researcher’s sense that participants desired greater autonomy with their own use of technology as evidenced by increasing improvements in technology that allows for a more tailored and individualized personal support system that promotes greater self-sufficiency. One example is demonstrated by Connie who described her feelings towards technology as: “the iPhone has revolutionized my life, or smart phones because normally I would be chained to my computer doing emails and internet searches or whatever it is that I had to do for all of my kids and to run the house.” She added: “The iPhone or smart phone has allowed me to not be chained to my office and I can do that out and about.”
Connie appeared keenly aware of the extent to which technology affected and continue to affect her everyday life. However, when asked about the iPad specifically, she stated: “it’s funny. Whenever I think of iPad, I think of Jack. If somebody said what do you think of the iPad? I’d say Jack.” Although Connie did not express specific concerns regarding the iPad, she did make it a point differential between the two generations by stating: “The iPad that we have at home, the two different generations that we have. I use mine. Jack Jr. uses his. No one else in our family for some reason uses the iPads.” In terms of her use, Connie expressed feelings of discomfort as to why she is using her iPad. She stated: “For me, it's embarrassing. I like to use it because my eyes and I'm at that age where I can't read iPhone anymore. It's just much easier to have it bigger.” She stated: I'm not spending my time playing angry birds. I'm using it to email, respond to people, manage a whole household, I love it.” The researcher found that Connie’s honest reflection served her well. By honestly exploring her feelings, Connie revealed the ways in which her use of technology worked to her and her family’s advantage.

Initially when asked about technology, Mary stated: “Technology I think of more as, in fact I've usually thought of it as more for children who are completely non-verbal.” I have a friend…whose daughter has cerebral palsy, is in a wheelchair, and she's non-verbal and she has her communication board and she has an iPad and she does a lot of things that help her navigate the world.” Mary added: “I've always thought of technology in those terms.” The researcher construed that Mary’s use and experiences with technology were identified through her disabled son, Sean, and limited to her experiences as a working mother. Mary identified her use as a modern-day user, but not one that she would particularly call revolutionary (personal communication, September, 15, 2016). This became evident when Mary discusses her use of technology: “I always push back” which refers to her personal feelings towards technology.
On the other hand, Mary spoke of her work use by stating: “I use a phone for communication and for Sean’s (her Autistic son) scheduling, but I am not a big user of technology” (personal communication, September, 15, 2016). During the interview, she clarified this statement by adding: “I'm an administrative director of a non-profit in education foundation, I use your office suites and I use financials, like a donor database and I use things like that. I think I'm pretty typical American as far as what I know.” The researcher concluded that Mary honesty spoke about her husband, who is a V.P. of technology and a former programmer who “believes that everyone should know every short cut on the keyboard and how to go in and locate something in the operating system.” She laughed and commented: “I'm like, "Very few know that and I think I'm your typical user." Maybe I'm wrong but that's what I think.”

Several participants highlighted the notion that they use technology in their everyday lives at work but prefer not to use it at home. Diana stated: “Of course I use technology all the time. My phone, my computer. Yeah, technology is a huge part of our lives and the younger generation even more.” Charles, a technologist stated: “I use technology in my everyday life. Communicating with staff, clients home and family, however at home we have a tendency not to use technology” (personal communication, September 17, 2016). Although, when asked about any hesitations they might have toward integrating technology with their disabled daughter, the researcher identified that Charles and Diana had differing perspectives. When asked to comment on assistive technology, Diana stated: “I guess that would be more the iPad as far as using it for her (Caroline) to communicate.” She added: “I guess that's what I'm talking about more. I would like to work on that more with her to get to a place that she can maybe access it at home and let us know if she had a stomachache or she was tired or whatever.” Charles on the other hand stated: “I know we differ on that. I don't know if she is capable of expressing some of those
deeper issues if she had a stomachache or what have you.” He added: “She's working with Proloquo. I think it's a fantastic program. Whether she had a feel before now. It's pretty limited.”

Jeannie’s approach to technology as a communication device was viewed through a nostalgic lens. Jeannie stated “A long time ago, families talked, now everyone is just glued into their phones.” She went on to say that she misses “the socialization of back then.” She further stated: “It's tougher. I feel bad for my parents, no (cell) phones. Back then was different.” However, the researcher found that she saw personal value in technology as a communication tool because as a deaf person it gives her a voice that allows her to “communicate” with her family and “check-up” on them. Much like Jeannie, Peggy also thought of technology in terms it being non-existent when she was raising her family. Peggy stated “It didn't exist. It didn't. We were lucky that maybe they taught him signs to eat and drink. That was it. There was no technology when Tony was little.” She added: “We did not have any means of communication for him. However, she did add: “We did get lucky that he started speaking when he was two or three years old, but not to any degree where anybody could understand anything he possibly was saying. That remained most of his life.”

**Academic.** To varying degrees, technology in participant’s lives produced welcomed feelings of appreciation concerning the academic use of technology in their everyday lives. While some participants experienced initial reservations about their use, all participants but one, spoke of academic uses in terms of their child, whether asked or not. In every case, the academic use of technology was referred to in terms of their use at their child’s school. Participants expressed feelings of embracement, hope, and disappointment, while all indicated a perceived lack of academic application for their disabled child other than the use at the child’s school. An
example of hope and embracement is demonstrated by Mary who spoke with an enthusiastic tone while describing Sean’s early childhood use of a program that would speak to him, while expressing words and symbols of encouragement when correctly used.

It was a program that Sean could sit at the computer and it would talk to you so it would say, "Find the number four," and it would give you the numbers five, seven, four and you'd click on it and if you clicked on the right number it was perfect for him. They'd be like, "Yay, you got it right, woohoo. Now let's find the number or the letter G." Same thing, you'd get some choices and the better you did, the harder it got, the more choices, you were given five letters to choose from or whatever.

She added: “They'd have fireworks going off when you would get the right answer and they would say, "Woohoo, you're the best," they had twelve different ways of saying good job. It was very motivating for him.” Mary’s voice heightened and she began to smile stating: “He really liked it. He would sit there and when he was a kid that has a hard time concentrating it kept his attention and it kept him wanting to keep moving up a little bit to the next level.”

As Mary discussed her son’s current academic use and performance level, her tone changed, she lowered her voice and began by discussing how she approached her use of assistive technology through her child’s school. “I would say meeting with school and seeing what they're using and I know they use the iPads in the classroom a good amount.” She smiled slightly and stated: “Sean likes the technology so we, for a while were doing more of it than we are now.” She frowned and stated: “He's
gotten so used to ... We've let him get into bad habits I guess with the YouTube clips and stuff like that. I don't think he sees his iPad as a learning tool so much, not at home anyway.” Mary paused as she reflected on Sean’s academic use of technology and commented on his use as: “I'd say school, what they're doing and I'll do some research on and off.”

Connie also expressed academic experiences through her own and her child’s use. Connie was matter of fact when discussing her own use as being limited to the “iPhone or computer, internet, emails, Facebook.” Further clarifying: “I do waste some time on technology.” However, when speaking of her child’s use of technology, her voice reflected tones of disappointment, while her facial expressions matched her tone. For the researcher, it was difficult to pinpoint why she was disappointed. However, there were indications that her disappointment was both with lack of academic application for her son and how her son is allowed to use the technology. For instance, Connie stated that for her son, “he uses it to watch YouTube videos and game apps”, while expressing disappointment with how applications have not been developed to help her son learn:

Not too long ago, it just seemed like the programs out there were not quite right. One program might have one feature that would be good and useful and value added for Jack but then 90% of it might not be. Another application might have a couple features that were useful for Jack but again ... It just made it awkward to find a single program or a basket of programs that I felt were really good uses of Jack's time if that makes sense.
Both Mary and Connie’s reflective descriptions of their experiences, whether their own or their child’s, offer the researcher a partial explanation and further insight as to why parents are frustrated with application technology and as to why they leave academic learning to their child’s school as stated by both Charles and Diana.

Charles was very forthcoming about his daughter’s experiences with technology and academics. “As far as academics, I leave the choices and device of activities up to the teacher who have the background and knowledge.” He added: “I prefer that Caroline work with technology at school and at home be like any other kid” (personal communication, October 12, 2016). When asked: Who do you think influences Caroline's use of technology the most? Diana immediately replied: “I would say the teachers at school”, while Charles added: “Yeah, you.” Diana further replied; “The teachers and speech therapists, people at school for sure.” Diana further commented: “Yeah. School, I often leave it to the teachers because you guys have the experience.” Although Diana further clarified the parental role as being very involved. She stated: “I think they (parents) have to advocate for their son or daughter and make sure that they're getting the best education at school, the best care, the best opportunities of things they can do outside of the school day.” Shaking her head affirmatively, she added: “I think parents have to be pretty involved.”

Diana and Charles further offered insights to their experiences with technology and academics and in doing so, offered a plausible explanation as to why parents do not place a higher value on technology in terms of academic success. Charles began a two-way conversation between himself and Diana regarding parental frustrations with: I remember having conversations at some of her IEPs and having a difficult time trying to express to the teachers, "We're entrusting her to your care." He went on to explain: “Here's a girl who can't, if something
happened to her during the day she can't come home and tell us, "I had a bad day. Somebody was mean to me. Somebody may have harmed me." He added: “We have no way of knowing.” This statement lead to an interchange between Charles and Diana that exemplifies how they make meaning of their daughter’s use of technology and its application towards academics.

The following interchange between Charles and Diana represents how they made meaning of these experiences, while offering insight for the decisions they made with technology on behalf of their daughter: Charles began by raising his hands and passionately stating: “It's all so difficult. She gets home at 3:00. You want to have dinner on the table for her at 5:30.” Diana responded: “Yeah. I'm running around in fifty different directions.” Check replied: “Yeah. Truthfully, I can interject my thoughts here. My daughter gets home from school. I want her to have a break from school.” Diana responds: “Yeah. She's tired when she comes home.” Charles replies: “Especially if you've got a teacher that pushes them then ...” Diana asserts: “She's exhausted when she comes home. A lot of times she walks in the door and right into her bedroom.” Charles affirms: “Right into her bedroom.” Diana adds: “It's one of those days. You go in there twenty minutes later and she's laying on that bed...She's taking herself a rest. She's not getting a bath. She's had it...It's a long day for her.” Diana takes a moment and reflects adding: “On the weekends. Maybe on the weekends we could work on it a little bit more. That's when she's not being pushed all day.” With this said the researcher noted that Diana and Charles developed a keen cognitive awareness of their expectations for their child allowing them to balance their academic expectations for Caroline, with a realistic view of what they consider to be a good quality of life for her. This explanation resonated across all of the participant interviews, while offering the researcher an interpretation parental factors at play when considering technological use with a disabled child.
Conversely, Jeannie, the only disabled participant, reported on the significance of technological use for academics. Her enthusiasm for the iPad and her disabled son’s academic success became apparent when she stated that it was: “Awesome, I'm very happy with it. Wow. I fought for it for a while for him. The town approved it finally.” When asked why she fought for it, she stated: “For his communication...Yeah, last night Derek brought his iPad to a Chinese restaurant, picked the Chinese folder and was able to pick out rice, broccoli, chicken and egg rolls.” She added: “Three times in a row, if you asked him to do that three years ago he wouldn't be able to…” She added it was “because of the iPad, because of being able to work really hard with him, not only at school but at home he had been able to progress and become more independent.” Jeannie very excitedly, proudly used forceful hand gestures, signs and vocalizations stated: “I'm also trying to set up a sign language app. That way he can use both to be independent.”

