

Preventing Abandonment of Augmentative and Alternative Communication (AAC)

Devices for Students with Autism: Parent Perspectives for Successful

Implementation

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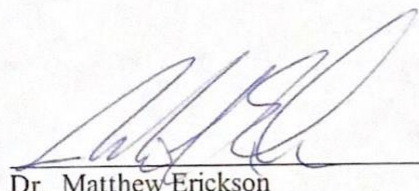
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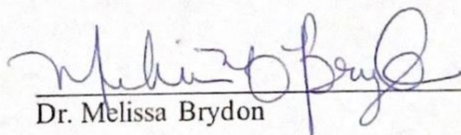
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ABSTRACT

The purpose of the present study was to investigate the perspectives of parents of students with ASD who use high-tech AAC in educational settings. Although the use of AAC in school settings has been studied, research has not narrowed its scope to focus on children with ASD who use high-tech speech generating devices (SGDs) and receive special education services in school settings. By analyzing both qualitative and quantitative data, this study aims to create an initial framework for successful implementation of AAC for children with Autism Spectrum Disorders.

A mixed methods design was chosen for this study. Parametric and nonparametric statistics were utilized to test the theory that ease of use, device usefulness, and ease of learning the AAC technology positively influence parent satisfaction. Transcripts from semi-structured interviews were manually coded to identify qualitative themes related to parent satisfaction with their children's AAC devices. Three qualitative themes emerged: parents feel like they are not equal members of the IEP team, parents act as self-advocates, and parents have difficulty trusting the recommendations made by the school team. Quantitative data analyses revealed a strong positive correlation between ease of use and satisfaction, ease of learning and satisfaction, and usability and satisfaction. Triangulation of data through qualitative analysis confirm that satisfaction is related to ease of use, ease of learning, and usability of the high-tech AAC device.

Future studies should investigate parent perspectives that lead to abandonment of speech generating devices in different regions of the United States and across underrepresented groups. In addition, preservice programs in special education and speech-language pathology should be studied in order to determine the extent to which students entering the field have been taught to engage in family-centered practice. Finally, future research should investigate strategies that lead to successful implementation of speech generating devices with children with ASD.

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DEDICATION

This dissertation is dedicated to all of the families whom I have had the honor of meeting and supporting throughout my career.

I also dedicate this dissertation to my sisters. I deeply respect and admire you all.

Finally, this dissertation is dedicated to Lauren and Josh. You are my greatest joy and constant inspiration.

Table of Contents

Chapter 1: Introduction.....	11
Statement of the Problem.....	13
Conceptual Framework.....	14
Significance of the Study.....	15
Statement of Purpose	15
Definition of Terms	16
Chapter 2: Literature Review.....	18
Introduction	18
Review of the Literature	18
Augmentative and Alternative Communication	18
Summary.....	41
Chapter 3: Methodology	43
Research Questions.....	43
Research Design	44
Participants	45
Ethical Considerations.....	46
Consent and Access	46
Instrumentation	46
Confidentiality	48
Role of the Researcher.....	48
Quantitative Data Analysis	49
Qualitative Data Analysis.....	49
Integration of Data.....	50
Summary.....	51
Chapter 4: Results.....	53
Characteristics of the Research Sample.....	55
Data Analysis.....	57
Research Question 1	57
Research Question 2	63
Research Question 3	65
Conclusions	68
Chapter 5: Discussion.....	70

Summary of the Current Research Study	70
Results	71
Research Question 1	71
Research Question 2	72
Research Question 3	73
Implications and Recommendations for Future Research	74
Limitations of the Study	75
Small Sample Size	75
Sampling Procedure.....	75
Time that the Study Was Conducted	76
Internal Validity	76
Conclusion	77
References.....	79
Appendix A-Permission for USE Questionnaire.....	86
Appendix B-Recruitment Brochure.....	87
Appendix C-Interview Email.....	88
Appendix D-Informed Consent	89
Appendix E=IRB Approval	93
Appendix F-Survey Instrument	94
Appendix G-Interview Questions.....	104
Appendix E-Recruitment Brochure	106
Appendix F-Interview Email	107

LIST OF TABLES

Table 1 Items in the Use Questionnaire with labels in current study	53
Table 2 Demographic information of study participants	55
Table 3 Qualitative demographic information	57
Table 4 The relationship between parent perspectives as IEP team members and AAC abandonment	59
Table 5 Summary of children's communication modality across settings.....	63

Chapter 1: Introduction

Autism does not discriminate. It affects children across ethnic and socioeconomic backgrounds. Current data reveal that one in 54 children in the United States are diagnosed with Autism Spectrum Disorders, almost triple in prevalence from the year 2000 (Centers for Disease Control and Prevention [CDC], n. d.). In addition, over 2 million Americans use Augmentative and Alternative Communication (AAC) due to a significant expressive speech-language delay or disorder (American Speech-Language-Hearing Association [ASHA], n. d.). While the number of children with ASD using AAC is not clear when reviewing statistical data, what is clear is that Autism Spectrum Disorders may result in significant expressive speech-language delays or deficits that necessitate the use of AAC.

According to the International Classification of Functioning, Disability, and Health (ICF) developed by the World Health Organization (WHO) in 2001, treatment should be functional and person-centered (ASHA, n. d.). The ICF framework considers anatomical and functional aspects of disabilities as well as environmental and personal factors that can influence an individual's functional abilities (ASHA, n. d.). The ICF framework guides research, clinical practice, and social policy, and is the basis for the scope of practice for speech-language pathologists (SLPs) (ASHA, n. d.). AAC research and practice is encompassed in the ICF framework (ASHA, n. d.). One of the purposes of person-centered treatment is to ensure that families and individuals have a voice in their therapeutic relationships (ASHA, n. d.).

Speech-language pathologists are specialists in treating communication disorders, including the complex communication needs of individuals who rely on AAC. In the field

of speech-language pathology, about half of nationally certified SLPs work in school settings. Person-centered treatment, as indicated in the ICF framework and ASHA scope of practice for SLPs, becomes an important consideration for individuals with complex communication needs as they enter public schools.

Decisions about AAC use take place when a child begins school. A multidisciplinary team, or group of school staff that works together to make educational recommendations for students with disabilities, is tasked with making decisions about communication modalities that are appropriate for students with ASD. Assistive technology devices and services are a special consideration for every student with an Individualized Education Plan (IEP) (Klang, Rowland, Fried-Oken, Steiner, Granlund, & Adolfsson, 2016). An IEP team for a student with complex communication needs may include a SLP, classroom teacher, special education teacher, other related service providers such as occupational therapists or physical therapists, a parent or guardian, and a local education agency representative who is knowledgeable about special education law and local resources (Yell, 2019). Research shows that families of children who use AAC have not historically been involved in the decision-making process (Parette, 2000). As a result, the child's communication needs at home and in the community are often ignored. Further, parents feel that they lack the training needed to interact effectively with their children while using AAC devices. The lack of inclusion leads to parent frustration and device abandonment (Parette, 2000).

When considering the use of assistive technology and its place in IEPs, the scope of practice for SLPs within the ICF framework, and the importance of parent participation in the IEP process, it is crucial to address person-centered and family-

centered practices. These practices occur when professionals consider and incorporate the needs of the individuals and families for whom they provide service. Teachers and SLPs generally agree that parents should be involved in the planning and implementation of AAC (Bukleman & Light, 2000; DeBortoli et al., 2014; DeCarlo et al., 2019; Mandak & Light, 2018; Parette, 1996). Parents know the needs of their children, the dynamics of their families, and their goals for their children in terms of academic progress and life after high school. However, parents often feel excluded from active participation and want an equal voice in the education of their children with ASD and complex communication needs (Parette, 2000). By using a family-centered treatment framework in school settings, it is possible to reduce barriers to using AAC and promote positive outcomes for students with ASD who rely on AAC to communicate (Bukleman & Light, 2000; Mandak & Light, 2018; Romano & Yu Shon Chun, 2018).

Statement of the Problem

Although the use of AAC in school settings has been studied, research has not narrowed its scope to focus on children with ASD who use high-tech speech generating devices (SGDs) and receive special education services in school settings. While there is research on family-centered practice, these studies have not focused on children with ASD receiving AAC intervention in public schools. The specific factors, or combination of factors, that best facilitate family involvement of parents with children with ASD in public school settings are unknown. It is not known how much influence parents of children with ASD have in the decision-making or intervention process regarding AAC. The variables leading to parent satisfaction with a child's AAC device are also unknown. Studies show that parents are often not trained to use their children's high-tech AAC

(Mandak & Light, 2018). In addition, studies also show that an array of variables serve to increase or inhibit use of AAC (Baxter et al., 2012; DeBortoli et al., 2014; Donato et al., 2018; Moorcroft et al., 2020). These are important considerations because of the increased prevalence of ASD as well as the availability and affordability of high-tech SGDs.

Conceptual Framework

To frame this study properly, it was important to study historical perspectives about AAC as well as literature about other populations of AAC users beyond children with ASD. Light and McNaughton (2012) outlined the advancements, evolving views, and evolving functions of AAC over the last 40 years and discussed the implications for school teams. As the focus shifts from a basic communicative purpose to a means of becoming fully immersed in society, the stakes are high for AAC users (Light & McNaughton, 2012). Light and McNaughton also explored child, teacher, and SLP factors that influence the use of AAC. In addition, legal issues were explored, as IEP teams are responsible for ensuring that students with disabilities, including children with ASD, receive a free and appropriate public education that includes assistive technology and services when appropriate (Yell, 2019). By framing the current study from a historical perspective, ASD, a disorder whose prevalence has increased dramatically over the past 20 years, became the focus. Studying parent views of this population of students who may present with complex communication needs that necessitate the need for high-tech AAC was the next step in advancing research in best practices for students with ASD.

Significance of the Study

Recent research shows that parents of children with ASD who use AAC devices feel disconnected from school teams. Further, the literature to date does not include a framework for effective parent involvement for this population. Research shows that parents of children with ASD who use AAC feel unsupported by SLPs, that communication between key stakeholders is lacking, and that parents have difficulty using their children's AAC in the absence of a supportive network (Moorcroft et al., 2020). In addition, parents want to be actively involved in decision-making and seek training for how to communicate with their children at home (Parette, 2000). Currently, there is no research that addresses abandonment of high-tech AAC related to usability of devices. Therefore, the relationship between ease of using and learning how to use a device to parental satisfaction is unclear. The tablet-based systems with high-tech AAC applications are the most prevalent devices used by about half of children using AAC (Calculator, 2014). However, the studies that focus on iPad applications for AAC do not concentrate on the needs of families of students with ASD. This is the first study to explore active involvement and inclusion of parents with children with ASD as they relate to the use of high-tech AAC in school.

Statement of Purpose

The purpose of the present study is to investigate the perspectives of parents of students with ASD who use high-tech AAC in educational settings. This study attempts to gain insight into this population by investigating the following research questions:

1. What is the relationship between parent perspectives as members of an IEP team and abandonment of speech generating devices for their children with ASD?

2. What changes to the development and implementation of the IEP do parents suggest in order to create an initial framework for effective use of a high-tech AAC device by children with ASD in educational settings?
3. How do ease of use, ease of learning, usability, and satisfaction with high-tech AAC relate to parent satisfaction with their children's speech generating devices?