The researcher found that Jeannie displayed an interpersonal unspoken emotional connection with the non-verbal community as a whole. When asked why the iPad was so important to Jeannie, she signed: “He is non-verbal. I feel I have seen non-verbal kids very frustrated. Trying to communicate and signing help, to help them understand better.” She added: “The next app might be speaking. You never know.” Jeannie related her child’s non-verbal communication to her own experiences as being a deaf person. She added: “Same thing with deaf people, a lot of deaf people can't speak, they learn sign language. The same thing with non-verbal kids all of them should learn sign I believe.” Jeannie concentrated on the feelings of those who are non-verbal by signing: “That way, it makes them happy to be able to communicate. Body language, he's doing great with both. He says I love you. He says I lo you.” (Jeannie signed I love you.) She proudly stated that: “He is starting to put all the pieces together when he is
saying and signing it. I think it's important. It doesn't matter to me. I am deaf. I think it's the best for non-verbal kids to have both.” The researcher noted that this type of success was not reported by any other participant and that Jeannie’s recent acquisition of and success with the iPad may account for her enthusiasm towards it.

**Entertainment.** Equal to the communication/social and academic subordinate themes identified in the participant interviews, the researcher also captured welcomed feelings of experiences regarding technology as a form of entertainment. Much like during the communication/social subordinate themes, the participants immediately determined that the questions were directed on behalf of their child and not themselves and answered accordingly. All six participants reported that technology was a driving force in their child’s life, while half of the six reported the iPad as being one of their child’s greatest sources of entertainment. Other sources of entertainment identified during the interviews included: Sony® PlayStation® and television. In all scenarios, participants identified their child’s use of assistive technology, however in some cases the participants voiced concerns that they may rely more on technology than they intend. Furthermore, the researcher noted that in all cases, the participants affirmed that the technology was critical in calming and providing an avenue of leisure for their child. Mary, reconstructed her son’s view of his iPad use “as an entertainment source not an educational tool but he does at school.” Mary further stated:

Well, he loves his iPad so he uses technology but I would say he doesn't use it in an educational way. He'll use it for entertainment purposes, using videos, like video clips, listening to some music. He has some Disney® videos downloaded onto them so he can watch right off of his iPad. Particularly if we're on a trip or something like that, he will bring that along with him but that's about it.
Mary reflected on this comment with a smile as if it just happened. She self-analyzed by pausing as she spoke about the Disney® videos and laughed recalling using them for long trips in the car.

After further reflection, the researcher identified that Mary felt she needed to clarify her statement:

I would think that maybe we could probably do a little quid pro quo and say, "You can use it for your clips and everything but I do want to teach you how to use X, Y or Z or let's try this program. I'll just put on here for you and see how it goes." If it was something he was mildly interested in that's why I come back to a Facebook page or email or something where if you did write to somebody and they wrote you back and said, "Yeah I'll come for lunch let's make a date." He'd be like, "Oh okay so there's this automatic reinforcement that people respond if I do this or that.

The researcher noted that whenever assistive technology was used in the form of entertainment for their disabled child, the parent immediately identified the need to justify its use. Justifying its use was not unique to Mary and it was identified by the researcher across all six participant interviews.

Much like Mary, Connie identified that her son uses the iPad for entertainment. Connie identified that she facilitates his use by having it “loaded up on all of our electronic devices so he easily navigates iTunes software that we have, games.” She stopped, reflected and then added: “The trick is, the software that we have, he learned very quickly. If we make him do the educational software instead of YouTube, he'll do it but, again, it's an autopilot because he knows you know how to do it.” As she analyzed her statement she concluded: “That's always the challenge, getting the software to keep up with him, if that makes sense.” Connie reflected
on this statement with a smile, while raising and tilting her head with a sense of pride as if she had just captured the essence of how smart her son has become. However, just like Mary, Connie too felt the need to clarify her child’s use of technology as a source of entertainment:

I'm on the computer a lot. I think this is what happened: When he was very young, a toddler, he would watch Sesame Street® video cassettes, he'd put them in the VCR. We threw those away because he watching them too much. The DVDs came out and he would get DVDs for his birthday as presents and Christmas. He started watching Sesame Street® on DVDs. Then we threw the DVDs out because you're like, "Jack, no more DVDs, no more Sesame Street®." Then he discovered YouTube® on the computer, the iPad and on the iPhone. He could pull up all these videos and DVDs he used to watch as a kid.

Connie paused and again with a very confident smile stated: “A lot of it was his realizing himself what he could get out of the device.”

Charles and Diana readily admitted that they used assistive technology as a tool of entertainment for their daughter. Charles identified the iPad and iPod as tools that allow his daughter to relax. He stated: “I think that technology allows Caroline to relax especially during social occasions” (personal communication, October 12, 2016). He added: “If it is too noisy or crowded, Caroline can put her headset on and watch a show. This seems to calm her” (personal communication, October 12, 2016). When Charles made these comments, his voice was confident, while he remained stoic in expression and non-committal with his body language as if he did not care what anyone thought. The researcher gleamed that Charles had justified his decision to use the devices for relaxation and it was no longer up for discussion. While Diana on
the other hand, identified reasons and explained their use of technology as an entertainment tool for their daughter:

We use this a lot just to watch a video. You know what? It finishes and she knows where to push to get it to go again. It does help keep her, when we go to restaurants, it just kind of calms her down. Half the time she probably can't even hear it because it's loud in a restaurant. She's looking all around the restaurant. She's not just focused on that, but it is a calming thing for her. Even like her iPod, that just helps her like it's her security thing. She hears her music.

Diana stopped and reflected on her comment. She smiled and reached over and restarted Blue’s Clues® on Caroline’s iPad. ((It should be noted that Caroline was present for interview and used a headset with her iPad during the entire interview. At the end of each Blue’s Clues® session, Diana would reach over and restart the program. It was obvious to the researcher that Diana was using the iPad to entertain and clam her daughter Caroline.) Diana then turned to the interviewer and stated:

I brought her down to Norwood Day last ... Norwood shuts the center of town down. There are probably ten thousand people down there on Norwood Day. I brought her down last Saturday in the stroller. At first, she was kind of, "Oh, boy." But she had her iPod on. She loves it seeing all the people and all the goings-on. I thank god for technology. I was thinking what would we have done if we didn't have these things that are portable that we can bring out and about with us that does help her to cope with things.
As Diana discussed her experiences using an iPad and iPod on behalf of her daughter, the researcher perceived she demonstrated a heightened level of justification through the above illustration of her experiences.

Although Jeannie and Peggy also revealed they use technology for entertainment with their children, the type of technology is different from the other participants. In the case of Jeannie, she allows her son to be immersed in television. During the interview, the researcher observed her son, who was present during the entire interview, watch TV, while eating potato chips and ketchup. Jeannie stated: “He's not very interested in computers. He loves music, he likes music with a blue tooth speaker.” She added: “He watches his TV shows at three and four, Judge Judy and Family Feud but not too much.” The researcher noted these shows were on during the interview. Finally, Jeannie elaborated on her son’s television watching by stating: “He likes watching music through the TV. He changes subjects a lot. He doesn't have OCD tendencies with television or electronics really just mainly music.”

In a similar tone, Peggy clarified her son’s experiences stemming from his use with the PlayStation. Peggy stated that “he is on the thing all the time” (personal communication, October 18, 2016). Peggy also justified his use by stating: “His PlayStation®, yeah. No, that was the draw because I think part of the thing is it constantly moves. It constantly changes so there's that entertainment value that it's not just looking at the same thing all the time.” Peggy smiled as she added: “Yeah, PlayStation® was absolutely his first and then from there he got on to the computer but maneuvering the PlayStation®, it took, it's work, you got to get those thumbs.” Although Peggy totally encouraged her son’s use of the PlayStation®, she stopped and reflected on how her son’s experience with PlayStation® influenced her life, while broadening her son’s ability to engage at a higher level. She sat for several seconds and stated:
PlayStation® has been my savior. PlayStation® has given him the ability to do something recreational. To be really honest with you he has not a lot of likes. He can't be independent in a lot of things. He's not outgoing. He likes to be within his own space where he's comfortable. I think a lot has to do with his gait, unsteady gait, his vision, there's a lot of the physical pieces of it in and he has a very small world that he's comfortable in. His PlayStation® gives him that recreational piece because he can't go out on a field and play baseball like the kids do.

As Peggy further reflected, the researcher noted that the tone of her voice softened, she glanced up as if she was recalling many of the hurdles she has overcome and then with a slight smile on her face she stated the following in a very monotone voice:

He can't do all those things and he's very comfortable in his world and within this world he can create conversations with his friends and his peers at his program. They talk about different video games just like all the typical kids do but this gives him the ability to have some kind of ... without this he would have had nothing recreational really other than sitting in front of the television with a movie. It gives him something to interact with also. It's not something you just sit and watch. You have to participate in it but it also gives him a way to have dialog with his friends about the latest games and what wrestler did he earn. I think it serves a lot more than just people seeing communication.

The participants’ accounts to the superordinate theme of Experiences with Technology indicate several important findings. Many of the participants identified their own use of technology as something to be taken for granted as it is an everyday occurrence. In all cases, the participants were reserved about their child’s use of technology as a form of communication and
social interactions, often leaving that responsibility to the school. This gap became more evident when the participants began speaking about technology and academics. Even though participants were asked about their experiences with technology and academics, most of the participants elected to discuss academics in terms of their child and their schooling. In this case, four of the six participants identified that technology was a school driven activity. Only one participant, who happened to be deaf found academic, communication and social value for their child out of school.

The largest gap between subordinate themes was observed by the researcher concerning technology as a form of entertainment. It should be noted that although participants were asked about their use of technology as a form of entertainment for them, all six commented on the child’s use of technology as a form of entertainment. Four of the six participants identified how the iPad and iPod were openly used by the participants as a form of entertainment for their children, while two of the participants identified television and a gaming station as the identified technology. More so, all of the participants except one, the only male participant, identified a need to justify technology as form of entertainment, whereas no such justification was given for the other sub-ordinate theme in the Experiences with Technology super-ordinate theme. Finally, despite similar descriptors used to justify personal expectations, it was apparent to the researcher, through the inflection of each voice, the body language exhibited, and the demeanor of each individual, that each participant had a different level of expectations about how their personal beliefs impacted their child’s growth.

The second super-ordinate theme is Barriers or Obstacles to Technology. The four subordinate themes are: access to technology, affordability of technology, functionality of technology, and frustration with technology.
Barriers or Obstacles to Technology. The super-ordinate theme *Barriers or Obstacles to Technology* emerged through the discussions, however it was mentioned throughout various points within the data. The topic was not a research question, however participants volunteered information regarding their access, ability to afford, frustration with, and the functionality of the technology. The participants perceived themselves as good parents who are actively involved in their disabled child’s life. Yet, some of the parents recalled varying feelings of anger and frustration with perceived obstacles, while others perceived no such obstacles. The first subordinate theme, *access to technology* illustrates the participant’s proficiency to obtain technology. The second subordinate theme, *affordability of technology* captures the participant’s capacity to purchase technology. The third subordinate theme, *functionality of technology* refers to how participant’s make meaning of the practicality the technology for their disabled child. The forth subordinate theme *frustration with technology*, identifies participant’s struggles with using hardware and software. Despite these barriers, the participants in all cases, demonstrated a tenacity to do what is best for their disabled child.

**Access to technology.** Access to technology played an underlining role in the participant’s ability to utilize technology. Jeannie replayed a detailed description of obstacles she encountered while trying to obtain an iPad for her disabled son. During this description, Jeannie became very animated, she began to sign so fast, the interpreter had a difficult time keeping up. The researcher noted that her sign gestures, to include several gestures with her middle finger, were accompanied by dynamic facial expressions. Jeannie described her experiences as follows:

I started it, I told them. I want Derrick to have the iPad. Nowhere Special Education, his teachers talked to me, we talked back and forth. We both agreed that an iPad would be a
better decision. The home program therapist agreed, they're all on board and then finally Nowhere Special Ed department granted him one. Now Derrick brings it back to school and home. He's going to get a new one. They're going to still set up the program from them so that way the iPad doesn't belong to Nowhere Special Education and also the sign language app will be downloaded onto his iPad because for the past three years we've been asking them to download a sign language app and Nowhere has refused even though it's in his IEP.

They suck. They suck, Nowhere Special Needs Department needs to get reported, they're horrible. I'm sick of it, since he was three it's been hell. They've attacked me, Derek's teachers are wonderful, they're great. We have a perfect relationship but the town, they don't believe in sign language, long story.

Jeannie exuded a deep sense of frustration over her dealings with the Nowhere. She stated that she does not have the support network that others may have because she is deaf (personal communication, December 22, 2016). She stated her entire support network is deaf and all of her friends have “normal” children (personal communication, December 22, 2016). Without a network, she became determined to do whatever she need to get the technology Derrick needed to succeed. Jeannie took a quick sip of her energy drink, smiled and signed: “I got a lawyer, she found the best program for him. She found the SPOKE program for him in Foxboro for his elementary school years and oh my god, woo he just improved, he sky-rocketed.” Although equally as determined a parent, Mary projected a different approach to potential barriers in obtaining in technology.
Mary’s access to the technology that may be right for her child comes from her network.

Mary described her experiences of developing a network in terms of “traditional” parent’s judgmental views: “

I don't, as I said about judging other people and other families, when I see that kid on the playground misbehaving I don't automatically think it's just bad behavior. I wonder why he's behaving that way and sometimes in the end it is bad. It's just a kid who doesn't have any limits and the parents handling things all wrong but other times it's, you can totally see it's a kid on the spectrum and it's totally something they can't control and that they want to keep, I'm using a Sean example, kicking those wood chips, kicking those wood chips, kicking until, when he was a child, picking him up and removing him to someplace where there were no wood chips because he couldn't shut it off.

Mary added: “It's interesting. It's a little different. It somewhat can be isolating. Yet you find a network amongst people, other people with kids with special needs who get it.” Although stoic in facial expression, the researcher noted that Mary’s tone softened when she began to speak about her network. “I think I have different friends than I would have had had Sean been a typical child.” She added: “I think my network of friends are different and probably better I say, I often say that the nicest people I've ever met are the parents of special needs kids.” At this point the researcher recorded that Mary began to smile as she stated: “They're such kind and good people. I don't know if that made them that way or if that's just, there was a grand plan and that's why those kids ended up where they ended up.” Mary’s smile turned to a half-hearted laugh when she stated: “It's crazy. The silly conversations we would have about things that other parents of teenagers across town are not having these conversations.” The researcher identified a
sense of resolve with the participants in terms of using a network to access technology. Much like Mary, Charles and Diana found networks a positive avenue in accessing technology.

Both Charles and Diana used their positions as a technologist and an educator to research Caroline’s Rhett Syndrome diagnosis. Diana stated: “I had been in touch with the Rhett Syndrome Group of Massachusetts. We had started to get involved. We met other parents.” She added: “I think having a diagnosis, for me at least, was much better than not knowing at all because you had a support system. You had something you could join and be part of.” Diana reflected back on her experiences of her daughter’s diagnoses. The researcher documented that Diana paused as she reflected and with a reserved enthusiasm stated: “When Caroline was not even officially diagnosed, but we were pretty sure she had Rhett Syndrome, we immediately got involved with the Rhett Syndrome Group in Massachusetts. Charles affirmed the importance of being part of a network. He stated: “Being involved with a network of people who are in your boat and doctors who specialize in Rhett Syndrome is key to doing what is best for your child (personal communication, October, 12, 2016). In terms of access to technology, the researcher recorded that Charles became very serious with a look of determination on his face when he said: “Look…It is not about access to technology, it is about access to the technology that is right for your child, which in our case is a child with Rhett Syndrome (personal communication, October 12, 2016).

Conversely, Connie was the only participant who did not speak of an outside network. She and her family were living abroad when she began seeing signs that something was different about her son. Once the family moved back to the U.S. her son was diagnosed. Once diagnosed, “the family became Jack’s biggest advocate.” As a result, the researcher interpreted Connie’s network as a closed family network who relied on each other for access to technology. Much
like Charles, Connie found accessing technology is not as important as finding the right technology for your child. Connie reflected about her experiences and stated:

> The technology exists but the technology in and of itself isn't the product, it's like how that technology is used. The software, the applications that are available is what it makes it a useful technology. There's a lot of good stuff that's available and for kids that are not like Jack, I'm sure it's the greatest thing since sliced bread. I haven't exhausted all the apps that are out there either so, in fairness to software developers, maybe there's stuff out there that I just haven't seen that would take Jack to the next level.

Across the participants the researcher interpreted an embodied persistence stemming from the participant's desires to do whatever possible to gain access to technology, especially on behalf of their child. The participant’s voices, tones, body language conveyed their determination to achieve this goal as is the need to be part of a network. This determination is also evident for those who cannot afford the technology, however it does not undermine the appreciation of those participants who can afford it.

**Affordability of technology.** The second subordinate theme, *affordability of technology*, differs from access to technology in that the participants actively determine whether they perceive costs of technology as an obstacle in their disabled child’s development. In the data collected, only one participant discussed monetary support as a barrier in obtaining technology, while all of the participants stated that technology is either provided through their student’s school or through social services. All other participants recognized the financial burden that technology may impose for student success, most did not recognize it as a barrier for their own child’s success. Connie recognized that since she and her family are financially independent that
it removes one less obstacle that her family must deal with concerning her son. Connie’s voice lowered as she broke eye contact with the researcher and stated “I think I, to be honest, have an atypical experience only because of what I know from other families.”

The researcher observed a sense of relief on her face as she went on stating: “Another thing to be honest is that we have been able to provide any therapies that we need for Jack to have. We don't have financial stress.” To the researcher, Connie seemed liberated as she continued to speak of other obstacles that she has not had to deal with other than finances. “I have kids that adore their sibling. Not having marital stress, not having financial stress, not having sibling rivalry or jealousy, it makes my situation look very easy.” Much like Connie, Mary is financially stable enough that she is able to purchase technology that aids in her son’s learning, especially at home. Although she did admit that more recently her purchases are use more for entertainment than structured learning. When asked about the financial burden or toll that software and hardware has on the household, Mary recognized that it is a factor when she stated: “Thankfully you don't have to repurchase it.”

Much were the sentiments of Diana and Charles who also recognized that being able to afford technology relieves a certain level of stress. When asked about being able to provide technology, Diana reached down, fed Caroline a piece of sandwich, looked at the researcher, tilted her head to the left and stated: “I am not sure if you knew that a few years back Charles lost his job. It was a really good job. It was a scary time for us” (personal communication, October 12, 2016). She added: “We were not sure how we were going to make it. We appreciate and value everything we have” (personal communication, October 12, 2016). The financial stress that Diana and Charles experienced during period is a way of life for Jeannie and her family. When asked about affording technology, Jeannie lifted her arms and shrugged her
shoulders and stated: we don’t have any money” (personal communication, December 22, 2016). She then added: “That is why getting the town to pay for the iPad was so important to me. I needed their help, Derrick needed it, and they just didn’t want to pay” (personal communication, December 22, 2016). Peggy also expressed her frustrations with obtaining technology on behalf of her child when she stated: “There wasn't even ‘JACK’ made available to us. Or offered to us, I should say.” Although the ability to financially acquire technology was determined to be an obstacle, the researcher, in each case, interpreted greater difficulties in the participant’s functionally applying the technology with their disabled child.

**Functionality of technology.** With reference to accessing and applying technology, the participants responded to the *functionality of technology* in terms of how they make meaning of the practicality of a given technology for their disabled child. In the case of the participants, the practical application of the technology ranges from physically manipulating the device, to finding software that allows their child to communicate. Participants identified the range of functionality as being unique to their individual child. The participants perceived themselves as experts on their child’s abilities to use technology. Throughout the data, all six participants discussed the functionality of technology as it relates to their own child’s disability and none of the participants discussed their ability to use technology. Connie demonstrated a unique perspective relating to software, when asked about the functionality of technology for her son. Connie stated: “The trick has always been, though he obviously really strongly has a desire for electronic devices, the educational programs they have, or the AVA programs they have, are not that compelling so it's odd.” The researcher noted how she stared off for a second as if to rationalize her comments and then added: “Kids like Jack have this inherit love of the device, but the software that's out there doesn't match that level of desire for the kid. If they could create
programs that do, oh my gosh.” Pausing for a moment and with a big smile she continued: “You
could blow the roof off of what you could teach and get out of these kids, I think.”

The researcher found that Connie demonstrated a great deal of thought about what she
would like to see in the future regarding the functionality of technology, while exhibiting her
persistence in keeping up with technological trends that may help her son in the future. Connie
spoke of her hopes for the future and discussed them as being the: “One thing that I'd like to see
... I haven't looked in a while but I'd like to see what new programs there are out now, what new
software there is for kids like Jack.” She added: “Not too long ago, it just seemed like the
programs out there were not quite right.” Connie paused to reflect before continuing. “One
program might have one feature that would be good and useful and value added for Jack but then
90% of it might not be.” As Connie reflected on her experiences, the researcher detected a sense
of disappointment in the tone of her voice. This appeared most evident when she stated:
“Another application might have a couple features that were useful for Jack but again ... It just
made it awkward to find a single program or a basket of programs that I felt were really good
uses of Jack's time.” Jeannie expressed similar thoughts concerning the functionality of
technology regarding her disabled child. “Oh the Smart Board. His program switched from the
pictures with the Velcro, I forget the proper name. He also likes the iPad better, he's more
focused. He wasn't really interested in the pictures.”

The researcher found that many times throughout the investigation, Jeannie’s deafness
added an additional dimension when applying technology to her son’s individual needs. For
example: “We think he's more interested in the iPad because of the sound and it talking back.
That helps him focus, that helps him be more involved and into it.” As she thought about her
experiences, Jeannie smiled and unlike Connie found value in the technology. She signed: “He'll
use familiar pictures that are also on his iPad to circle things that he did throughout his day and how he felt throughout his day and different activities he did throughout his day.” Finally, Jeannie added:

I want the world to know that even though some people may think autism and they get scared, autism isn't horrible. There's nothing wrong with autism. You have to respect that people are different. I hate when people stare. When he brings the iPad everywhere. So what! It's how he communicates, be open minded!

Mary echoed many of the obstacles that Connie and Jeannie experienced. “We've used iPad programs and things like that but not a lot of them.” She paused and reasoned: “His writing is difficult and I think technology is maybe, "Gee, he should be typing more," that's extremely difficult and it's really almost grueling for him.” Here, the researcher interpreted Mary’s understanding of functionality in terms of son’s ability to sustain and physically manipulate the device. Her tone became more rational as she stated: “There are certain things that I think, ‘Should we even push this? Is it that important of a skill to learn?’” The researcher found that Mary, with a sense of culpability stated: “We don't use as much probably as maybe we should.” Mary’s sense of guilt was also apparent when she responded to the question of what influences your use of technology, answering using her experiences on behalf of her son. She replied: “Sean likes the technology so we, for a while were doing more of it than we are now... We've let him get into bad habits I guess with the YouTube clips and stuff like that.” She added: “I don’t think he sees his iPad as a learning tool so much, not at home anyway."