Definition of Terms

- *Abandonment*: Ceasing to use a speech generating device that was recommended by the school IEP team (Johnson, Inglebret, Jones, & Ray 2006).
- *Augmentative and Alternative Communication (AAC)*: Using some forms of sign, gestures, symbols, writing, facial expression, and speech generating devices to communicate when verbal language is absent (Bukelman & Light, 2020).
- *Autism Spectrum Disorders (ASD)*: A developmental disorder characterized by deficits in social and communicative behavior (American Psychological Association, 2013).
- *Barrier*: An environmental event or condition that prevents or interferes with use of AAC (Donato, Spencer, & Arthur-Kelly, 2018).
- *Individualized Education Plan Team (IEP Team)*: A team of individuals responsible for implementing an Individualized Education Plan to ensure that a student is making adequate yearly progress (U. S. Department of Education, 2000).
- *Speech generating device (SGD)*: A type of AAC that speaks a message that is inputted by the speaker (Bukelman & Light, 2020).

- *Speech-language pathologist (SLP)*: A professional who specializes in preventing, assessing, and treating communication disorders (American Speech-Language-Hearing Association, n. d.).
- *Facilitator*: An environmental factor that leads to successful use of AAC (Donato, Spencer, & Arthur-Kelly, 2018).

Chapter 2: Literature Review

Introduction

The purpose of this study was to investigate the perspectives of parents of students with ASD who use high-tech AAC in educational settings. This literature review briefly addresses autism spectrum disorders (ASD), Augmentative and Alternative Communication (AAC), Multidisciplinary Teams (MDTs), Individualized Education Plans (IEPs), and family-centered practice. Changes in education, the prevalence of ASD, and in AAC technology are also discussed.

Federal law mandates that students with disabilities, including children with ASD, be educated in the least restrictive environment (Individuals with Disabilities Education Act, 2004). Additionally, parents are required to be members of the educational team and provide input for educational plans. One of the considerations that educational teams must make is a child's potential need for assistive technology. The views of school teams and parents of children with autism requiring assistive technology are addressed in this review.

Review of the Literature

Augmentative and Alternative Communication

Augmentative and Alternative Communication (AAC) is a type of assistive technology. AAC includes all of the means that we use to share our thoughts and feelings without speaking (ASHA, n. d.). It includes gestures, facial expressions, some forms of sign language, and writing. This literature review focuses specifically on high-tech AAC, or speech generating devices (SGDs). In addition, the literature review addresses AAC through the lens of children, teachers, speech-language pathologists, and parents.

SGDs are a type of high-tech AAC. They use computer-based programs to generate a spoken message using words, phrases, and sentences (Wellmark, 2019). The recent increase in availability of mobile devices, particularly the iPad, has made AAC more accessible and widespread while decreasing user expense (Light & McNaughton, 2012). More research is being conducted on the topic of AAC, specifically with speech generating devices (SGDs), due to decreased price of the technology (Lorah, Tincani, & Parnell, 2018). While private insurance companies do not yet cover the cost of iPads, the overall cost is relatively low, allowing schools and individual families to purchase them without outside funding (Lorah et al., 2018). In addition to the relative affordability of iPad-based SGD applications, technology support is typically readily available from the application designers. If a device is broken or needs repair, the application may be transferred to another mobile device during the repair (Lorah et al., 2018). In contrast, dedicated systems, or systems that are only built for communication, are associated with higher costs, are typically funded through insurance companies, have lengthy repair periods in which the user may be without the system, and have a strained technical support network (Lorah et al., 2018). The increase in availability and usability of iPad-based AAC applications, paired with school districts' obligation to involve parents in the decision-making process, is new territory that must be carefully considered.

The Evolution of AAC

Just as the availability of tablet-based technology has increased over time, so has the range of communicative intents expressed by AAC users. In its advent, users of AAC primarily expressed basic wants and needs. Now, the focus has shifted to functional

communication so that children can actively engage in social activities and in reciprocal communicative exchanges during daily living activities (Light & McNaughton, 2012).

Public opinion about AAC has also changed dramatically over the last 40 years. Most notable is the significant professional and public awareness and recognition of AAC, which may have had a positive impact on knowledge and acceptance of high-tech AAC as a mode of communication (Light & McNaughton, 2012). In addition, research over the last 40 years has debunked the misconceptions that AAC negatively impacts the development of verbal speech and that a child must possess prerequisite skills to use AAC effectively (Bukleman & Light, 2020; Light & Drager, n. d.). Finally, tablets are portable and used by 52 percent of Americans (Statista, 2020). The mainstreaming of tablet-based technology has allowed AAC users to integrate into their communities without the negative stigma associated with using some larger dedicated AAC systems (Bukelman & Light, 2020).

Current Challenges

Since the myths about AAC use have been discredited, SGDs have become more accessible and affordable, and the focus has shifted to functional communication, Light and McNaughton (2012) noted two major challenges relating to AAC. The first was improving intervention for individuals with complex communication needs. The second was translating these interventions through the lens of evidence-based practices to ensure the best possible communicative outcomes for high-tech AAC users. The American Speech-Language-Hearing Association's (ASHA's) evidence-based practice paradigm guides professionals in providing evidence-based services by integrating clinical expertise, scientific evidence found in published literature and data, and client/caregiver

expectations (ASHA, n. d.). All three areas of this evidence-based model are addressed in this literature review, with an emphasis on client/caregiver expectations.

Child Factors that Influence Successful Use of AAC

Although prerequisite skills to communicate with high-tech speech generating devices are not needed, research has shown specific skill sets that may predict and influence AAC success (Sievers et al., 2018). Predictors of positive outcome use are numerous, interconnected, and can vary greatly depending on the individual. For example, children with more subtle ASD characteristics and higher expressive language skills tend to respond positively to AAC intervention (Sievers et al., 2018). The more requirements built into the AAC device, the greater the cognitive demands placed on the learner (Parette, 1996). Therefore, high-tech AAC may not be the most effective fit for children with more severe cognitive impairments.

Several factors have been shown to moderate responses to different interventions and related outcomes for children who require AAC. Some of these factors are joint attention, children's ability to explore objects in their environment, and the ability to imitate the verbalizations of others (Sievers et al., 2018). Specifically, children with stronger skills in these areas experience better communication outcomes with AAC interventions (Sievers et al., 2018).

Finally, mediators are factors that emerge after the start of intervention and help to explain why and how a particular therapy was effective (Sievers et al., 2018). Among the mediators that determine the effectiveness of AAC interventions are the communication partner's knowledge of AAC, the user's perception of AAC, and the frequency with which AAC is used (Sievers et al., 2018).

These complex and interwoven variables differ among students, families, and school teams, making implementation of AAC a critical consideration for IEP teams. Comprehensive multidisciplinary evaluations are necessary in order to allow IEP teams to make informed decisions that allow students with ASD to reach their fullest academic and social potentials.

AAC Users with ASD in Public Schools

IEP teams have the formidable task of recommending and implementing AAC devices for students with complex communication needs. One population of children with complex communication needs that has been the subject of recent research relating to the use of SGDs is children with autism spectrum disorders (ASD) (e.g., DeCarlo, Bean, Lyle, & Paden Miller Cargill, 2019; Donato, Spencer, & Arthur-Kelly, 2018; Sievers, Trembath, & Westerveld, 2018).

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), Autism Spectrum Disorders (ASD) are characterized by lasting social-communicative deficits and “restricted, repetitive patterns of behavior, interests, or activities” (American Psychological Association, 2013, p. 50). In addition, these symptoms must be present early in development with a significant impact on functioning that cannot be explained by intellectual disability or other cognitive delay (American Psychological Association, 2013). In the United States, ASD affects one in 54 children across socioeconomic and ethnic populations (CDC, n. d.). Although the number of children with ASD who use high-tech AAC is unclear, given the level of severity of speech and/or expressive language disorder that many children with AAC demonstrate, the likelihood that many IEP teams will need to consider AAC is relatively high.

Legal Issues and AAC

In schools, students with autism require special considerations in Individualized Education Plans (IEPs). IEPs are mandated by the Individuals with Disabilities Act (IDEA) and designed to ensure that students receive a free and appropriate public education (Yell, 2019). All IEPs must consider a student's need for assistive technology. One type of assistive technology that IEP teams may recommend is AAC. If AAC is funded through IDEA Part B, it is usually recommended after a multidisciplinary evaluation by an IEP team that includes a classroom teacher, special education teacher, related service providers (including SLPs), and parents (U.S. Department of Education, 2000). The intricacies involved with selecting augmentative and alternative communication modalities for students with complex communication needs may present a challenge for members of IEP teams, including educators, related service providers, and parents.

The IEP team is mandated to address many of the parental concerns identified by Mandak and Light (2018), including community and organizational resources addressed in the Procedural Safeguards, written progress reports that are provided at least quarterly by teachers and related service providers, written assessment results that are to be provided in advance of the IEP meeting by the multidisciplinary team, and information about the child's disability, which is addressed in the evaluation report or reevaluation report (U.S. Department of Education, 2000). In addition, parent education can be added as a specially designed instruction, particularly when IEP teams consider that a common concern communicated by parents is a lack of training in both operational competency and in implementing the device in daily activities in the home (DeCarlo et al., 2019;

Mandak & Light, 2018; Sievers et al., 2018). IEP teams should be mindful of the need for training as a service that “can be written into the IEP” (Parette, 1996). Parent training is a crucial element to successful implementation, as parents are part of every IEP team and careful planning is needed early on for students with ASD to make adequate yearly progress in order to prepare for eventual transition from school to society.

Transition from School to Community

When considering the long-term use of a high-tech SGD, it is vital for IEP teams to consider how it can best be integrated into the home and community. Transition planning is essential for all students with disabilities, including students with complex communication needs. Being part of a society begins at school and extends to the home and community. Parette (1996) suggested that IEP teams should anticipate future vocational needs early in the educational process for students using AAC, as AAC can translate to greater independence after graduation. Goals for the use of the AAC device should take into account the individual needs and preferences of the student, teachers, and family (Parette, 1996). Some other considerations are “comfort, dependability, transportability, longevity and durability, and adaptability” (Parette, 1996, pp. 8-9). A student should like the device, it should be in working order for a long period of time, and it should have the capability to change as the child’s educational and social needs change. Overall satisfaction and usability of the device can be best accomplished by combining the expertise of professionals and experience of parents.

Facilitators and Barriers to AAC Implementation

Teachers' perspectives. Teachers have a crucial role on IEP teams and in facilitating successful implementation of AAC in schools (DeCarlo et al., 2019). Teachers' buy-in and confidence in operating SGDs influence their willingness to incorporate AAC use during classroom activities (DeCarlo et al., 2019). Conversely, teachers who do not believe that a student's communication device is an extension of the child and serves as their voice may be less willing to use the child's SGD outside of academic tasks (Moorcroft, Scarinci, & Meyer, 2020). Using a student's SGD outside of academic tasks is important as school teams attempt to encourage the ability of the student to convey various messages across the school setting (Calculator, 2014). This first step in generalizing use outside the classroom is important in teaching AAC users that communication occurs both during and outside of academic tasks. Current trends in AAC indicate that in addition to expressing wants and needs, students benefit from expressing a range of communicative intents including thoughts, observations, and social behaviors (Calculator, 2014). Teachers who serve on IEP teams help create goals and objectives that enable students to express themselves using a range of messages efficiently across communication partners and locations (Calculator, 2014). Despite the potential for students to use their AAC devices across school settings, DeCarlo et al. (2019) revealed that although teachers may possess relatively high levels of operational competency, or the ability to successfully navigate and manage the device, teachers did not use these devices at high rates outside of academic tasks. This poses a problem for students who rely on AAC in terms of developing social skills, friendships, and learning to speak to unfamiliar listeners.

Speech-Language pathologist perspectives. SLPs are professionals on IEP teams who are trained to assist in the team's ability to foster social skills and overall communication development. SLPs are related service providers in the context of an IEP team. They are experts in communication, including complex communication deficits. SLPs evaluate and treat individuals with ASD and play a key role in the selection, implementation, and progress monitoring of students who use AAC. The specialized skill set of SLPs is crucial for IEP teams who provide services to students with complex communication needs. Just as teachers may find it difficult to implement AAC across settings during the school day, SLPs experience challenges as well. According to Johnson, Inglebret, Jones, and Ray (2006), SLPs perceive a number of factors as critical to the long-term success or failure of AAC systems. Johnson et al. (2006) used focus groups and a questionnaire to examine the perspectives relating to success or abandonment of AAC for SLPs working in a variety of settings including schools, early intervention, university clinics, hospitals, and private practice (Johnson et al., 2006). Their study did not focus solely on students with autism or SGDs, but the findings provide insight into the perceptions of SLPs working with a diverse population of children using low technology, high technology, or multimodal AAC systems. The authors identified several factors that contribute to the perceived success or abandonment of AAC by speech-language pathologists. Some of these factors include support of families for use of the device, attitudes of communication partners and stakeholders about AAC, and the characteristics and fit of the device being appropriate for the student (Johnson et al., 2006).

Eight school-based SLPs included in a study by DeBortoli, Arthur-Kelly, Mathisen, and Balandin (2014) noted that due to the complexity of the systems available, family values, and individual student characteristics, it was often necessary to be creative rather than to adhere to strict guidelines while implementing AAC with students with complex communication needs. This study identified barriers that differed from those identified in previous studies. SLPs' knowledge about the devices as well as their workload were identified as factors that can impact the successful use of AAC by students with complex communication needs in school settings. In addition, SLPs expressed frustration that teachers did not feel that it was their role to communicate with students using AAC. The cultures of some schools led to the impression that SLPs could not successfully advocate for the needs of their students. One SLP noted that she felt that she was in a difficult position to advocate for the wishes of the family while attempting to maintain a rapport with the students' teachers. This study highlighted the differing views of parents, teachers, and SLPs and the potential impact on children with complex communication needs.

Romano and Yu Shon Chun (2018) examined professionals' views of barriers and facilitators to successful implementation of a variety of AAC devices. This study identified material, individual, and social and environmental barriers to successful use of AAC by children with complex communication needs. Despite these barriers, speech-language pathologists included in this study were more likely to identify factors that facilitate the use of AAC, including system versatility and portability, social and environmental factors, therapeutic influences including family involvement and interdisciplinary practices, and the child's ability to develop language and skills needed

to communicate independently. Conversely, this study found that parents were more likely to identify barriers to AAC use. This disconnect may be problematic as parents and SLPs view implementation and use of AAC quite differently.

Parent/family perspectives. Despite the different views held by SLPs and parents, the obstacles that parents believe hinder the communication development of their children cannot be ignored. Usability of the device, reliability of the device, lack of technical assistance, and failure to address cultural differences are some of the factors that parents of AAC users perceive as barriers to their children's communication development (Baxter, Enderby, Evans, & Judge, 2012; Donato et al., 2018). Baxter et al. (2012) conducted a systematic literature review to identify themes relating to successful implementation or abandonment of AAC. Children included in the descriptive design studies included children with cerebral palsy, multiple disabilities, autism, and aphasia (Baxter et al., 2012). The views of parents, teachers, and family members were included in the review. Difficulty in using the device, poor reliability, and deficient technical support were identified as barriers to successful implementation of AAC use. Specifically, the authors' analysis showed that when high-tech devices are difficult for children to use, take a long time to be repaired if broken, and lack technical support from the manufacturer, children may not experience success. Additionally, families report barriers in terms of cultural differences. When the voice output of the device does not match the accent or native language of the user, parents reported that words could be mispronounced or absent from the device, causing communication breakdowns. Because high-tech devices typically require the user to navigate various icons and folders to retrieve the intended words that they wish to communicate, it was noted that the time it

takes to formulate a message can be a barrier to effective communication and AAC success. In terms of issues that could translate to being important to members of an IEP team, failure to include parents in selecting devices, lack of training of family members in carry-over use to the home setting, negative reactions by communication partners, and lack of staff training were identified as barriers to successful implementation of AAC.

Donato et al. (2018) narrowed the scope of their systematic literature review to include barriers and facilitators to using AAC for children with ASD. Their study eliminated the heterogeneous group of congenital and acquired conditions included in the Baxter et al. (2012) article and identified five themes from their qualitative analysis of 42 studies. Participants included children with ASD, related service providers, music therapists, parents, and peers. The first theme described barriers that were related to therapy providers and services. In particular, funding, accessing evaluations, finding service providers with adequate training, and workload constraints of professionals were identified as barriers. Within this theme, parents reported that various professionals gave different advice for implementing the devices, which the authors added may be due to a lack of training in evidence-based practices. The second theme related to systems and technologies. Like Baxter et al. (2012), barriers such as lack of training, carry-over of use to non-academic activities, and time needed to program devices were identified. Lack of experience and training of communication partners was identified as a third theme. This theme was not identified in previous studies. However, it is an important consideration as communication partners must consider the time that it takes for users of SGDs to formulate messages as well as their potential use of AAC in tandem with facial expressions and gestures to express their thoughts. The fourth theme related to a parental

barrier of viewing AAC as a device that hinders verbal speech development, despite evidence to dispute this misconception. When parents perceive that the SGD will slow or prevent the development of verbal speech, they are less likely to use the device at home. The final theme related to characteristics of children with ASD, particularly their difficulty attending to communicative exchanges, motivation, fine motor difficulties, inability to initiate interactions, and inflexibility (Donato et al., 2018). When children have difficulty with reciprocal communicative exchanges, and when they lack motivation to interact with others, fine motor difficulties needed to operate the device, and initiation abilities, as well as demonstrate inflexibility during communication, participants in the study perceived these barriers to restrict successful use of SGDs (Donato et al., 2018).

Interestingly, the Donato et al. (2018) study found that the same five themes that serve as barriers can also facilitate successful use of AAC. When children master the ability to use their devices independently, and when parents work to carry over AAC use at home, the barriers of parental factors and child factors become facilitators of success (Donato et al., 2018). Therefore, when assessments are conducted in tandem with families to choose the appropriate device that can grow with a child over time and parents see their child's success in using the SGD, the barriers change to facilitators. This consideration is crucial for school-based teams as they strive to meet the requirement to involve parents in the development and implementation of IEPs for students with autism.

Parents as members of IEP teams

Parents have detailed and unique insights about the preferences and needs of their children. They are experts in raising children with ASD while also managing households, careers, other children, and personal interests. When parents do not feel like an integral

part of the IEP team, they experience higher levels of stress due to parental demands, time required to follow recommendations made by the school, and time needed to learn the AAC technology (Parette, 1996). The stress in balancing managing the household and managing the carry-over of IEP goals to the home setting can be daunting (Parette, 1996). It may be necessary for IEP teams to consider the amount of time that it takes for families to implement new technology, encourage effective use of that technology, and become trained and proficient communication partners (Parette, 1996). For these reasons, parents should be equal members of IEP teams and be actively involved in the decision-making process for their children (Fish, 2008).

Negative experiences on IEP teams

Although parents have unique insight and expertise relating to their children with ASD, they may have adverse experiences within IEP teams. In a qualitative case study of seven families from a Texas-based support group for parents of children with ASD, Fish (2006) concluded that parents did not feel treated as equals, educators did not follow the IEP, and families were not adequately trained in special education law. All families reported negative experiences in IEP meetings relating to the school's strict discipline for behavioral issues that may be manifestations of their children's disability, the school's lack of exposing their child to community settings, and the students' lack of exposure to the general education setting (Fish, 2006). The important consideration of building skills needed for successful integration to the student's community after graduation was missed. In addition to negative outcomes for their children, parents reported that they were mistreated by members of the IEP team, particularly for being labeled "unreasonable" and blamed for their children's deficits (Fish, 2006). Parents reported that

they were treated more positively when they were accompanied by an educational advocate to the IEP meeting. In terms of desired changes, parents reported a desire to have an increased focus on cooperation and adherence to IEP goals and objectives as well as decreased punitive disciplinary practices for their children. Fish (2006) also noted that parents felt that “if school districts were more honest, friendly, and less deceitful, then IEP meetings would be a more positive experience” (p. 63).

In a later study, Fish (2008) surveyed 51 parents of students, 21 of whom were diagnosed with ASD, about their experiences with the IEP process. Despite over half (63 percent) of the parents reporting that they had a clear understanding of the process, results showed that as children age, parent satisfaction regarding their level of involvement in the IEP process tends to decrease. In addition, despite 75 percent of parents reporting that they had positive relationships with educational professionals, 58 percent of the parents surveyed stated that they would like to have more influence during their children’s IEP meetings. According to Fish (2008), parents would like an increased presence in their children’s IEP meetings, training about educational law, and for teachers to adhere to their children’s IEP. Additionally, parents prefer when teachers do not have predetermined goals at the meetings, when they are provided a draft of the IEP prior to the meeting, when teachers avoid the use of educational jargon, and when teachers are honest (Fish, 2008). Research has established that parents have specific needs and preferences as members of IEP teams and that schools may not meet these needs. The failure to fulfill the wishes of parents can lead to parental stress and decreased involvement in the education of their children with ASD.

Family Involvement

Family involvement is a common factor that SLPs identified as facilitators or barriers to successful implementation of AAC use (DeBortoli et al., 2014, Johnson et al., 2006, Romano & Yu Shon Chun, 2018). Families play an integral role in the lives of their children with complex communication needs and may include parent(s), grandparents, siblings, and other extended family members (Bukleman & Light, 2020). The SLPs who participated in the study by DeBortoli et al. (2014) cited collaboration with families as critical to supporting the needs of students with complex communication needs. Specifically, home-school collaboration to encourage carry-over of communication strategies across settings and communication partners as well as schools focusing on family-centered interventions were judged to be important (DeBortoli et al., 2014). Romano and Yu Shon Chun (2018) reported that SLPs indicated that family involvement in therapy and families using AAC with their children across social contexts was a predictor of better communicative outcomes.