Although Mary expressed appreciation for the functionality of technology for her son, she also expressed concerns and difficulties associated with technology specific to her son:
He does like technology I have to say. He had a DVD player, a mini DVD player too so when we go to visit my family in New Jersey or something we'll bring it. He's got the headphones on but you hear this, he's playing with the volume, he's fast forwarding, he's rewinding. He just doesn't ... and I think that's been a downside of the iPad…

Mary added: “For Sean and many of the children on the spectrum, self-initiated repetition is not a good thing.” She smiled and stated: “It’s not good for him or for us” (personal communication, September 8, 2016).

Peggy’s experiences with the functionality of technology, in many ways mirror those of the other participants. However, her son is diagnosed with multiple disabilities and therefore functionality of technology is a more prevalent obstacle. When reflecting upon her son’s early years, Peggy stated: “We did not have any means of communication for him. We did get lucky that he started speaking when he was two or three years old, but not to any degree where anybody could understand anything he possibly was saying.” Adding: “That remained most of his life.” Peggy also spoke of how her son uses technology at home. “We've got the computer at home, but we have to get more in to ... Because of his visual impairment, we've had to increase ... It's a MAC ... Increase it to as big as we can possibly increase it.” Peggy paused and then offered the justification for the increased font. “His vision is 20/400 currently. He can't see squat.” Peggy also commented on the functionality of the home computer. “He can't really work the keyboard very well, but that's his own little thing.” For Peggy, the main issue was being cognizant of her son’s physical limitations, while being mindful of how change affects his behavior. Peggy stated: “In his particular case I think he's plateaued. I think because, you know what it is, it's he's to a point where it serves a purpose, he's comfortable, he knows. For him,
change is not good.” She stopped smiled and added: “We want to be comfortable in our little circle right here that he can do.”

Much like all the other participants, Diana and Charles spoke of the functionality of technology in terms of their daughter Caroline’s ability to use it and how applicable the hardware and software was for her. While reflecting upon her daughter’s challenges and use of technology, Diana stated: “I would say pretty limited, her use of it.” She added: “Again, I think she needs our assistance to do it more and get more practice at it.” The research noted that she turned to Caroline and smiled, picked up a piece of her sandwich, and fed it to her. Diana stopped thought for a moment and rationalized their use of technology with Caroline. “She for sure understands that there's going to be Blue’s Clues® on there, she for sure understands, oh absolutely. And knows, if I put on a different show, yeah she knows.” As she rationalized her statement, the researcher noticed a pleasing tone in her voice as she continued. “She knows down right well, what exact music is going to come out of that thing when we clip it on. Yeah, she understands what she can get out of it. Or what she wants out of it.”

However, when asked about how often technology was used at home, Diana just like Mary, replied with a sense of guilt when she stated: “I guess that would be more the iPad as far as using it for her to communicate. I guess that's what I'm talking about more. I would like to work on that more with her to get to a place that she can maybe access it at home and let us know if she had a stomachache or she was tired or whatever.” Diana stopped, shock her head no and stated: “Our bad…Maybe on the weekends we could work on it a little bit more.” Although they parent the same child, Charles was very willing to disagree with his wife regarding the functionality of technology for their daughter. “I know we differ on that. I don't know if she is capable of expressing some of those deeper issues if she had a stomachache or what have you.”
The researcher noted that he immediately stated: “A lot of the Rhett girls that are in a wheelchair that I've met seem to do better with things like the My Tobii.” He went on to rationalize: “they're able to do an eye glance and focus on and change some of the settings on the program. They're able to say, I want to hit this.” Charles paused slightly, looked at Caroline, smiled and said: “Caroline is up and around so it's kind of hard to settle her down to pay attention.”

Overall, the researcher found that the participants were quite aware of how their child’s disability affected their ability to use technology. They were also conscious of the functionality of the technology and whether it was a viable tool for their child. Yet despite these obstacles, all of the participants were determined to attempt the use of any technology that may make their child more comfortable, happy, or expressive. However, throughout the interviews, all six participants did identify how their attempts to use technology at home, resulted in varying levels of frustration.

**Frustration with technology.** Across participants, a cautious sense of optimism for technology was present in regards to *frustration with technology.* The researcher interpreted a combination of disappointment, dissatisfaction, exasperation and weariness in the manner in which the participants spoke about their child’s frustrations when they attempted to use varying technologies with their disabilities. Mary began her story by commenting on her son’s appreciation for technology, but also his frustration using it. She stated: “He really liked it. He would sit there and when he was a kid that has a hard time concentrating, it kept his attention and it kept him wanting to keep moving up a little bit to the next level.” The researcher noticed that Mary frowned as she continued to recall her experience. “He was also very good at touching things all over the screen and then they'd be gone and we'd have to reinstall them.” Mary stated he would often throw or hit the technology when he became frustrated (personal communication,
September 22, 2016). She also indicated it was not only frustrating for her son, but for her and her husband as well. “It was a little frustrating because we would install things, they would be there, we would use them and then the next time you went to use it you couldn't find it anywhere.” She shook her no as she added: “It had been deleted or put some place we couldn't find it.”

Mary also indicated that her son’s frustrations did not end there. As he got older, and began to use other technologies, his frustrations continued. When commenting on whether his frustration level has decreased, she stated: “I think he's remained the same. I guess I've ... I say that but then again I think I haven't pushed it so much because I felt he was frustrated and that particularly with the standard keyboard for a computer.” The researcher took notice that she stopped for a second, her eyes rolled up, her face went blank as if she was recalling a painful memory. She then stated: “Again, holding it and telling him, "You can't touch it that hard, you've got to tap it lightly and pick your finger up so that you only get one letter." Then as she reflected upon her own frustrations and with a sense of uncertainty she commented: “There are certain things that I could never tell if he really couldn't do it or if he just was doing it to annoy me or others just like I'm just going to hold the key longer.” Adding: “I know I'm not supposed to but I ... I thought there was a little of that going on. He was a little frustrated because I think it was hard.” As she reflected, Mary concluded with the realization that he will not use all of his “fingers and knowing the keyboard without looking at it. It's not that and probably never will be.” When commenting on his current level of exacerbation, she replied: “I think he's a little bit frustrated by it but I don't know if he's anymore frustrated. I'd say he's probably stayed around the same.”
Connie recalls her son’s experiences with technology as limited by its ability to maintain her son’s attention or to remain connected to the Internet. When asked if your son is frustrated with technology, she replied: “Only if you can't get internet. He says, "iPhone's dead, iPad's dead." Connie reiterated that Jack has a fascination with electronic devices to the point that his fascination is frustrating for her. She recalled: “he's so compelled by electronic device…If he sees someone with an iPhone sticking out of their pocket, he's like sticky fingers and he'll grab it and scroll through, and try to bring up internet.” As she reflected on her experiences, she added: “I wish there were software that matched that interest and motivation that he had, that's not just like watching YouTube or mindless entertainment.” Connie also indicated that when her son gets bored or frustrated with one device, he will just seek out and switch to another device (personal communication, October 12, 2016).

Unlike Connie, Diana’s level of frustration is directly associated with her daughter’s limitations due to Rhett Syndrome. Diana recalled that although her daughter enjoys using technology, she is unable to self-initiate. Diana commented: “She enjoys the entertainment and we've also just started to do FaceTime with her brother at school. Have we started to FaceTime Brian? And she really seems to enjoy that and she kind of looks at him and smiles.” Diana stopped, smiled and continued: “And then I say, "Say goodbye." and she poked him in the eye. She seems to get that.” Upon further reflection of her experiences concerning frustration, Diana remarked: “I think it would be more like if you could tell she really wanted something and we weren't sure what it was…Sometimes by then she's in such a fit that it's hard to get her to calm.” At this point during the interview, Caroline’s iPad stopped playing Blue’s Clues®. Caroline reacted by hitting the iPad so hard that it fell on the floor. Without a second guess, Diana pick up the iPad placed it in front of Caroline and played the next Blue’s Clues® show. Diana turned
to the interviewer, smiled and added: “Well I think like what we just saw. If she's getting worked up, she'll start doing her breath holding. She can concentrate perfectly fine, if she's really motivated...That's been the case about her for her whole entire life.” Regarding Caroline’s frustration with technology, Charles replied: “One of the problems with using technology for Caroline is her inability to use the touch screen effectively. It is Rhett’s holding her back.” He continued: “She is able to hit it or bang it but not manipulate it. From there it becomes a guessing game for us as to what she wants.” (personal communication, October 12, 2016).

Much like all the participants, Jeannie’s frustrations with technology derived directly from her son’s disability. Jeannie recalls her son’s frustration being a result of a lack of focus and his inability to attend to a task. She recalls “Sometimes we have to tell him to look and to focus and not look away. A lot of times he'll look away so sometimes. Other times he's very focused like right now he was no problem, knew exactly.” When asked if technology was helping him academically, Jeannie said “Yes. I do. A little bit. Right now, it's tough for him, but they're working on it with him.” Upon further reflection, Jeannie commented: “I've never seen him fall apart.”

Peggy’s reflections on frustrations mirror those of Charles, Diana, and Mary where frustration with technology has led to violence. Peggy recollects these experiences as:

Yeah, we've gone through multiple (televisions), and it's not that he just gets frustrated and you know how TVs are now, they're very fragile and Tony's not a very fragile kind of guy so we've gone through multiple flat screen TVs that have met their demise because of a controller that just happened to go through it. He doesn't know how it happened, it just happened...He had, he gets very frustrated and I think this has to do with his age, he
wasn't brought up with an iPad. He's not used to maneuvering with his finger, the touch screen is just beyond his concept and because his hands, I don't know, they just don't work right for him that he really has a hard time maneuvering the iPad.

Across the participants, the researcher interpreted a sense of pride in what their child is able to accomplish, a sense of guilt of not doing enough for their child, while at the same time being tenacious about doing everything they can for their child. The researcher also interpreted a great sense of patience regarding their child’s frustration with technology, whether it was a direct result of their disability or not. The participants’ accounts to the superordinate theme of Barriers or Obstacles to Technology indicate several important findings. Many of the participants identified how the use of networks aided them in access technology, while only one participant mentioned how networking hindered her access to technology, while another did not mention networking at all. In all cases, the participants recognized the need to access technology on behalf of their child and displayed an unwavering desire to use technology as a tool to increase their child’s learning. For some participants, this determination carried over concerning their ability to afford technology, although all participants recognized that costs associated with technology can be a great hurdle to overcome.

The largest obstacles identified between the subordinate themes was observed by the researcher concerning functionality and frustration with technology. The researcher interpreted the participant’s experiences in these two themes as being the most emotional and difficult for the participants to converse. Once again, it should be noted that although participants were asked about the functionality of and their frustrations with technology, all six commented on the child’s use of technology and not their own. In terms of functionality, all six participants identified how technology was a tool to improve student learning, while five of the six
participants identified experiences where only small portions of the technology could be geared towards their child’s specific learning needs. More so, all of the participants expressed varying levels of frustration with technology, where half experienced frustration levels that resulted in violence. Finally, despite similar descriptors used to illustrate personal experiences, it was apparent to the researcher, through the data, the inflection of each voice, the body language exhibited, and the demeanor of each participant, that each individual had varying levels of emotions concerning the barriers and obstacles related to their child’s technological development.

The third super-ordinate theme is *Personal Value and Enlightenment*. The two subordinate themes are: *value of technology* and *personal concerns*.

**Personal Value and Enlightenment.** In the final super-ordinate theme, Personal Value/Enlightenment, the researcher interpreted that the participants had developed a heightened sense of protection and advocacy for their disabled child. In doing so, the researcher interpreted that the participants were humbly proud of their role and accomplishments as a parent. This was most apparent with the countless obstacles they had conquered as a team with their child. The participants made sense of their accomplishments in this regard through the value they placed and the concerns they had with technology. The two sub-ordinate themes are *value of technology* and *concerns with technology*.