One area of family support relating to long-term success of AAC use is the school team assisting the family in setting and reaching communication goals (Johnson et al., 2006). Parette, Brotherson, and Huer (2000) asked parents of AAC users about their experiences relating to decision-making in the AAC process. Response topics included family preferences for building professional relationships, establishing respect for their ethnicity and values, and being trained to use their children's AAC device. Families indicated that they value "trust, communication, team decision making, and honesty" (Parette et al., 2000, p. 183). In addition, families prefer professionals who do not use professional jargon, and they want professionals to understand that they know their

children best. Families also want to be informed about the assessment process and want the assessment to be objective and based on the needs specific to their children. Families expressed a desire for training for themselves and for extended family. Such training includes not only how to transport and maintain the device, but also device options related to technology support, warranties, and funding. Just as it can be a challenge for teachers and SLPs to incorporate AAC use into non-academic periods in the school day, it can be equally challenging for parents and families to utilize AAC at home and in communities. Family-centered practice is a way to help families facilitate effective communication across settings.

Family-Centered Practice

Family-centered practice addresses family needs and guides professionals in involving family members in assessing and treating children who use high-tech SGDs (ASHA, n. d.). SLPs are trained to acknowledge the important role that families play as decision makers (ASHA, n. d.). In this practice model, the skills and expertise of families are recognized. “Families are considered from a lifespan perspective and may include parents, guardians, siblings, spouses and caregivers” (ASHA, n. d.). Family-centered practice includes respecting family preferences, teaching families the skills needed to facilitate language and communication development, and recognizing that the needs of families change over time (ASHA, n. d.).

When services are family centered, implementation is consistently used across settings and communication partners, AAC systems are easy to use, vocabulary is able to grow as language develops, communication partners are adequately trained and perceive benefits to using AAC, and children demonstrate motivation to communicate, AAC is

likely to be a successful mode of communication (Donato et al., 2018). Therefore, it is crucial for AAC teams to include the family unit rather than individual family members (Bukelman & Light, 2020). Studies have addressed family-centered practice, but none to date have specifically studied potential differences in the needs of nuclear family members and extended family members, despite the acknowledgement that extended family members play a central role in some cultures and ethnicities (Parette et al., 2000). It is noted that current literature uses the terms “parents” and “family members” interchangeably, leaving the readers to interpret the specific family context for themselves.

Romano and Yu Shon Chun (2018) reviewed qualitative data obtained through semi-structured interviews of 20 parents and 20 SLPs. Through the lens of family-centered services, their results indicate that barriers arise when family members lack the knowledge that AAC functions as a child’s voice. To facilitate the use of AAC outside of the therapeutic setting, SLPs report that they invite family members to participate in therapy as well as show video recordings of therapy sessions (Romano & Yu Shon Chun, 2018). Despite the claim that parents believe that AAC use facilitates language and adaptive behavior development, they report that they tend to serve as interpreters for their children due to their ability to predict their children’s wants and needs based on their facial expressions and gestures (Romano & Yu Shon Chun, 2018). In order to overcome these barriers, the Romano and Yu Shon Chun (2018) recommend “the need for guidance and professional-family bond” (p. 5). Through these family-professional relationships, SLPs may be able to better model and train parents to facilitate the use of SGDs in their homes and communities.

Mandak and Light (2018) extended this research and studied the perceptions of SLPs and parents of children with autism spectrum disorders (ASD) and complex communication needs from a family-centered service delivery model. A family-centered service model emerged after over 30 years of research that concluded that relational practices and participatory practices are necessary to providing family-centered services (Dunst & Trivette, 1996). There are two prongs to the family-centered service delivery model (Dunst & Trivette, 1996). Relational practices are tied to best practices in clinical service delivery and include “active and reflective listening, compassion, empathy, respect, and effective communication” (Mandak & Light, 2018, p. 1312). Participatory practices are related to being flexible and responsive to the needs to families while taking their preferences and concerns into consideration (Mandak & Light, 2018). Participatory practices include active family involvement in making choices and decisions for their children as well as building upon current family strengths to build new communicative competencies (Mandak & Light, 2018).

Mandak and Light (2018) found that SLPs tend to overestimate their provision of family-centered services, while parents may underestimate the family-centered services that they receive. This disconnect may impact the ability to implement AAC device use across settings and communicative partners. SLPs rated “providing general information” and “showing interpersonal sensitivity” as areas needing improvement (p. 1319). Parents also rated “providing general information” as low (p. 1321). Interestingly, parents rated “enabling and partnership” as low, suggesting that they do not feel equality in their relationships with SLPs (p. 1321). Because previous studies by Romano and Yu Shon Chun (2018) and Parette (2000) identified the importance of parent and family training,

SLPs' and parents' reports that "providing general information" (Mandak & Light, 2018, p. 1321) as lacking is a barrier that warrants further investigation.

Parent training

Senner, Post, Baud, Patterson, Bolin, Lopez, and Williams (2019) researched the effects of parent training on the use of high-tech AAC systems in the home setting. Although the study included a small sample size of four children and their mothers and was not limited to children with ASD, it provides insight into the positive effects of parent training, particularly since that is a common barrier to successful AAC use at home. Senner et al. (2019) implemented partner-augmented input (PAI), which is a structured modeling procedure in aided language stimulation. The mothers participated in a pretest, were given a description and demonstration of the intervention strategies, verbally practiced the intervention steps, engaged in structured and advanced practice with specific feedback provided, took a posttest, committed to long-term use of the mastered strategies, and were trained in generalizing the intervention strategies. Overall, the training took about 12 hours over a nine-to-12-month period. During this time, children gained between four and 27 new words, and the participants with ASD saw the largest gains with 26 and 27 novel words. Senner et al. (2019) concluded that parent training is a vital part of intervention with children who use high-tech AAC. They found that training is effective when conducted during natural activities in the home environment. While difficult to accomplish in a school setting, the effectiveness of PAI training highlights the positive effects of parent training that can manifest when the team is dedicated to family-centered practice.

Parents' perspectives about AAC training

Mandak and Light (2018) found that parents lack specific knowledge about AAC because that information is not provided by their children's SLPs. This perception was confirmed as a barrier that was also identified by the SLPs in the study. Parents in the study noted that they would like to become connected to other families with children who use AAC. These connections are seen to be helpful in assisting parents to build a network to share information, to engage socially, and to share their experiences relating to their children with ASD using high-tech AAC (Mandak & Light, 2018). In addition, parents want information about community and organizational resources to assist in navigating the services available for their children (Mandak & Light, 2018). Parents in the study were seeking information specific to their children's disability, its etiology, and prognosis. The authors found that almost 75 percent of parents want this information in written form, and about 65 percent of parents want general information about their child to be communicated to all family members. In terms of more specific information about their children, about half of the parents included in the study stated that they would like written progress reports and written assessment results. In reading this study through the lens of educational teams, 72 percent of parents had children with ASD who attended public schools or schools for children with special needs.

A study by DeCarlo, Bean, Lyle, and Cargill (2018) also explored training needs of parents of children with ASD using high-tech AAC. Parents expressed that they lacked training in programming and operating their children's devices, which resulted in poor operational competency. The study also concluded that parents have less buy-in than teachers, which means that they did not always perceive the children's communication

devices to be extensions of their children or their children's voices. Therefore, the authors concluded that due to lack of training and relatively lower buy-in when compared with teachers, parents "are not creating sufficient communication opportunities for their children to use their AAC device at home" (DeCarlo et al., 2018, p. 478), suggesting a need to focus on family training as part of the intervention package of children with ASD who use high-tech AAC.

Sievers et al. (2018) studied variables that led to positive outcomes for children with ASD who relied on AAC as their primary mode of communication. This systematic review included seven qualitative studies of 245 children with autism between the ages of 18 months and 10 years. One of the disadvantages of this study is that the authors did not focus solely on high-tech AAC. Rather, the study included manual sign and the Picture Exchange Communication System (PECS), which could have affected the mediators, particularly relating to the communication partner's knowledge of manual sign (Pyramid Educational Consultants, n. d.; Sievers et al., 2018). Despite this limitation, the study provides insight into factors that should be considered when assessing and developing intervention plans. The authors studied predictors, defined as "baseline characteristics that have a main effect on outcomes but no interactive effect" (p. 225). They also considered moderators, defined as "baseline characteristics that predict differential responses to interventions and aid in identifying for whom and under what conditions" a factor affects an outcome (p. 226). Finally, the authors explored mediators, defined as "factors that are assessed during the delivery of an intervention that are associated with outcomes" (p. 226).

Purpose of the current study

DeBortoli et al. (2014) concluded that further research is needed to examine the role of families in intervention for their children with complex communication needs. There is currently a host of research that examines teacher perspectives and the perspectives of SLPs relating to low-technology and high-technology AAC success and abandonment. While valuable contributions to the field of education and speech-language pathology, these studies do not specifically address the perspectives of families of children with ASD. In addition, some studies include the views of SLPs who work in a variety of settings rather than solely in public schools (Johnson et al., 2006). Over 90 percent of SLPs working in educational settings work with children with ASD, making up about 25 percent of their total caseloads (American Speech-Language Hearing Association, 2014). Therefore, studying family views of factors that influence successful implementation of AAC is important from the lens of their roles on school-based teams. Because of the increased prevalence of ASD to one in 54 children as of 2020 (CDC, n. d.), the unique social-communicative deficits of children with ASD, and the availability of less expensive AAC options such as tablet-based AAC applications, it is important to focus on the unique factors that impact children with ASD and their families within the context of a school team. There is a need for research specifically to focus on parent perspectives of students with ASD who use high-tech AAC in educational settings.

Significance of the study

This study is needed in order to develop an initial framework for successful implementation of AAC in schools. No such framework exists, and research shows that IEP teams struggle to overcome the barriers to successful implementation of SGDs.

Because of the unique social communicative deficits of children with ASD and the increased prevalence of the developmental disorder, it is important for school-based teams to understand how best to address the needs of these students through the lens of those who know the children best: the parents.

The current study is relevant to speech-language pathologists as they are the professionals who play a central role in the selection of AAC systems for students in educational settings. It is important for related service providers to understand the role of families, as it is one of ASHA's criteria for engaging in evidence-based practice (ASHA, n. d.).

Summary

IDEA mandates that children with disabilities, including children with ASD, receive a free appropriate public education. One crucial document to ensure this right is the IEP, with team members including teachers, parents, and speech-language pathologists. This literature review included teachers' perspectives, SLPs' perspectives, and parents' perspectives regarding students with ASD who require high-tech AAC devices when communicating. An in-depth account of the needs of families and family-centered practice was discussed.

Because of the varied perspectives of members of the IEP team and the complex needs of students with ASD who rely on AAC, a mixed methods design was chosen for the current study. This design was chosen to integrate data collected from semi-structured interviews of parents of school-age children who use high-tech SGDs and survey data that measured parents' satisfaction with the AAC device. By analyzing both qualitative

and quantitative data, this study aims to create an initial framework for successful implementation of AAC for children with Autism Spectrum Disorders.

Chapter 3: Methodology

The purpose of this study was to investigate parent perspectives of students with ASD who use high-tech AAC in educational settings. A convergent mixed methods design was chosen for this study. In this design, qualitative and quantitative data were collected in parallel, analyzed separately, and then integrated to provide a means of comparison (Creswell & Creswell, 2018). Parametric and nonparametric statistics were utilized to test the theory that ease of use, device usefulness, and ease of learning the AAC technology positively influence parent satisfaction. A semi-structured interview was manually coded to determine qualitative themes related to parent satisfaction with their children's AAC devices. This chapter describes the methodology for the research project.

Research Questions

1. What is the relationship between parental perspectives as members of an IEP team and abandonment of speech generating devices for their children with ASD?
2. What changes to the development and implementation of the IEP do parents suggest in order to create an initial framework for effective use of a high-tech AAC device by children with ASD in educational settings?
3. How do ease of use, ease of learning, usability, and satisfaction with high-tech AAC relate to parent satisfaction with their children's speech generating devices?

The corresponding hypotheses are

H 0: There is no linear relationship between ease of use, ease of learning, usability, and satisfaction.

H 1: There is a linear relationship between ease of use, ease of learning, usability, and satisfaction.

Research Design

Mixed methods designs are used to integrate qualitative and quantitative data (Creswell & Creswell, 2018). By triangulating sources of data, weaknesses from both qualitative data and quantitative data can be counterbalanced (Creswell & Creswell, 2018). This method of inquiry was best suited for addressing the research aims of the current study. First, recent research has not addressed parent perspectives surrounding abandonment of AAC with children with autism. Therefore, qualitative data were needed to explore themes relating to the needs of this population. Second, due to the limited number of published studies, comparing qualitative themes with quantitative data relating to parent satisfaction was justified in order to integrate data and establish triangulation. This research design allows for in-depth conceptualization and expansion of the breadth of data related to parent perspectives on abandonment of AAC and testing for relationships between satisfaction and other factors (Johnson, 2014).

The philosophical worldview underpinning this mixed methods study is pragmatism. Pragmatism embraces different worldviews and is not tied to a single philosophy (Creswell & Creswell, 2018). For this reason, merging qualitative and quantitative data provide rich information when applied to the research questions in the current study.

This study took place throughout the United States. Permission was obtained by the author of the Usefulness, Satisfaction, and Ease of Use Questionnaire (USE, Lund, 2001) prior to conducting the study (Appendix A). A recruitment flier was posted on several social media groups, on the ASHA SIG 12 webpage, the SLP ABA SIG social media pages, and was sent to the director of all Intermediate Units in Pennsylvania

requesting that it be disseminated to members of their Local Task Force (Appendix B). The recruitment flier included a link to the survey where participants provided informed consent to participate in the study. Following completion of the questionnaire, participants were asked to contact the researcher via email if they were interested in participating in an interview (Appendix C). Semi-structured interviews were conducted via Zoom, and they allowed the researcher to clarify questions and responses as well as probe for more in-depth responses throughout the interview (Johnson & Christensen, 2014). These respondent interviews included parents who spoke about their own experiences relating to using speech generating devices with their children. Informed consent to conduct and record the interview was obtained in advance (see Appendix D).

Participants

Participants were parents from Pennsylvania, New Jersey, Utah, and Florida. Purposeful sampling, choosing participants that fit the current research questions and goals, was used for the quantitative portion of the study (Tracy, 2013). More specifically, in order to take part in the study, a participant must have a child with a diagnosis of autism assigned by a licensed medical professional, and that child must have abandoned a high-tech AAC device that was recommended by an IEP team. Parents who served as participants for the quantitative portion of the study had children who were between five and 21 years of age and attended a public school or approved private school funded by the child's local district. Demographic information about ethnicity, gender assigned at birth, and family income were collected in a survey and reported using descriptive statistics. Additional snowball sampling was attempted for the qualitative portion of the study, as the population of interest was difficult to access (Tracy, 2013).

Ethical Considerations

A structured plan, including approval from Slippery Rock University's Institutional Review Board, informed consent, the right to withdraw from the study without penalty at any time, and participant confidentiality, was followed to ensure that ethical considerations were addressed in order to protect the participants in this study.

Consent and Access

The research proposal was submitted to Slippery Rock University's Institutional Review Board (see Appendix E). After permission was obtained by the Institutional Review Board and discussion board moderators, the researcher posted a notice of the need for participants on discussion boards and social media pages of SIG 12 and SIG SLP ABA. The recruitment brochure was also posted on social media pages for professionals who treat children who use speech generating devices. In addition, the researcher emailed the directors of Intermediate Units throughout Pennsylvania to disseminate the recruitment brochure to their Local Task Force. No prior permission was needed to post the recruitment brochure to other social media pages. Interested parents completed the questionnaire via hyperlink to the survey. Upon completion of the questionnaire, parents were asked to contact the researcher if they were willing to participate in an interview. Interviewees were asked, but not required, to recruit other parents for the study. The snowball sampling method did not yield additional participants for the study.

Instrumentation

The online survey for the current study was accessed through a hyperlink attached to the recruitment brochure. The survey was a seven-point Likert rating scale (See

Appendix F) that required participants to rate their agreement with questions relating to usefulness, ease of use, ease of learning, and satisfaction (Lund, 2001). In addition, the survey contained demographic questions relating to the child's gender, educational placement, and grade level as well as the parent's income, race, level of education, and relationship to the child. All demographic questions are relevant to analyzing the generalizability of findings.

The USE Questionnaire was chosen for the study because it subjectively measures the usability of a product (Gao, Kortum, & Oswald, 2018). The USE Questionnaire was found to be a valid and reliable metric for evaluating the usefulness of Microsoft Word and Amazon.com (Gao et al., 2018). In addition, the USE Questionnaire was employed to study the usability of an elliptical trainer for individuals with disabilities (Burnfield, Shu, Buster, Taylor, & Nelson, 2011). The USE Questionnaire was also used in previous studies that explored the usability of a smartphone application to prevent anxiety (Stoll, Pina, Gary, & Amresh, 2017). Most recently, the USE Questionnaire was used to explore the factors related to use or non-use of AAC systems (Moorcroft, Scarinci, & Meyer, 2019). Given that it has been established in published literature across various technologies, the USE Questionnaire was determined to be appropriate for the current study.

The semi-structured interview questions were adapted from published studies (i.e., Fish, 2008; Romano & Yu Shon Chun, 2018). Fish (2018) piloted the interview questions with a member of a parent support group. Romano and Yu Shon Chun (2018) conducted pilot testing to ensure understanding of all interview questions prior to their

study. Given that the semi-structured interview questions were based on questions from these two studies, pilot testing was not deemed to be necessary for the current study.

Confidentiality

Protecting the privacy and rights of participants is paramount in research. Qualitative interview data were recorded on Zoom. The recordings were maintained on a private Zoom account on a password protected computer and were deleted after data analysis was complete. There is a restricted version of Zoom that is designed to protect the private health information of users. However, this version was rejected for the current study because it does not provide the option to record the interview. The recording option is crucial for accurate transcribing and coding of qualitative data.

Qualtrics® xm was used to collect demographic and survey data, which includes an encryption feature that ensures confidentiality of the participants. Participant data was stored on a secure server. All data were transmitted via a secure Hypertext Transfer Protocol Secure (https), and user logins were secured with Transport Layer Security (TLS). All data were stored on a password protected computer that was kept in a private office.

Role of the Researcher

Lund's (2001) USE Questionnaire was created in Qualtrics® xm so that the questionnaire could be accessed via hyperlink. A demographics questionnaire was added so that participants were able to answer all questions in the same document. No direct contact with the participants was made in the quantitative phase of the current study.

The semi-structured interview (see Appendix G) was administered in real time via Zoom. Time to build rapport and trust was spent prior to the interview. Demographic

information was obtained from the participants at the time of the interview. The follow-up questions were asked, and questions were clarified upon request by the participant.

All communication with participants began with an informed consent form so that participants were aware of the purpose of the research study. Bias was minimized with the participants who completed the questionnaire via electronic mail. During the interviews, bias was minimized by avoiding leading questions.

Quantitative Data Analysis

Quantitative data were analyzed using SAS software. The data were analyzed after a 30-day participation window was closed. Descriptive statistics were used to “describe, summarize, and explain or make sense of a given set of data” (Johnson, 2014, p. 518). Frequency distributions were used to summarize the demographic data. In addition, Pearson’s R correlation coefficient was used to study the relationship between satisfaction, ease of use, ease of learning, and usefulness of high-tech AAC. P-values were used to determine if there was a difference between the mean scores of various variable pairings within the USE questionnaire in order to determine whether or not the differences are statistically significant (Johnson, 2014). Because of the small sample size, a nonparametric test was also used. Nonparametric statistics do not assume that the data distribution are normally distributed (Johnson, 2014). The Spearman Rank Correlation was calculated to measure the strength and direction of the relationship between various pairings within the USE questionnaire (Laerd Statistics, n. d.).

Qualitative Data Analysis

Qualitative data were analyzed in several steps. Interviews were recorded on Zoom and manually transcribed. Transcriptions were checked for accuracy by reviewing

responses with participants after each interview was transcribed. This type of member checking also ensures trustworthiness, or credibility, of the responses (Tracy, 2013). During the member checking process, two participants indicated that no changes were needed and that the transcriptions accurately represented their responses. One participant indicated that changes needed to be made to accurately reflect the names and locations of her child's private service providers. The changes were made to the transcription and verified with the participant to ensure accuracy. The transcriptions were organized by source, which allowed the researcher to pair the transcribed interviews with quantitative demographic data for each participant (Tracy, 2013). Primary-cycle coding was performed manually and used to examine the key words or phrases that appeared in the transcribed data (Tracy, 2013). This first-level coding was used to describe "what" existed in the data (Tracy, 2013). Codes were labeled and color-coded in the margins of the text. Redundant codes were combined to allow for second cycle coding of the data into themes. Second-cycle coding was conducted to "organize, synthesize, and categorize" (p. 194) codes into concepts (Tracy, 2013). Hierarchical codes, or codes that conceptualize data by grouping smaller codes together, were created from the data that were analyzed during second-cycle coding (Tracy, 2013). Negative case analysis was used during second cycle coding to identify data that did not support the hypothesis that lack of parent participation leads to abandonment of high-tech AAC to ensure credibility of qualitative data (Tracy, 2013).

Integration of Data

Data integration occurred during when analyzing and interpreting data in the study. Qualitative and quantitative questions were chosen so that the information

obtained in parallel provided a range of data used in the analysis and interpretation phases of the study. During data analysis, quantitative data were extracted from the USE questionnaire, and qualitative data were organized into themes. Following quantitative and qualitative data analysis, the findings were integrated in a side-by-side comparison. Second level themes from qualitative analysis were compared to Spearman Rank Correlations, *p*-scores, and Pearson's R. The data were presented in visual displays in order to gain a more complete picture of the findings. Convergence and complementarity of data as well as discrepancies in qualitative and quantitative measures were noted. Convergence and complementarity were discussed as ways in which qualitative and quantitative data agreed. Discrepancies were explained, further investigated, or offered as a topic for future inquiry.

Summary

The purpose of this study was to investigate parent perspectives of students with ASD who use high-tech AAC in educational settings. The data were collected by conducting a survey and a semi-structured interview, and then integrating the data to establish triangulation, transferability, generalizability, and validity. The survey was used to determine the relationship between parent satisfaction and usefulness, ease of use, and ease of learning a high-tech AAC device. The interview was used to explore themes that led to abandonment of high-tech AAC devices when parents served as members of an IEP team as well as parent suggestions for successful implementation of high-tech AAC in schools. Integration of data through a mixed methods model determined similarities and contradictions among the data. Findings relating to qualitative themes, results of the

quantitative analysis, and a discussion about how the data collection methods converged will be discussed in the proceeding chapter.