**Value of technology.** Across participants, a sense of pride, accomplishment and humility presented themselves in regards to the value they placed on technology. The researcher noted that none of the participants displayed arrogance or overconfidence in the value they placed on technology. The participants reflected on how they valued technology as demonstrated by Peggy who reflected:
It's just, you know, but I imagine we're going to look twenty years down the road, ten years down the road, never mind twenty years, ten years down the road and there's going to be huge changes anyway. They're going to be saying, wasn't that there when I was little but I think we've seen it come to where just in his world from nothing to he has access to different things that weren't in existence.

Even though Peggy did not have the access to technology, she paused slightly and reflected on her experiences in terms of the value she placed on technology and stated: “I think it's because, like I said, we didn't have that accessibility. We didn't have those perks so we've worked around systems that didn't include today’s technology.” Peggy summed up her thoughts on the value of technology today by stating: “I think it serves a lot more than just people seeing communication.”

The researcher noted that Diana valued the use of technology with great enthusiasm. “I think technology is fantastic.” She stopped and reflected and then spoke of technology in terms of her daughter. “I think technology can be a great tool for her to help express what she wants…I think technology can be a great tool for her to help express what she wants.” In terms of her use of technology with her daughter, Diana remarked:

I think I would want to play around with it a little more. I've played around with it and I can see how you get from one thing to another. I think I'd have to probably start to do it at home on a more regular basis and then it would come.

When asked about the value of technology, Diana immediately interpreted the question in terms of being a parent as she recalled her experiences. She commented: “I think they have to advocate for their son or daughter and make sure that they're getting the best education at school,
the best care, the best opportunities of things they can do outside of the school day.” Although Charles had previously echoed Diana’s experiences, when asked about the value of technology, he too interpreted the question in terms of being Caroline’s parent. He elaborated:

Yeah, I think it would enhance her quality of life…but in terms of my current priority, and again, I'm only speaking about Caroline, it's not high on the list, but if I had a child who maybe was a little bit more able to use the device, to communicate, I think it would be a huge difference maker.

Like Diana and Charles, both Mary and Jeannie also reflected on the value of technology in terms of their children. Mary found “It is a huge plus because it’s still so hard for him…” Jeannie responded similarly on behalf of her son offering further hope and optimism: “Maybe next year he'll just be taking off and using it nonstop. I think it's really good...It's time to move. It's time to improve.” Connie, too was very passionate about technology: “I think it's great.” As Connie further reflected upon her experiences concerning the value of technology, she added: “I know that there's a whole school of thought about minimizing time on electronic devices and things …To me, I think of it as being technology that assists people… Yeah. I think of it as technology that assists people with their daily living.” It was at this point that Connie turned her concentration to that of a parent of a disabled child. Looking at the future, Connie responded: “I think he'll (her son) do better than ever. I've noticed at home that he's more verbal, his volume is much higher, he's using more spontaneous combinations of words instead of just pre-programmed phrases.” Connie’s value of technology was deeply rooted in her belief that if it does not maintain engagement, then its value diminishes accordingly. The researcher documented that Connie’s tone was upbeat as she expressed her concerns about the value of technology in her and her family’s lives.
To me, the golden door to access everything else is engagement. As much as we try to teach him everything else, whether it's self-help skills or how to shoot a basketball, or math, or reading, if he isn't fully engaged he's not really learning. Just puts on autopilot, but once you get him truly engaged, the possibilities are endless. Yeah, for some way to get him engaged and then once you get him engaged, like I said, you could use it to teach anything that you wanted to. Academic, non-academic, social skills.

All of the participants made sense of their value of technology in terms of their disabled child. Several of the participants commented the positive aspects of technology, while most expressed varying concerns with its current and future applications.

Concerns with technology. The participants exhibited differing levels of concerns with technology for the present and the future. The researcher interpreted that the participants were successfully coping in their current family environments and were more concerned about how technology may impact their children in the future. While reflecting and then commenting on assistive technology, Mary stated: “I just get worried about kids on the spectrum that that's all they want to do. I worry about the exposure to technology because I think it can be very addictive.” Without hesitation and with a sense of hope in her voice she added: “Every kid I think can be sucked in to the exclusion of actually interacting with other human beings and trying to develop a little bit better social skills and relationships with developed friendships.” As Mary worked through her experiences she continued in terms of her son: “I would say again, I do worry about him getting a little too attached to that device and that it might just become that's all he wants to do to the exclusion of everything else.” Mary’s voice lowered as she weighed the value of technology with her concerns. The researcher noted that Mary put her head in her hand, turned towards the researcher and said with a very quiet voice: “I think it is important in that
regard and I do think as he becomes an adult and is perhaps living independent of us that he can
do something without having to have a lot of adult supervision or assistance with.” Much like
Connie, Mary’s concerns with technology revolve around its’ ability to maintain engagement. “I
think he's excited (about technology) but yet if you saw him picking it up you wouldn't see this ...
I've often said there's nothing, there's not a lot of enthusiasm.”

Jeannie previously stated that she extremely happy with how technology has improved
her son’s life. Her concerns centered on the how the technology can be applied to her son
specifically. When asked about how technology can improve, she spoke of the iPad and the
applications used by her son. She stated the applications needed: “Real people that he
communicates with. Real pictures of outside. Pictures of music. More specific pictures of
music. I think that would make it better.” When asked the same question, Peggy spoke about
life for students after the school setting, when they are in adult day programs. on behalf of her
son’s use of technology: “it would be nice to have computer labs in these day programs or iPads,
a bunch of iPads and let's do a group. I think, but see where they're in day programs now there's
no more educational value here.” Peggy further pondered: “Their education is done but I don't
know, I just think accessibility... these people still have a lot to say and unfortunately…why can't
they have this chance to speak too and chance to have this technology but they don't.”

Much like Mary’s concerns, Connie expressed an apprehension about overuse of
technology by her son. Connie reflected on her experience with her son

I think he's addicted to it. One of the reasons I say that is because he sometimes will go
through ... You'll see his demeanor change and he looks very distressed, and he has a
very faraway look. Not coincidentally, he doesn't have an electronic device in his hand.

I think there's something addictive about watching those videos. I don't know what it is.

When about her concerns about technology in the future, Connie carefully considered and with a slight hesitation stated: “I think technology will be because Jack's 21 now, he's improved over the years but he's not going to improve drastically, so when he's 60 he's still going to look very much like he is now, which means a 1 on 1” (aide). She quickly added: “person to person contact is going to be difficult for him.” In one of her final comments Connie summarized how she felt about technology.

I keep beating like a dead horse. I'm all for the technology that's available. Each kid is different, of course, but for Jack's needs and his strengths, I just wish there are some ways to find a program that was a better fit for him. I just don't know if it's in the works.

The final super-ordinate theme of Personal Value and Enlightenment was evidenced in the participant’s rendition of their experiences with technology in terms of what returns their child will gain from the use of technology and any concerns that they do have or may have in the future. The participants’ value and acknowledgement of their child’s success informed their conviction that they hold hope that someday technology will serve a higher purpose by producing a key that will unlock a few of the constraints that hold their child’s mind and bodies prisoner. This purpose was demonstrated in two distinct ways, the value they placed on technology and concerns they have with technology.

The participants exhibited an intense understanding of their responsibility as a parent, an advocate and supporter of their child and children with disabilities as a whole. All of the participants were humble and modest about the role they played in furthering their child’s
learning and quality of life, while displaying a certain level of reluctance about their achievements, even though all of the participants identified and stressed the need for further technological research concerning children with disabilities. These accounts demonstrate all of these participants’ high level of commitment to advocate, support, and inspire their disabled child. For them, the researcher interpreted as a natural outcome of being a good parent.

**Summary**

The purpose of this study was to explore how parents of disabled children make meaning of their experiences with technology. The researcher examined the interview data, which reflected a true introspective reflection of how technology allows for many accomplishments, while also hindering personal growth. First and foremost, the data produced perspectives that informed how the participants made meaning of their experiences with technology and in all cases revealed how these participants identified that they do so on behalf of their disabled child. This reoccurring theme first appeared with the participant’s experiences using technology. Even though all of the participants were admittedly avid users of the latest high-tech devices, they immediately interpreted questions from their experiences and observations of their child. Through this lens, participants were able to honestly reflect about how they themselves use technology with their family and for them, more importantly, their disabled child. This insight allowed these participants to speak candidly about their own perceived shortcomings, feelings of guilt, and abilities to cope as parents, while at the same time shedding light on their successes, determination, and accomplishments.

The participants described the emotional hardships, frustrations, and obstacles they faced on a daily basis. These factors often led to feelings of limited self-worth. However, in no instance did the researcher observe a lack of self-respect or over self-confidence. The
participants shared similar experiences regarding obstacles and barriers they encountered and because this is a life-long journey for them and their children, they will continue to encounter. For these participants, the barriers and obstacles only serve as a reminder of their determination to overcome adversities, especially when it comes to their disabled child.

The data reflected a perceived lack of technological functionality when applied to their disabled child. In all cases, no one type of assistive technology met all the needs of their child, nor did it come close. Many of the participants found limited use of adaptive assistive technology. However, all of the participants found technology as a tool in entertaining their child. This in particular raised emotions of great parental reflection, while offering a unique perspective into the participant’s personal lives. Most of the participants identified positive experiences of comfort and motivation through professional, friend, and family networks. The networks helped the participants to understand and apply various technologies, while offering an avenue of support. These social networks are indicative of the interdependency between parents of disabled children.

The data also indicated frustrations and financial barriers the participants experienced with technology. Most importantly, it should be noted that overcoming these obstacles that produced feelings of self-worth and parental pride. The in-depth reflection of these experiences offered by the participants revealed their commitment and determination to succeed as a parent. As such, the participants were able to demonstrate the value of technology in their child’s life as well as their present and future concerns.

As will be discussed in Chapter Five, several understandings can be concluded from these findings. The accounts of the participants indicate a clear need to develop technologies that will
more actively support disabled children. The varying degrees of frustration with technology also supports this claim. The presence of a lack of access due to finances and the appropriate application indicates that a greater societal emphasis must be placed on technological uses instead of corporate profits. As evidenced by the participants, a positive influence is still needed to evolve social understandings of everyone’s right to their place in the world. Finally, the participants reflective, honest, and introspective examination of their own experiences demonstrates an unselfish conviction to do the right thing on behalf of not only their disabled child, but all disabled children.

The subsequent chapter discusses the research findings and offers recommendations for further research
Chapter V: Discussion of Research Findings

The purpose of this study was to explore how parents of autistic children make sense of their experiences with assistive technology in terms of their ability to comprehend and make-meaning of the technology. Specifically, this study examined parental experiences using assistive technology via the lens of the framework of expectancy value theory (Atkinson, 1957) and the tenants of Ardelt and Eccles’s (2001) parental self-efficacy theory to understand the dynamic interplay between the personal, behavioral, and environmental influences (Bandura, 1997). The following question was used to guide this research: How do parents of children diagnosed with Autism Spectrum Disorders make sense of their experiences with assistive technology? With this question as a guide and in an effort to understand how parents make sense of their experiences with assistive technology, this study employed an Interpretative Phenomenological Analysis (IPA) research methodology. An IPA study was selected because it highlights the diversity of parental accounts by revealing central themes that emerge from the participants’ talk (Jarrett et al., 1999). The analysis conducted assists in the process of meaning-making that are embedded in multiple contexts including the parent’s social and cultural environments (Smith, 1996). This is important because participants’ meaning reflects the embodiment of cognitive parental self-efficacy (Brocki & Wearden, 2006) that subsequently embodies their understanding of assistive technology and ultimately helps to support their ASD child.