Chapter 4: Results

One of the considerations that IEP teams must address is students' need for assistive technology, which includes high-tech AAC. The decision to implement the use of AAC is often related to students' communication needs. The wording of the USE Questionnaire (Lund, 2001) was adapted to reflect children's use of AAC (see Table 1), and it has been used in AAC research in one study in the past (Moorecroft, 2019; Scarinci & Meyer, 2019). In addition, semi-structured interviews were adapted from published peer-reviewed articles by Romano and Yu Shon Chun (2018), DeCarlo et. al. (2019), and Fish (2008). The purpose of this study was to investigate parent perspectives of students with ASD who use AAC in educational settings.

Table 1

Items in the Use Questionnaire with labels in current study

Label	Content
Usefulness	It helps my child communicate effectively.
Usefulness	It is useful.
Usefulness	It gives my child more control over activities in his/her life.
Usefulness	It makes communication easier.
Usefulness	It saves time when I use it.
Usefulness	It meets my needs.
Usefulness	It does everything that I expected it to do.
EOU	It is easy for my child to use.
EOU	It is user-friendly.
EOU	It requires the fewest steps possible for my child to communicate effectively.
EOU	Using it is effortless.
EOU	My child can use it without written instructions.
EOU	I do not notice any inconsistencies when my child uses it.
EOU	My child recovers from mistakes quickly and easily when using it.
EOU	My child uses it successfully every time.
EOL	My child learns to use it quickly.
EOL	My child easily remembers how to use it from day to day.
EOL	It is easy for my child to learn to use.

Table 1 (continued)

EOL	My child quickly becomes skillful with it.
Satis	I am satisfied with it.
Satis	I would recommend it to a friend.
Satis	It is fun for my child to use.
Satis	It works the way that my child wants it to work.
Satis	It is wonderful.
Satis	It is pleasant to use.
Satis	I feel like my child needs to have it.

Note. Labels were not used on the actual participant survey. EOU = Ease of Use, EOL = Ease of Learning, Satis = Satisfaction

The Usefulness, Satisfaction, and Ease of Use Questionnaire (USE) is an instrument that “measures the subjective usability of a product” (Gao et. al., 1028, p. 1414). The questionnaire is divided into four sections that are presented using a 7-point Likert Scale. The first section relates to usefulness, the second section relates to ease of use, the third section contains items relating to ease of learning, and the fourth section relates to satisfaction (Lund, 2001). The semi-structured interview included questions relating to the children’s communication skills, the parent’s experiences during IEP meetings, likes and dislikes about current and previously used AAC devices, and ongoing concerns or advice they suggest for other families.

Several research questions were investigated in this study.

1. What is the relationship between parental perspectives as members of an IEP team and abandonment of speech generating devices for their child with ASD?
2. What changes to the development and implementation of the IEP do parents suggest in order to create an initial framework for effective use of a high-tech AAC device by children with ASD in educational settings?

3. How do ease of use, ease of learning, usability, and satisfaction with high-tech AAC relate to parent satisfaction with their child's speech generating device?

The corresponding hypotheses are

H 0: There is no linear relationship between ease of use, ease of learning, usability, and satisfaction.

H 1: There is a linear relationship between ease of use, ease of learning, usability, and satisfaction.

Characteristics of the Research Sample

The participants for the quantitative portion of this study consisted of seven parents of children with a diagnosis of autism spectrum disorders who are enrolled in public schools throughout the United States. Four of the participants were from Pennsylvania, one is from Florida, one is from Utah, and one resided in New Jersey. The participants were all recruited from AAC social media groups. All children in the study were educated in self-contained classrooms, and all parents had at least an associate degree. Most of the children (71 percent) were white and male (86 percent). Four participants reported a yearly income between \$50,000 and \$79,999, and three participants reported an income of over \$90,000 per year.

Table 2

Demographic information of study participants

Variable	Frequency	Percentage
Educational level of parent		
Less than high school degree	0	0
High School Graduate or GED	0	0
Some college but no degree	0	0
Associate degree-2 year	1	14
Bachelor's degree-4 year	4	57
Master's degree	0	0
Doctoral degree	0	0

Table 2 (continued)

Professional degree	2	29
Race		
White	5	71
Black or African American	1	14
American Indian or Alaska Native	0	0
Asian	0	0
Native Hawaiian or Pacific Islander	0	0
Other	1	14
Family's yearly income		
\$30,000-\$39,999	0	0
\$40,000-\$49,999	0	0
\$50,000-\$59,999	1	14
\$60,000-\$69,999	2	29
\$70,000-\$79,999	1	14
\$80,000-\$89,999	0	0
\$90,000 or more	3	43
Prefer not to answer	0	0
Child's gender		
Male	6	86
Female	1	14
Other	0	0
Prefer not to answer	0	0
Child's grade level		
Elementary K-5	3	43
Middle School 6-8	0	0
High School 9-12	4	67
Child's current educational placement		
Self-contained classroom	7	100
Resource classroom	0	0
General education classroom	0	0
Separate special education school	0	0
in the home district		
Homebound instruction	0	0
Other	0	0

Three parents participated in the qualitative portion of the study. One mother was from Florida, one mother lived in New Jersey, and one mother resided in Pennsylvania. A summary of the characteristics of the qualitative participants is reported in Table 2.

Table 3

Qualitative demographic information

Gender	Age	Device type	Duration of device use
Male	15	Proloquo2Go on iPad	10 years
Male	8	Proloquo2Go on iPad	3 years
Male	6	None	2 years

Data Analysis

Research Question 1

What is the relationship between parental perspectives as members of an IEP team and abandonment of speech generating devices for their child with ASD?

The first research question was addressed through qualitative data analysis. During qualitative analysis, common words and phrases were identified. This descriptive first level coding described what was present in the data. Second level coding analyzed why participants responded to the questions. Negative case analysis was used to look for data that did not appear to support the emerging theme. Table 4 describes the themes, subthemes, and examples in detail. Three themes that emerged related to this research question include the following: Parents feel like they are not equal members of the IEP

team, parents act as self-advocates, and parents have difficulty trusting the recommendations made by the school team.

Subthemes that related to inequality in IEP teams included parents feeling that they were not actively involved in decision-making, often leaving decisions about their children's communication modality up to the school team. Parents also expressed dissatisfaction with communication that they received from the school, feeling like the frequency and content is insufficient. Finally, parents did not feel that they receive adequate training regarding use of their children's speech generating devices.

Qualitative data analysis revealed several subthemes related to parents acting as self-advocates, including the need to find their own training resources, the need to hire private practitioners in addition to the school services that their children receive, and the need to network with other families of AAC users.

Finally, parents expressed their difficulty in trusting recommendations made by school teams. They expressed frustration when their child was penalized due to the inability to effectively communicate and with attempting to remedy long-standing problems. In addition, parents feel that they know their children best, including their children's learning styles and future communication needs. Finally, parents want control of the speech generating devices, indicating that they would like them to be sent home and that families should be permitted to program vocabulary needed for communication at home.

Table 4

The relationship between parent perspectives as IEP team members and AAC abandonment

Theme	Subtheme	Participant Quote
Parents feel like they are not equal members of the IEP team.	Parents did not feel involved in decision-making.	“We didn’t get to choose which program.” “They kind of oversold it to us.” “I just kind of like listen to what everyone recommended.” (Parent 1)
		“I didn’t have a role. I was just the mom.” “There’s a saying about crossing the T’s and dotting the I’s and that’s what the IEP meeting is about. So it’s just a paper that has to be signed and if you don’t agree with it, tough noogies and you move on.” (Parent 3)
		“I just went out on my own and purchased the iPad...They just kept pushing and pushing it and I refused to do the LAMP.” (Parent 2)
	Parent dissatisfaction with home-school communication	“We haven’t really met with a speech therapist this year (Parent 1)
		“It’s very negligible. It’s not collaborative.” (Parent 3)
		“I get a weekly note or daily note at home on you know like a two sentence blurb.” (Parent 2)
	Lack of training in AAC	“...no one really knows how to use it. I don’t feel like the school does the training that they need to. But it’s not really discussed at IEP meetings or discussed with his SLP at school.” (Parent 2)

Table 4 (continued)

		<p>“...in terms of using (AAC) at home. Probably not as much as...if there had been more support.” (Parent 1)</p> <p>“It says I’m supposed to get parent training and they do one parent inservice and check the box off that they did parent training.” (Parent 3)</p>
Parents act as self-advocates.	Found own AAC resources	<p>“Make sure you understand your voice and that you can... do the research to find what’s best for your child and not just accept what they offer.” (Parent 2)</p> <p>“I followed groups on Facebook. Definitely...look at what resources are out there for you.” (Parent 1)</p> <p>“There are so many resources out there, especially with YouTube and ASHA...I listened to...podcasts.” (Parent 3)</p>
	Connected with other children who use AAC	<p>“I was talking to other parents of adults and other families with children who are using devices.” (Parent 2)</p> <p>“That’s why I think maybe that’s why I have a different perspective on how it’s really beneficial to people who are...living their lives out in the world.” (Parent 2)</p>
	Hired private practitioners	<p>“We have this amazing private speech therapist who comes to our house on Saturdays and she can help.” (Parent 1)</p> <p>“I had a private therapist [from a university].” (Parent 3)</p>

Table 4 (continued)

		<p>“Actually had to hire an attorney...we had to go through mediation.” (Parent 3)</p> <p>“I’ve had private advocates.” (Parent 3)</p>
Parents have difficulty trusting recommendations made by the school team.	Parents feel that they know their child best.	<p>“It was very hard for him to make progress [with the abandoned device] due to those things that just don’t fit his learning style.” (Parent 2)</p> <p>“[He] has to learn how to communicate and be educated at the same time. I don’t think people really understand...” (Parent 3)</p> <p>“I’m not sure that I wouldn’t want to introduce it [AAC] at another point...where he might want to have a backup method of getting himself heard.” (Parent 1)</p>
	Parents feel frustrated.	<p>“I’m seriously 10 years down the rope and there are so many issues, and it’s just so overwhelming and so consuming, and I don’t know if it’s fixable.”</p> <p>“I trusted the system and you can’t do that.” (Parent 3)</p> <p>“...a behavior plan will attempt functional communication with him before penalizing him. I was like, well, why wasn’t that your idea.” (Parent 1)</p>
	Parents want some control over the device	<p>“I think that the device that you have for your child should be controlled by the family.”</p> <p>“I would also recommend on not just accepting a device that stays at the school.” (Parent 2)</p>

Table 4 (continued)

“They actually kind of asked us...don’t make changes to it without talking to the speech therapist. Whereas, I’ll be honest, sometimes I didn’t stick to that.”
(Parent 1)

Abandonment was defined as ceasing to use a speech generating device that was recommended by the school IEP team (Johnson, Inglebret, Jones, & Ray 2006).

All parents in the current study reported abandoning AAC systems. In addition, all parents described complex experiences of working with more than one speech-language pathologist as well as private practitioners, and actively seeking the best opportunities for their child. While all parents expressed similar experiences that led to abandonment of a communication system, each journey was unique. Parent 1 moved her family to a school district where she knew that her child’s needs would likely be supported. Because she actively sought out a network of support, she abandoned her child’s device at the request of the school district. Nevertheless, she expressed apprehension about this decision because her child may need the device again in the future. Parent 2 purchased her own AAC device after being dissatisfied with a system that the school recommended. She hired a private SLP to work with her child on Saturdays to facilitate use of the communication at home. Parent 3 has the longest history with AAC. She abandoned low-tech AAC in favor of a high-tech option at the recommendation of a private clinic. Because of challenges experienced in IEP meetings, lack of trust for school personnel, and assuming roles of self-advocates, two parents in this study abandoned devices in favor of self-selected high-tech AAC options for their children.

A negative case analysis revealed a difference in the perspective of Parent 1. The participant expressed that she is in agreement with the IEP team to discontinue using high-tech AAC because her child has developed the ability to express himself verbally. Stating, “You’re the professional. I believe you” expresses a level of trust that parents 1 and 3 did not have for school personnel.

Research Question 2

What changes to the development and implementation of the IEP do parents suggest in order to create an initial framework for effective use of a high-tech AAC device by children with ASD in educational settings?

Parents did not overtly suggest any changes to the development and implementation of IEPs. Based on the qualitative analysis of research question 1 and additional qualitative data obtained in the semi-structured interview, some themes emerged as critical to IEP development and implementation. First, parents want a role in selecting the AAC devices that best fit their children. Parents in the study were aware of how their children communicate at home, at school, and in the community. Table 5 provides a summary of each child’s communication skills across settings.

Table 5

Summary of children’s communication modality across settings

		Home:	School:	Community:
Child 1	Age 6	Verbal	Verbal	Gestures Pulling, pointing Some verbalizations

Table 5 (continued)

Child 2	Age 8	High-tech AAC Gestures Sign language Guiding the listener to the desired item Vocalizations	High-tech AAC. Gestures Vocalizations	High-tech AAC Gestures
Child 3	Age 15	High-tech AAC Modified sign	High-tech AAC Modified sign	High-tech AAC Guiding listener to the desired item

One parent expressed that schools do not have a clear understanding about communication skills at home and in the community. Parent 2 expressed that “when his teacher did a home visit....[she] was shocked...we don’t hear him talking this much in school.” Providing time for parents to provide input during the evaluation process is necessary. When it comes to implementation of AAC, parents expressed that they value control and training. All three parents stated that they trained themselves by finding external resources on You Tube, Facebook, the ASHA website, and other sources. Participants felt that training by the school was not comprehensive and did not lead to a full understanding of the features of a high-tech AAC device. In addition, parents expressed that not all school personnel were adequately trained. Parent 3 expressed that “they don’t know how to teach the goals.” Parent 2 stated “regarding his IEP in general, no one really knows how to use it.” Parent 3, however, expressed overall satisfaction with the training of the school staff, stating “I’m grateful that he had a lot of support and it seems like the speech therapist and the teachers were very familiar with it.” Finally, parents suggested that they want AAC devices that they can use at home and in the

community. All three participants expressed that communication should be supported at home with a device that is used across settings. Parents feel that it is important to have a device that can be programmed with words their children use outside of school so that each child can effectively communicate wants and needs at home and when in the community.

Research Question 3

How do ease of use, ease of learning, usability, and satisfaction with high-tech AAC relate to parent satisfaction with their child's speech generating device? The corresponding hypotheses are

H 0: There is no linear relationship between ease of use, ease of learning, usability, and satisfaction.

H 1: There is a linear relationship between ease of use, ease of learning, usability, and satisfaction.

The aim of the final research question is to study the qualities of the device itself in order to gauge qualities that lead to satisfaction with the high-tech AAC device.

Results of the USE Questionnaire were analyzed using parametric (to assess group means) and nonparametric statistics (to assess group medians) (Johnson & Christensen, 2014). Although parametric tests typically have more statistical power, nonparametric analyses were conducted in the current study due to small sample size and the potential for outliers (Johnson & Christensen, 2014). Table 6 reports summary statistics for the data.

Table 6

Summary Statistics

Variable	Mean	SD	Minimum	Maximum	N
Usefulness	5.48	.75	4.29	6.71	7

Table 6 (continued)

EOU	5.12	1.13	3.42	6.57	7
EOL	5.64	1.31	3.0	7.0	7
Satis	5.63	.83	4.57	6.86	7

Note. EOU = Ease of Use, EOL = Ease of Learning, Satis = Satisfaction

Participants selected responses to questions on a 7-point Likert scale. Responses were assigned a numerical score ranging from 1 through 7. The mean scores, minimum scores, and maximum scores are listed for the four categories of the USE Questionnaire. The standard deviation, or spread of scores, is also included. Standard deviations revealed that the Usefulness and Satisfaction mean scores were more consistent than the mean scores for Ease of Use and Ease of Learning.

Spearman rank-order correlations were calculated, and the associated correlation tests were conducted in order to determine relationships between Usefulness and Satisfaction, Usefulness and Ease of Use, and Usefulness and Ease of Learning. Results indicated a strong positive correlation showing a strong linear correlation between Usefulness versus Satisfaction with $r_s(7) = .99$, $p = .0002$. The p -value indicates the correlation is significantly different from 0. There was also a strong positive correlation between Ease of Use versus Satisfaction with $r_s(7) = .83$, $p = .022$. The p -value indicates that this correlation significantly differs from 0. Finally, the correlation between Ease of Learning and Satisfaction was also strong and positive, indicating a strong linear correlation between Ease of Learning versus Satisfaction with $r_s(7) = .93$, $p = .022$. The p -value indicates the correlation significantly differs from 0.

Pearson correlations were calculated, and their respective hypothesis tests were conducted in order to determine relationships between Usefulness and Satisfaction,

Usefulness and Ease of Use, and Usefulness and Ease of Learning. Results indicated that there was a strong positive linear correlation between Usefulness versus Satisfaction $r(7) = .94$, $p = .0013$. The p -value indicates that this correlation is significantly different from 0. These results correspond to the nonparametric analysis. There was also a strong positive correlation indicating a strong linear correlation between Ease of Use versus Satisfaction $r(7) = .92$, $p = .003$. The p -value indicates that this correlation is significantly different from 0. These results do not disagree with the nonparametric results. Finally, there was a strong positive correlation indicating a strong linear correlation between Ease of Learning vs. Satisfaction $r(7) = .83$, $p = .02$. The p -value indicates that this correlation is significantly different from 0. While this varies slightly from the nonparametric analysis, the results do not disagree.

Table 7

Analysis of Correlation

Variable	Correlation	p -value
Usefulness v. Satisfaction	$r = .95$.0013
	$r_s = .97$.0002
Ease of Use v. Satisfaction	$r = .92$.0030
	$r_s = .83$.0216
Ease of Learning v. Satisfaction	$r = .83$.0220
	$r_s = .94$.0200

Qualitative data confirm that ease of use, ease of learning, and usability relate to overall satisfaction with the device. When asked what they liked about their children's current high-tech AAC devices, participant 2 stated, "It is so easy to use. So easy to set up. So easy to make changes on the fly...I think that anyone regardless of their

background with AAC can use it.” Participant 1 stated that her child is “proud of himself when he hits the right button...the nice thing about Proloquo2Go is that you can model from a companion device.” This participant expressed that modeling from a second device allowed her child to successfully express his wants and needs. Participant 3 indicated that her child was able to “learn a new communication skill on Proloquo2Go then very quickly...it was really a confidence booster.”

Conclusions

This chapter contains the results of the qualitative and quantitative analyses, connects these analyses to the research questions, and demonstrates consistency with convergent parallel mixed methods methodology. Seven participants participated in the survey, and three of those seven participants participated in the semi-structured respondent interviews. All participants had children with a diagnosis of ASD who have abandoned AAC in the past.

Consistent with qualitative data analysis, first cycle coding, second cycle coding, negative case analysis, and member checking were conducted. The three themes that emerged included the following: parents feel like they are not equal members of the IEP team, parents act as self-advocates, and parents have difficulty trusting the recommendations made by the school team. Quantitative data examined variables that lead to parent satisfaction with their children’s speech generating devices. Parametric and nonparametric statistical analyses revealed a strong positive correlation between ease of use and satisfaction, ease of learning and satisfaction, and usability and satisfaction. Triangulation of data through qualitative analysis of in vivo codes, or “codes that employ language and terms uses by the participants themselves” (Tracy, 2019, p. 202) confirm

that satisfaction is related to ease of use, ease of learning, and usability of the high-tech AAC device. Chapter 5 includes a summary of the analyses, conclusions derived from those analyses, limitations of the current study, and recommendations for future research.

Chapter 5: Discussion

This chapter will discuss the data interpretation and connect the data to the review of literature. Conclusions will be drawn in order to answer the research questions posed in this study. Limitations of the study as well as recommendations for future research will be discussed.

Summary of the Current Research Study

Autism Spectrum Disorders affect one in 54 children in the United States (CDC, n. d.). In addition, over 2 million Americans use AAC (ASHA, n. d.). The number of children with ASD who use AAC is unknown, although it is established that when children with ASD rely on speech generating devices to communicate, treatment should be functional and person-centered (ASHA, n. d.). As stated in the ICF framework in the scope of practice for speech-language pathologists, person-centered treatment is an important factor for SLPs working as members of IEP teams (ASHA, n. d.).

Existing research shows that parents have not historically been involved in decision-making for AAC for their children (Parette, 2000). This lack of inclusion can lead to frustration and abandonment of their children's primary mode of communication (Parette, 2000). When asked about their experiences with IEP teams, parents expressed concerns about lack of effective implementation of goals, perhaps due to lack of knowledge by school personnel (Zagona, Miller, Kurth, & Love, 2019). Parents feel unsupported by SLPs, feel that communication among stakeholders is lacking, and have difficulty using their children's AAC without a supportive network or community (Moorcroft et al., 2020). Parents would like to experience more collaboration at IEP meetings as well as have professionals understand how communication impairments

impact behavior (Fish, 2006). More specifically, parents expressed dissatisfaction with punishing behaviors that are linked to communication deficits (Fish, 2006).

Research has shown that parents are more likely than SLPs to identify barriers to AAC use (Romano & Yu Shon Chun, 2018). Usability, reliability, and lack of available technical assistance are some factors that parents of AAC users perceive as barriers to their children's development of communication skills (Baxter et al., 2012; Donato et al., 2018).

The data collected in this study support the findings in previous research. One difference is that the current study focuses solely on children with ASD who use high-tech AAC. Research for this target population had not been published at the time of the study and could be used to help guide school districts in improving the service delivery for this population of students. The online survey used in the present study included a Likert-scale that asked participants to rate items related to usability, ease of use, ease of learning, and satisfaction with their children's high-tech AAC device. Qualitative interviews were analyzed to identify themes related to participant experiences as members of an IEP team and abandonment of AAC. Interviews were also structured to identify ways to implement AAC more effectively.

Results

Research Question 1

What is the relationship between parent perspectives as members of an IEP team and abandonment of speech generating devices for their children with ASD?