As evidenced in the literature review, there is limited data available regarding the specific lived experience of parents using assistive technologies to support their ASD child, which illustrates a gap in the research base and provides a rationale for study. Thus, the findings of this study are intended at expanding current research base regarding this populations use of assistive
technology. The participants for this study were six parents of children with varying disabilities. The participants differed in gender, socioeconomic backgrounds, education and generation status. The investigation revealed three major themes that aligned the participant’s experiences, challenges, impediments, towards technology as factors in a fundamental process that led to their understanding of how they apply technology in their everyday lives.

Constructed from the data collected in the participant interviews, three super-ordinate themes, and nine subordinate themes developed in response to the research interview questions. The super-ordinate themes include: Experiences with Technology, Barriers/Obstacles to Technology, and Personal Value/Enlightenment. Sub-ordinate themes to Experiences with Technology included: Communication/Social, Academic, and Entertainment. The corresponding sub-ordinate themes for Barriers or Obstacles to Technology incorporated Access to Technology, Affordability of Technology, Functionality of Technology, and Frustration with Technology. The final superordinate theme of Personal Value/Enlightenment generated the sub-ordinate themes: Value of Technology and Concerns with Technology.

The following sections represent a topic based elaboration of the research findings relevant to the participant’s experiences with technology. The findings for each superordinate and sub-ordinate themes are reviewed in relation with the current literature. Once established, the thematic findings are presented in the conclusion of this study. The final section offers recommendations for the problems of practice that represent thematic applications and recommendations for further research.

**Thematic Findings**
Experience with technology. Thompson (2005) identified that an increase in knowledge of experiences with technology will directly and positively influence student learning. In the parental setting, the data revealed that the participant’s personal experiences with technology, increased the participants revealed desirable personal feelings towards their ability to use technology in their everyday lives. The data emerged from the research interview questions inquiring about how technology integration made them feel, or what the integration process had or has been like for them and their family. The participants reflected upon these experiences and discussed their understandings of technology in terms of their use, which brought about the subordinate themes Communication/Social, Academic, and Entertainment.

Communication/Social. The participant’s responses described their use of technology with a sense of dependence in their everyday lives, while they described their need and reliance through their own experiences as an unusable tool of communication with their child. Additionally, they related that technology had its greatest impact concerning their daily communications and their ability to socialize with friends and family. Pia (2004) reported how technologies are the most significant cultural achievements and as such have become a cultural resource. From the onset, the participants identified the need for technologies in the day to day operations of their lives to include work networking as well as social networking specific to their child’s disabilities. Park, Turnbull, and Park (2001) identified how supportive factors beyond individual relationships affects parents’ advocacy on behalf of their disabled child.

In the data collected, the participants identified the need to access and acquire information to make informed decisions. The data indicated that using technology as a conduit of communication between family and other parents with disabled children was an essential link in gathering information. This finding corroborates the findings of Leiter and Krauss (2004)
who identified how parent’s access to information is vital in the decision-making process.

Access to information is important as is parental expectations of their disabled child.
Throughout the entire study, participants routinely answered questions on behalf of their disabled child even when the question was focused on their own attitudes, beliefs and behavior. Since Tajfel and Fraser (1978) originally reported that expectations originate from and influence a person’s beliefs, knowledge, and experience, while affecting their behavior, it makes sense that parents expectations on behalf of the children can either positively or negatively their child’s knowledge (Hastings & Brown, 2002).

**Academic.** In the data collected, all of the participants except for one, identified assistive technology as a school related function, where they did not perceive home use as an academic extension of school. The data collected substantiated the Otis, Green and Lim (2011) study where they explored the significance of parental perceptions of the importance of technology in their child’s lives. In addition, the perceptions, although justified through each of the participant’s experiences, do not support the conclusions of Schacter (1999) who found that richly reinforced learning environments increased achievement at all levels of education for both regular and special needs students. Conversely, all parents reported their approval of their special needs child’s use of various technologies as a form entertainment.

**Entertainment.** Edyburn’s (2005) research regarding critical issues in advancing the special education evidence base examines the characteristics that advance certain uses of special education technology. This research can be related to the subordinate theme of entertainment. The Edyburn (2005) research provides an analysis of qualities found in emerging research to advance special education knowledge, while highlighting critical issues surrounding technology and special education. This is important because nowhere in the article or within the empirical
literature research was there a correlation between technology use for entertainment and student learning. Therefore, the participant’s justification to use technology as entertainment is clearly warranted as a parental prerogative.

Despite similar descriptors used to justify personal expectations, it was apparent to the researcher, through the inflection of each participant’s voice, the body language exhibited, and the demeanor of each individual, that each participant had a different level of expectations about how their personal beliefs impacted their child’s growth. This substantiates the findings of Lindstrand, Brodin and Lind (2009) who highlight how parental expectations result in [affect] long-term development for children, while supporting the assertion of Sala-Suszyńska (2016) who demonstrate how digital media is creating an environment where such activities of childhood are changing dramatically and accelerating child development. Since child development is concerned with the evolution of skills (motor, language, and social) and involves the advancement of cognition, intelligence, reasoning, and personality, the parent’s decision to allow the children to use technology at home for entertainment purposes is well grounded within the literature. Tapscott (1999) identified that when children control their media, rather than observe, they develop faster. However, as they develop faster, they also develop a greater likelihood to incur greater obstacles to technology. The subsequent theme identified in this study is related to the participant’s experiences with barriers and obstacles to technology that they have experienced.

**Barriers/Obstacles to Technology.** Berg et al. (2016) stated that disparities in adversity among children with autism spectrum disorder may experience a greater number of family and neighborhood adversities, potentially compromising their chances for optimal physical and behavioral health outcomes. These obstacles are affected by perceived levels of parental stress,
the type of disability, time spent with the child, and gender of the parent and child (García-López, Sarriá, & Pozo, 2016). García-López, Sarriá, and Pozo (2016) also found that parental resilience is affected by parenting styles. while Boshoff, Gibbs, Phillips, Wiles, and Porter (2016) found that these barriers cause a disequilibrium in parenting a child with autism spectrum disorder. Moreso, Boshoff, Gibbs, Phillips, Wiles, and Porter (2016) found that these obstacles cause stress especially when trying to access and use services and technologies. In this study, the investigation revealed that the participants experienced stress when struggling to overcome challenging barriers. The data produced four primary obstacles the participants experienced with technology: Access to Technology, Affordability of Technology, Functionality of Technology, and Frustration with Technology.

**Access to Technology.** Access to technology played an underlining role in the participant’s ability to utilize technology. When the participants made meaning of their experiences concerning access to technology, they identified the need to acquire information to make informed decisions. The significance of accessing technology is highlighted by Sanders, Parent, Forehand, Sullivan, and Jones (2016) who identified parental perceptions of technology and perceived efficacy as vital components to technology-related parenting strategies across all child developmental stages. The data indicated that using technology as a means of communication between family and other parents with disabled children was a critical link in gathering information. This finding corroborates the findings of Leiter and Krauss (2004) who identified how parent’s access to technology is also vital component in the decision-making process.

As an element of access to technology, the data revealed how the participants relied on their family and social networks in accessing the proper technology for their disabled child.
Accessing the proper technology is important because for children with ASD, technology can be very addictive and counterproductive regarding social interactions (Shane-Simpson, Brooks, Obeid, Denton, & Gillespie-Lynch, 2016). The data collected also supports the most recent study of Sidhu, Gwynette, and Veenstra-VanderWeele, (2016) who identify how children with ASD face significant deficits in social communication and interaction skills, while being susceptible to problematic media use. Additionally, the participants expressed and in some cases demonstrated tendencies to consider electronic technology as a potential compensatory remuneration or as a distraction method for unwanted behaviors as described by Sidhu, Gwynette, and Veenstra-VanderWeele (2016).

Finally, the data revealed most of the participants engaged in crowdsourcing activities. Howe (2006) defined crowdsourcing as “taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call” (Howe, 2006, p. 1). In general, crowdsourcing benefits the users with access to a large pool of knowledge and expertise (David, Babineau, & Wall, 2016). The data indicates that parents experienced advantages in a higher self-determination in accessing technology through crowdsourcing. This is evident by Jeannie’s drive and determination to gain access of an iPad from a reluctant school special education program.

**Affordability of technology.** Affordability of technology differs from access to technology in that the participants actively determine whether they perceive costs of technology as an obstacle in their disabled child’s development. In the data collected, only one participant discussed monetary support as a barrier in obtaining technology, while most of the participants stated that technology is either provided through their student’s school or through social services. All other participants recognized the financial burden that technology imposes for student
success, however they did not recognize it as a barrier for their own child’s success. Although not directly, all of the participants recognized that technology enhanced their child’s learning and provides equality within society. These findings support Altinay, Cagiltay, Jemni, and Altinay’s (2016) assertion that assistive technology and other related aspects of technology-enhanced learning environments aid in producing life-long learning for disabled learners.

Studies have shown that children with special needs are less likely to make decisions about their own lives (Cavet & Sloper, 2004; Franklin & Sloper, 2009; Mitchell, Malone, & Doebbeling, 2009). Therefore, the role of the parent becomes critical because parent’s do their best understand the nature of their child’s special educational needs, especially in removing obstacles they encounter such as financial access. The data revealed parents value the role that technology plays in their disabled child’s life, the need to expose their children to various forms of technology, and the role that finances play in accessing technology. Once accessed, the participants spoke of the functionality or how they make meaning of the practicality of a given technology for their disabled child.

**Functionality of technology.** In this study, the participant’s practical application of technology ranged from physically manipulating the device, to finding software that allows their child to communicate. The application of technology is as varied as each individual’s diagnoses with autism. The data revealed the participants identified the range of functionality as being unique to their individual child and as such perceived themselves as experts on their child’s abilities to use technology. This is supported in the literature by Webster, Cumming, and Rowland (2017) who identified how parents of children diagnosed with autism spectrum disorders (ASD) are experts when it comes to their children and they play a critical role in teaching and guiding their children's learning into adulthood. As such, parent’s in this study,
assumed the role and responsibility of determining the proper and most functional technology for their disabled child. It should be noted that in this context, Leal, Teixeira, and Silva (2016) argue that families can be a powerful tool to tackle these challenges. In the data, all six participants discussed the functionality of technologies to support the development of their child diagnosed with an autism spectrum disorder.

In this study, functionality is discussed in terms of parental screening and sensing technologies that are relevant and applicable for Autism Spectrum Disorder (ASD) therapy. This is important because as identified by Cabibihan, Javed, Aldosari, Frazier, and Elbashir (2016) technological innovations have tremendous potential to improve disabled student’s learning. Moreso, there is a need for methodological evaluation of such emerging technologies in order to assess their effectiveness and study their limitations so they can optimally be applied and perform to their potential (Cabibihan, Javed, Aldosari, Frazier, and Elbashir, 2016). Overall, the data revealed the participants were quite aware of how their child’s disability affected their ability to use technology. In terms of functionality, the data reveals how the participants identified how technology was a tool to improve student learning, while five of the six participants identified experiences where only small portions of the technology could be geared towards their child’s specific learning needs. Participants were also conscious of the functionality of the technology and whether it was a viable tool for their child. Yet despite these obstacles, all of the participants were determined to attempt the use of any technology that may make their child more comfortable, happy, or expressive. Finally, the participants identified how these attempts to use technology resulted in varying levels of frustration.

Frustration with technology. Besides revealing enhanced concerns regarding the functionality of technology that the participants experienced, the data also identified frustration
as an obstacle when using assistive technology. Across participants, a cautious sense of optimism for technology was present. The researcher interpreted a combination of disappointment, dissatisfaction, exasperation and weariness in the manner in which the participants spoke about their own and their child’s frustrations when they attempted to use varying technologies with their disabilities. All of these frustrations are reported by Alper and Raharinirina (2006) who identified that even in cases where technology was made available to disabled persons and their families, the devices were often abandoned. The major reasons for abandonment include a lack of consideration given to the individual’s disability and family’s needs, difficult to overcome design factors of the device such as setup, programming, and functional use, unreliable technology, and/or applications and the fact that the equipment drew negative attention to the special needs individual (Alper & Raharinirina, 2006).

This study’s findings indicate that the participants experienced all of Alper and Raharinirina’s (2006) reasons for abandonment in terms of parental frustrations. However, nowhere in the data, did the participants discuss factors that mediated these obstacles. To do so, Todis (1996) found that student’s needs could be met only if the following was present: the student’s education program met family’s goals and values; technology and student’s goals were linked; effective collaboration and communication between family, students, and professionals; equipment is replaced or modified as needed; and problems were immediately resolved as soon as they arose. The data revealed that most of the participants identified how the inability to modify technology, especially applications, presented a great level of frustration, while fears of their child being addicted to technology equally frustrated the participants.

Within the data, participants demonstrated a fear that their child may become addicted to technology. The data suggests that these fears are based on the fact that the repetitive nature of
applications within technology devices will draw their child into the programs, while negatively reinforcing the echolalia nature of their disability, which affects words, phrases and behaviors. These fears are supported throughout the literature (Baruch, 2001; Hourcade, Pilotte, West, & Parette, 2004; Mazurek and Engelhardt, 2013). Baruch (2001) identifies how when using technologies, autistic children may become obsessive and in some cases, may degrade the human qualities of thinking, feeling, and behaving. In addition, Mazurek and Engelhardt, (2013) identified how children with autism spectrum disorders (ASD) have strong problematic preferences for screen-based media. Moreover, Mazurek and Engelhardt, (2013) found these preferences are problematic because screen-based media use was significantly correlated with inattention and oppositional behaviors.

**Personal value and enlightenment.** The finding of this study indicated that the participants developed a heightened sense of protection and advocacy for their disabled child. In doing so, the data revealed the participants were humble and proud of their role and accomplishments as a parent of a disabled child. The data also divulged how the participants made meaning of the value of their accomplishments and through the concerns they expressed with technology. The two sub-ordinate themes are value of technology and concerns with technology are discussed in the following sections.

**Value of technology.** The findings indicated that the participants were proud of their parental accomplishments, although the data demonstrated a reluctance to use technology at home. This reluctance to use technology in the home setting is corroborated in the literature by Huang, Sugden, and Beveridge (2009) who found a low frequency of device use at home. Factors leading to low device use at home were identified to include children’s reluctance to use the device, parental perspectives, physical environmental barriers, and device-related factors
such as applications and device manipulation (Huang, Sugden & Beveridge, 2009). Huang, Sugden, and Beveridge (2009) found that although assistive devices have long been viewed as a beneficial and necessary intervention, the ultimate use of the device should be considered from the point of view of the users and the user’s different developmental stages and unique personal experiences should be taken into consideration.

Other factors identified in the literature that impact parental value of technology in the home include the disruption of family routines, greater parental responsibilities, and lack of consideration for cultural issues, may all result in greater stress being introduced into the home, resulting in technology abandonment (Hourcade, Pilotte, West, & Parette, 2004). The findings of this study support these factors in that the participants identified routines as being critical to their child’s learning. Further the data reveals that by the very nature of being a parent of a child with a disability adds to the family stress. This is supported by literature by Palmer, Wehmeyer, Davies, and Stock (2012) who identified that family members did not frequently identify device complexity as a barrier regarding the value a parent places on a device. The data in this study revealed the participant’s experiences did not include the complexities of managing a device.

**Parental concerns with technology.** Since device complexity was not identified as an obstacle in valuing a technological device, other concerns did present themselves. The researcher found that the participants exhibited differing levels of concerns with technology for the present and the future. Additionally, the researcher interpreted that the participants were successfully coping in their current family environments and were more concerned about how current technology does not currently meet the needs of their child and whether or not technology may positively impact their disabled child’s future. These concerns are identified in
the literature and are described by Putnam and Chong (2008) who analyzed current trends with assistive technology and found that current technology-based products for people with autism are not effective, although there is a desire for technology to meet the goals and to align to Autism spectrum user’s interests and strengths. Putman and Chong (2008) found that 75% of current Autism users had any experience with software or technology designed for people with cognitive disabilities, although reporting a desire to contribute in technology design that includes social skills, academic skills, and organization skills.

Across most interviews, the data revealed that the participants expressed concerns about whether future technologies will meet be more aligned to meet the diverse needs of their disabled child. The findings of Rose and Meyer’s (2000) research address these concerns in their identification that new technologies are changing societal concepts about the nature of learning and that the benefits for students with disabilities will, through necessity, meet the diverse needs of users. Rose and Meyer (2000) predicted the technologies of the future will be more diverse allowing for participation of numerous types of learners. Further, Rose and Meyer (2000) envisaged that the goals of education will become more diversified concentrating on the inherent diversity among all students and as such technology will adapt to these changes.

Finally, within the literature there is a call for a paradigm shift in the quantity and quality of collaborations between technology users, researchers, developers, and manufactures (Blackstone, Williams & Joyce, 2002). Blackstone, William and Joyce (2002) report how families with disabled children have a major stake in all types of research that can affect the design and development of technologies and accessories. Since the data in this research supports not only parental concerns but their willingness to explore research options, it becomes all the
more important that they and their disabled child be involved in the research, development, and testing processes (Blackstone, Williams & Joyce, 2002).

**Conclusion**

This study was guided by the following question will be used to guide this research: How do parents of autistic children make sense of their experiences with assistive technology? Through this question, this study sought to explore how parents of children diagnosed with a disability make sense of their experiences with technology. The researcher applied a qualitative interpretative analysis (IPA) research design which interpreted the participants’ various perceptions of experiences with technologies.

Consistent with the literature review section of this study, several key findings remained constant in terms of technology use, application, and end users value by families with disabled children. The meaningful and rich data gained from how the participants made meaning of their experiences with technology in this study corroborates the literature with reference to technological uses, barriers and obstacles to technology, the personal value they place on technology and future concerns they express about technological adaptations, educational gaps, perceived racism, lack of faculty support, and challenging campus climate (Blackstone, William & Joyce, 2002; Brocki & Wearden, 2006; Cabibihan et al., 2016; Huang, Sugdea Beveridge, 2009). This study also revealed that parents make meaning of their experiences with technology on behalf of their disabled child (Clark, Austin, & Craike, 2014). In addition, the data generated in this study reveal several unique findings that contributed valuable new research to the existing literature.
The research presented new data that expands upon the existing literature by identifying that various forms of technology has limited parental value for disabled children in the home, while indicating the parents possess a heightened sense of protection and advocacy for their disabled child through, the meaning of and the value of, their accomplishments and the concerns they expressed with technology. Furthermore, this study established a greater understanding of parental experiences with technology on behalf of their disabled child. Specifically, data indicates that most parents do not value technology as a means of communication in the home, therefore technology becomes a source of entertainment for their disabled child. Moreover, it was found that although many parents value technology in their everyday lives, they do not believe that recent advances in technology, such as the iPad, are limited in their application to maintain the interests of their disabled child. The new and unique findings generated through this study have various implications for practice and future research, which are discussed below.

Discussion of Findings in Relationship to Theoretical Framework

The theoretical framework for this inquiry was Ardelt & Eccles (2001) parental self-efficacy theory and Wigfield & Eccles (2001) expectancy value theory of achievement motivation. These theories partner logically within an IPA study in that it allows for the capture of experience and story-telling from participants (Delgado & Stefancic, 2001), while serving as a lens to understand how parents of ASD children make meaning of their experiences with assistive technology, specifically in a non-educational setting (Taylor, 2009). Reality is shaped by each individual and is based on the degree to which each individual, or as in this study the parent, perceives their ability to use an assistive technology application, as to whether it is considered difficult or not applicable to their child. As a result, this perception may negatively
or positively influence the individual or as in the case of this study, the parent’s attitude and use of the application.

Parent’s self-efficacy beliefs provide an estimation of a degree of confidence the parents’ place in their capability to use assistive technology, while helping their ASD child with the use of the technology, while evaluating which assistive technologies are appropriate or not appropriate for their child. In this study, the three assessment processes that are part of parental self-efficacy: analysis of task requirements, attributional analysis of the experience; and assessment of personal and situational resources or constraints were demonstrated by the parents as they evaluated assistive technologies with their ASD children (Gist & Mitchell, 1992). In the first assessment process, analysis of the task requirements, each parent evaluated and determined what was required to use a particular assistive technology. They explored the technology application themselves before they introducing it to their child. If the parent perceived that the assistive technology was too complex for their child’s use, their negative feelings determine that they would not introduce it to their child or may negatively hinder the proper introduction of the technology.

The second process, attributional analysis of the experience, the parents described their experiences when evaluating the use of an assistive technology for their child in terms of how they perceived their child would be able to perform the application requirements in terms of time before becoming frustrated. Parents in the study, identified how they considered time when using the assistive technology, the energy that was engaged in the technology, and whether the child was engaged with the assistive technology. In the use of iPad’s as a technology for entertainment, the parents were easily able to discern whether their child was actively engaged with the technology by the child’s attention span given to the technology. Finally, the third
process, assessment of personal and situational resources or constraints, the parents identified how they were able to discern the effect of the surroundings, the students’ feelings of comfort and capability of using the assistive technology. Parents demonstrated a sense of their own self-efficacy on behalf of their disabled child and as a proponent of the child’s capability to use assistive technology was determined through their observations of their child’s positive or negative experiences using the technology.

**Limitations of the Findings**

This study offers findings that bring a distinctive influence to the literature that examines the use of technology by parents of special needs students. In addition, it provides a unique view into how this topic connects with the use of technology in the home by special needs students. However, the study has its limitations, which are acknowledged and explained below, while influencing implications for the practice. Finally, recommendations for future research are discussed as next steps for enhancing the problem of practice.

This study was limited to a single substantially separate education cooperative in Massachusetts. The information collected consisted of data collected from 6 parents of children who attended the cooperative. Therefore, the results cannot be generalized to all parents of autistic parents, to parents with children who are diagnosed with any disability or to parents whose child may attend another school or another district. It should be noted the larger the sampling size, the more trust and confidence the results may represent the population. In this study, a larger sample size would have facilitated the application of the results to be more representative of the population, while limiting factors that may negatively or positively askew the data. In addition, a larger participant study may be beneficial to confirm these results.
In addition to a larger participant pool, a more equitable parental gender representation is also a limitation to the study. Within the study, females out represent males to a 5:1 margin. Although limited, the review of data concerning the participant’s experiences revealed no key conflicting responses between the genders. A more equitable and larger sample size would be more representative of the population, while diminishing the possibility of disparities between the genders experiences and further substantiating the results.

Although there were parameters that were put in place to make reasonable generalizations from the results of the sample back to the population, the types and varieties of technologies referred to also characterize a limitation of the study. Throughout the study, technology commonly was inferred by the participants as iPads, iPods, iPhones, their applications and gaming devices. These assumptions, although unintentional, restrict the participant’s ability to recall other experiences using other high, medium and low technologies. Since there are several hundred technologies used by parents of autistic children at home to facilitate communication, social interaction, educational activities, and entertainment, a distinction between technologies may offer further insights and additional data about how participants make meaning of their experiences with technology. Finally, the interviewees self-selected to participate in the interview process. Their eagerness to participate and share their stories may mean that their responses may not represent the full range of parental experiences with assistive technology within and outside the total study population.

Implications for Practice

There are a number of recommendations for practice based on this research study’s findings. Historically, quantitative studies have served as a resource for practitioners and policy makers because of the well-timed and abundant data collection. Qualitative approaches may be
better suited for research in home environments because their emergent designs allow for the focus to be on contextual factors, while the use of rich, thick descriptions of experiences are used to capture data (Pietkiewicz & Smith, 2014). The inherent strengths of qualitative research have allowed this researcher to explore lived experiences of parents in a way that gives meaning through a detailed narrative, while leading to insightful themes. Embedded within these themes was the concept that while technology is complicated by obstacles and barriers in its applications, it is not readily seen by parents of disabled children as a tool to enhance the lives of their children at home. Triangulation of the data from all of the sources revealed recommendations to successfully implement technology within the lives of disabled children, especially at home.

**Personal development.** When preparing for an integration initiative with any technology, a fundamental consideration must include personal development and support for end users, especially when the end users are parents and disabled individuals. Providing parents and disabled children with time to become familiar with the technology and plan the use of technology in their lives appropriately will permit for a greater chance of a successful use. In addition, since the data in this research supports not only parental concerns but their willingness to explore research options, it becomes all the more important that they and their disabled child be involved in the research, development, and testing processes. Manufacturers, developers, and researchers of technologies in the future should be more inclusive of diversity in their application of technologies to allow for collaboration.

The collaboration must be implemented throughout all aspects of the design process in order to be effective. As a finding from this research, it would be recommended that one of the most useful aspects to this type of collaboration would be to integrate home use as a component
of application implementation. This technique would be useful in helping the research and
design aspect of technology with home use which would include setting up devices up and
determining the functionality of their application in the environment where they will be used.
This recommended collaboration would allow parents to demonstrate their and their child’s
ability to actually integrate the devices into their homes and their lives. Moreover, it should be
implemented on an on-going basis to constantly reinforce its use due to the speed at which
technology currently changes. As a mechanism to facilitate the findings of this research, parental
workshops should be developed and coordinated to include, students, parents, teachers,
researchers and manufactures. The purpose of these workshops would be two-fold. First, they
could be used in the development of new emerging technologies, while also being used to re-
engineer existing technologies geared towards the student end-users. Second, this concept could
be further supported by a greater exchange of information and data collection in terms of
evidence that substantiates each student’s positive outcomes concerning the use of assistive
technology. It would be recommended as a result of this study that such exchanges be conducted
on a weekly or bimonthly basis in order to achieve maximum results.

**Disabled child development.** Parents should also consider providing students with
training on how to use iPad devices in the home setting. It is evident that many students possess
devices for their personal use, but as identified in this study, the use for disabled children is
currently limited to entertainment purposes. There are different uses for devices that are
necessary for disabled children to become more proficient. One of the most important use is that
of communication, which according to the participants in this study is a school related function.
Schools should offer disabled children lessons that focus on device management procedures,
care, expectations, and home application opportunities. These children would benefit from learning how to maximize the opportunities that these types of devices offer for home use.

**Recommendations for Future Research**

Findings of this study identify various avenues for future research. This researcher’s work highlights issues not previously reported in the literature and could serve as an impetus for further qualitative work. It would be beneficial to continue exploring ways that technology could be adapted for disabled children diagnosed with different disabilities. Parents and educators would benefit from studies that look at the integration of all technologies with regard to the daily activities of disabled children to develop continuity between technology driven fields and home application. This integration should include internet driven platforms to research and development conducted in fields unrelated to education such as medical, engineering, and space domains.

Parents in this study expressed concerns that technology is not specialized enough to address their disabled child specific needs. This is a key factor in their beliefs about how technology can be integrated to disabled children’s lives. Their perspectives and concerns warrant further investigation. As identified in this study, parents of disabled children, believe that only a small portion of today’s technology is applicable to their child. Therefore, education technologists should be mindful when developing applications and technology as a one size fits all. Additionally, as identified in this study, gender may play a role in the fact that assistive technology is used as a form of entertainment, especially in terms of the justification of its’ use as entertainment only and should be explored further. Moreover, this study identified how the participant’s children’s exposure to high level technology, such as the iPad, is limited to the last three years and as such may play a role in parent’s perceptions of the applicability, while earlier
exposure may impact how it is perceived. Therefore, offering two additional areas for further research. Finally, as identified in this study, one of the participants was deaf and as such was the only participant who identified assistive technology as an essential learning tool of communication for her disabled son. This dynamic in of its self, offers multiple research avenues worthy of future research.

As our society is moving towards a more technology rich culture, therefore current methodologies towards the development and application of these technologies must also change. Understanding the needs of all end users is an important component of advancing device expertise, but in advancing knowledge and learning in our everyday lives. Technological achievements and advancements must be all inclusive and these aspects warrant further research and analysis. It is suggested that future studies investigate other methods, programs and applications that are effective in developing new technologies, while finding new applications for existing technologies.

**Personal Reflection**

As a Special Education (SPED) teacher of children diagnosed with Autism and other disabilities, I was inspired to conduct this study because my belief was that technology gives a voice to those who do not have one. Additionally, prior to this study, I believed that the benefits of reinforcing how technology was used at school, in the home, would produce greater overall learning outcomes. It was these premises that drove the conception and desire to complete this study. However, as I learned how the parents in the study, viewed and justified the use of technology on behalf of their child, I came to realize how all the parents identified happiness as a single factor in determining what is best for their child. At first, as this theme arose through the interviews, I was surprised and to be honest taken back because it really opposed the premise of
this study. However, as I listened to the parents describe their interactions with their children and how they instinctively know what their child wants and desires (which I was lucky to observe during this study), I came to realize that parental love and the desire to do what they think is best for their child, trumps all the best intentions of this SPED teacher. It is ok just to go home from school and be a teenager, whether you are disabled of not.
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Appendix A

Items used to Assess Children’s Ability Beliefs and Subjective Task Values

Ability/Expectancy (a)

Compared to other students, how well do you expect to do in math this year? (much worse than other students, much better than other students)

How well do you think you will do in your math course this year? (very poorly, very well)

How good at math are you? (not at all good, very good)

If you were to order all the students in your math class from the worst to the best in math, where would you put yourself? (the worst, the best)

How have you been doing in math this year? (very poorly, very well)

Perceived Task Difficulty (b)

In general, how hard is math for you? (very easy, very hard)

Compared to most other students in your class, how hard is math for you? (much easier, much harder)

Compared to most other school subjects that you take, how hard is math for you? (my easiest course, my hardest course)

Required Effort (c)

How hard would you have to try to do well in an advanced high school math course? (not very hard, very hard)

How hard do you have to try to get good grades in math? (a little, a lot)

How hard do you have to study for math tests to get a good grade? (a little, a lot)

To do well in math I have to work (much harder in math than in other subjects, much harder in other subjects than in math).
Perceived Task Value

**Intrinsic Interest Value (d)**

In general, I find working on math assignments (very boring, very interesting).

How much do you like doing math? (not very much, very much)

Attainment Value/importance (e)

Is the amount of effort it will take to do well in advanced high school math courses worthwhile to you? (not very worthwhile, very worthwhile)

I feel that, to me, being good at solving problems which involve math or reasoning mathematically is (not at all important, very important).

How important is it to you to get good grades in math? (not at all important, very important)

**Extrinsic Utility Value (f)**

How useful is learning advanced high school math for what you want to do after you graduate and go to work? (not very useful, very useful)

How useful is what you learn in advanced high school math for your daily life outside school? (not at all useful, very useful)

(a) Alpha coefficient = .92

(b) Alpha coefficient = .80

(c) Alpha coefficient = .78

(d) Alpha coefficient = .76

(e) Alpha coefficient = .70

(f) Alpha coefficient = .62
Appendix B

Interview Questions

Interview 1:
1. Can you describe to me your family?
2. Can you tell me a story that describes your family?
3. What do you enjoy doing together as a family?
4. Can you describe to me a story that exemplifies something your family enjoys?
5. Can you tell me what it is like to be a parent of an Autistic child?
   a. How old was your child when he/she was diagnosed?
   b. How did you feel when your child was diagnosed?
   c. After the diagnoses, what resources were you made aware of to support your child?
6. What do you think of when I say the words parental involvement?
   a. Can you tell me a story about what parental involvement means to you?
7. What do you think of when I say the word technology?
   a. Can you tell me a story about what technology means to you?
   b. What or who do you think influenced your use of technology and how do you feel about that?
   c. How would you describe your experiences using technologies?
8. What do you think of when I say the word assistive technology?
   a. Can you tell me a story about how you have used assistive technology in your everyday life?
   b. What or who influenced your use of assistive technology and how do you feel about that?
   c. Tell me how you feel about using assistive technology?
9. What do you think of when I say the word iPad?
   a. Can you give me some examples?
   b. Can you tell me a story about how you have used assistive technology in your everyday life?
   c. What or who influenced your use of the iPad and how do you feel about that?
   d. Tell me how you feel about using the iPad?
   e. How would you describe your experiences using the iPad?
10. How would you describe how your family uses technology?
    a. Can you tell me a story about how your family uses technology?
    b. What or who do you think influenced your family’s use of technology and how do you feel about that?
    c. How would you describe your family’s experiences using technologies?
11. How would you describe your family’s use of assistive technology?
   a. Can you tell me a story of how your family uses assistive technology?
   b. What or who influenced your family’s use of assistive technology and how do you feel about that?
   c. Tell me how you feel about your family using assistive technology?

12. How would you describe your family’s use of the iPad?
   a. Can you tell me a story of how your family uses the iPad?
   b. What or who influenced your family’s use of the iPad and how do you feel about that?
   c. Tell me how you feel about your family’s use of the iPad?

13. What other thoughts do you have about using assistive technology in your everyday life?

**Interview 2:**

1. How would you describe how your child uses technology?
   a. Can you tell me a story about how your child uses technology?
   b. What or who do you think influenced your child’s use of technology and how do you feel about that?
   c. How would you describe your child’s experiences using technologies?

2. How would you describe your child’s use of assistive technology?
   a. Can you tell me a story of how your child uses assistive technology?
   b. What or who influenced your child’s use of assistive technology and how do you feel about that?
   c. Tell me how you feel about your child using assistive technology?

3. How would you describe your child’s use of the iPad?
   a. Can you tell me a story of how your child uses the iPad?
   b. What or who influenced your child’s use of the iPad and how do you feel about that?
   c. Tell me how you feel about your child’s use of the iPad?

4. Describe to me how well do you think you your child will do with their iPad this year?

5. Tell me how effective you believe that your child at using an iPad?
   a. Why do you feel this way?
   b. Can you tell me a story that will explain why you feel this way?

6. In general, how difficult do you feel it is for your child to use an iPad?
   a. Can you tell me a story about why you feel this way?
   b. Why do you feel that way?

7. How difficult is it for your child to improve their iPad usage?
a. Why do you believe this is so?
8. How hard does your child have to concentrate to use the iPad effectively?
   a. Why do you believe this is so?
9. To do well with the iPad, do you believe that it is important to improve their iPad skills?
   a. Please discuss why you believe this is important?
10. In general, do you believe that your child find working on the iPad exciting?
    a. Describe this experience and why you believe this is important?
11. Can you explain to me how much your child likes using the iPad?
    a. Can you tell me a story about why you feel this way?
12. Do you believe that your child feels they are able to use the iPad by themselves?
    a. Why do you feel that way?
    b. Can you tell me a story about why you feel this way?
13. How important do you think it is for your child to be good at the iPad?
    a. Why do you feel that way?
14. Please describe to me how useful the iPad will be in your child’s daily life outside school?
    a. Why do you believe this?
15. Do you hold any beliefs about how the iPad will be helpful in your child’s academic success?
    a. Why do you believe this?
16. What other thoughts do you have about your child’s use of assistive technology or the iPad in their everyday life?
17. Finally, do you have any thoughts about how the iPad or its’ applications can be improved to better assist your child with learning?