Three themes emerged as relevant to this research question. First, parents do not feel that they are equal members of the team, leading to exclusion from decision-making

for their children. This inequality was also expressed by lack of communication from their children's teachers and service providers and lack of training on how to use their children's speech generating devices at home and in the community. Second, parents feel that they have to self-advocate, leading to finding their own training resources, private practitioners, and a network of other AAC users to facilitate the use of their children's speech generating devices. Finally, parents expressed their difficulty in trusting recommendations made by the school team. They expressed frustration when their children were penalized due to their inability to effectively communicate and with long-standing problems relating to academic progress becoming too late to fix. Parents indicated that they know their children best, including their children's learning styles and future communication needs. All three participants stated that their children's communication devices should be sent home and that families should be permitted to program vocabulary needed for communication at home.

Research Question 2

What changes to the development and implementation of the IEP do parents suggest in order to create an initial framework for effective use of a high-tech AAC device by children with ASD in educational settings?

Results from qualitative analysis suggest that schools should provide an opportunity for parents to have input in the communication devices that are selected for their children. In addition, IEP teams should provide speech generating devices that can be sent home and programmed with vocabulary that facilitates communication at home. IEP teams should train families and school staff on how to use the speech generating

devices, and that training should consist of multiple sessions rather than one training event.

Research Question 3

How do ease of use, ease of learning, usability, and satisfaction with high-tech AAC relate to parent satisfaction with their children's speech generating device? The corresponding hypotheses are

H 0: There is no linear relationship between ease of use, ease of learning, usability, and satisfaction.

H 1: There is a linear relationship between ease of use, ease of learning, usability, and satisfaction.

The online USE Questionnaire was completed by seven participants. It was sent to all Intermediate Units in Pennsylvania, the ASHA SIG 12 group, the SLP ABA SIG, and to various professional AAC social media pages. The data were collected from Qualtrics[®]xm, and parametric and nonparametric statistical analyses were conducted to study the relationship between ease of use, ease of learning, usefulness, and satisfaction. In the survey, seven questions related to usefulness, eight questions related to ease of use, four questions related to ease of learning, and seven questions related to satisfaction.

A Pearson analysis was used to perform the quantitative analysis. This parametric statistic showed a strong positive linear correlation between usefulness and satisfaction, between ease of use and satisfaction, and between ease of learning and satisfaction. Because of the small sample size and to account for potential outliers, a Spearman analysis was also conducted. This nonparametric statistic showed a strong positive linear correlation between usefulness and satisfaction, between ease of use and satisfaction, and between ease of learning and satisfaction. This triangulation of data was important to validate the results of the study. Triangulation with qualitative data also established

trustworthiness of the survey results. One participant expressed that when using her child's current speech generating device, it is easy to use. Another participant said that her child gains confidence when using his device. The third participant expressed that her child learned how to use his high-tech AAC device very quickly.

Implications and Recommendations for Future Research

This is the first study to date to examine the relationship between parent perspectives of students with ASD and abandonment of high-tech AAC in educational settings. Existing research on abandonment of speech generating devices focuses on children with a range of developmental and acquired disorders that lead to reliance on AAC as a primary mode of communication. Because of this, the current study is an important foundation to begin to discern if there are any factors unique to ASD that IEP teams can consider when making educational decisions.

Kurth, Love, and Pirtle (2020) found that “parent input satisfaction and their knowledge of ASD were the most consistently significant predictors of parent satisfaction with their child's education” (p. 41). This finding was supported by the results of the current study as all three participants expressed that they want input into educational decisions that are made for their children. Kurth et al. (2020) also found that parents felt the need to fight for services, and that this process could last for years. The current study found that parents feel the need to self-advocate. One parent of a high school child in the current study expressed frustration that the problems had been going on for such a long time that she was unsure if it was too late to fix. She stated, “It's just so overwhelming and so consuming, and I don't know if it's fixable.” Results of the current study also support findings by Fish (2006). Parents want collaborative relationships with school

personnel, they want to deemphasize punitive discipline, and they want training by the school district.

The current study provides a starting point for further research that may help schools build positive and trusting relationships that lead to better outcomes for high-tech AAC users with ASD.

While providing this starting point, future research is needed in the field of AAC. As an extension of the current study, future research should investigate parent perspectives that lead to abandonment of speech generating devices in different regions of the United States and across underrepresented groups. There is a need to continue to conduct research in this area that includes families of color, families from diverse backgrounds, and perspectives of fathers and other caregivers. It is also important to investigate preservice programs in special education and speech-language pathology to determine the extent to which students entering the field have been taught to engage in family-centered practice. Finally, future research should investigate strategies that lead to successful implementation of speech generating devices with children with ASD.

Limitations of the Study

Small Sample Size

The small sample size was a limitation of the study. An exhaustive effort was made to recruit participants through every Intermediate Unit in Pennsylvania. In addition, social media posts and posting to SIG announcement boards yielded few participants. Surveying and interviewing a larger sample would give more credibility to the results.

Sampling Procedure

Purposeful sampling was used for this study, as the aim was to study a specific demographic. Snowball sampling was attempted but did not yield any additional participants. Random assignment was not utilized in the current study.

Time that the Study Was Conducted

The study was conducted during the peak of COVID-19. The global pandemic placed travel restrictions on the researcher. Going out to conduct research in the field was not possible. For example, conducting focus group interviews at parent group meetings for AAC users was prohibited due to restrictions on group meetings. In addition, two of the three participants of the interview reported that their children had not yet been in school at the time of the interview. Their frustration with virtual learning may have resulted in negative perceptions of their children's educational progress and may have affected the results of the interview.

Internal Validity

One threat to internal validity lay in the interview questions. Questions were obtained from previous studies. Although they were piloted in previous studies, they were modified to fit the current study. A second pilot study was not conducted due to the anticipated difficulty of finding an adequate sample size during the global pandemic.

Another threat to internal validity relates to researcher bias. The researcher is an SLP who specializes in providing clinical services to individuals with autism and to individuals who use AAC. Since the SLP solely selected the interview questions and conducted the interviews, researcher bias should be considered. Member checking was conducted to counterbalance possible researcher bias.

Conclusion

The purpose of the present study was to investigate the perspectives of parents of students with ASD who use high-tech AAC in educational settings. Results showed that parents may abandon their children's SGD when they feel that they are not equal members of their children's teams, when they feel that they have to self-advocate, and when they do not trust the professionals who work with their children. In addition, parents are satisfied with their children's high-tech AAC when the devices are easy to use and easy to learn.

The current study indicates that parents want to play an active role in choosing the high-tech AAC for their children, and they indicated that training in how best to communicate with their children using AAC is needed. In addition, parents suggested that the SGD should be controlled by the families so that their children can effectively communicate at home and in the community.

Because of the complexity involved in IEP teams' decision making about AAC use, several strategies are recommended (see Appendix G). SLPs, teachers, and school administrators should involve families in weighing options for the selection of AAC devices or applications. IEP teams must consider the individual characteristics of SGDs that lead to parent satisfaction with the device. Further, because it is necessary for professionals to understand how a child communicates across settings, collaboration with families is crucial. This collaboration should include directly or indirectly observing the child's communication outside the school setting. It is also suggested that schools become a resource for ongoing parent training and community support so that families and children feel connected and backed by their IEP teams. Finally, effective modeling

and strategies for successful use of AAC during home and community routines should be explicitly addressed with families, as generalization of AAC use is an important consideration in transition planning for students. Through active engagement and collaboration, the communication outcomes for children who rely on high-tech AAC can be improved.

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Appendix A-Permission for USE Questionnaire

From: Arnie Lund <lunda@uw.edu>
Sent: Thursday, July 9, 2020 9:20:28 PM
To: Saurer, Sheri A <sas1036@sru.edu>
Subject: RE: Permission for USE Questionnaire

I am of course delighted to give my permission. This is an incredibly important issue! In case it is useful, I'm attaching a zip file of some materials that may be useful with background on USE, and some other studies that have used it.

I would love to see your final dissertation when your work is done if you get a chance! It sounds fascinating!

ARNIE LUND

From: Saurer, Sheri A <sas1036@sru.edu>
Sent: Thursday, July 9, 2020 7:32 AM
To: Arnie Lund <lunda@uw.edu>
Subject: Permission for USE Questionnaire

Dr. Lund,

I am a doctoral student working on my dissertation. I am studying factors that contribute to families discontinuing use of speech generating devices for their children with autism.

I am requesting permission to use the USE Questionnaire for the study as it addresses critical areas of insight to technology usefulness and satisfaction with high tech augmentative and alternative communication devices. Your Questionnaire will be a tremendous asset to the study.

Thank you in advance,

Sheri Saurer
MS, CCC-SLP
Slippery Rock University

[Reply](#) | [Forward](#)

Appendix B-Recruitment Brochure

Preventing Abandonment of Augmentative and Alternative Communication (AAC)

Devices for Students with Autism: Parent Perspectives for Successful

Implementation

Investigator: Dr. Matthew J. Erickson,

Chairman and Associate Professor of Special Education

114 McKay Education Building, Slippery Rock University of PA, Slippery Rock, PA, 16057

724-738-2452

matthew.erickson@sru.edu

Sheri Passarelli Saurer, M.S., CCC-SLP, BCBA

The purpose of this research study is to investigate parent perspectives of their child with ASD who uses high-tech AAC in educational settings.

<u>Contact Information</u>	To participate in this study you must:
<p>To find out more about this study, please contact:</p> <p>Sheri Passarelli Saurer 724-549-7486 Sas1036@sru.edu</p>	<ul style="list-style-type: none"> • Be a parent or guardian of a school age child with ASD as diagnosed by a licensed medical professional • Have a child who attends a public school or approved private school that is funded by your child's school district • Have discontinued using a speech generating device that was recommended by your child's school

To participate in the 10 minute survey, please use the link:

https://qfreeaccountssjc1.az1.qualtrics.com/jfe/form/SV_3xeUHNzmnByW1et

Appendix C-Interview Email

Email to send interview participants upon request.

Dear _____,

Thank you for contacting me about your interest to participate in an interview regarding your child's experiences with AAC in his or her school. The interview will last about 30 minutes. In order to ensure that your responses are accurately recorded and interpreted, you will be contacted after the interview to review your responses and be given the opportunity to edit or clarify your responses.

Attached to this email is a consent to participate in the interview. There is also a consent to videotape the interview. The videorecording is being conducted to allow the researcher to accurately record your responses. The videos will remain private and will be deleted after you have reviewed and confirmed the accuracy of your responses. Please sign and return the consent forms so that we may schedule the interview at any time that is convenient for you. You have the right to refuse consent to participate and may withdraw your consent at any time. You must be 18 years of age to participate. The study is estimated to take about 30 minutes of your time.

Please contact me if you have any questions about this phase of the study.

Sas1036@sru.edu. 724-549-7486

Investigator: Dr. Matthew J. Erickson,
Chairman and Associate Professor of Special Education
114 McKay Education Building, Slippery Rock University of PA, Slippery Rock, PA,
16057
724-738-2452
matthew.erickson@sru.edu

Sheri Passarelli Saurer
Doctoral Candidate
Department of Special Education
Slippery Rock University

Appendix D-Informed Consent



Special Education Department
Slippery Rock, PA 16057-1326
724/738-2085

Approved

11/11/2020

**Slippery Rock University
Institutional Review Board**

CONSENT TO PARTICIPATE IN RESEARCH
Preventing Abandonment of Augmentative and Alternative Communication (AAC) Devices for Students with Autism: Parent Perspectives for Successful Implementation
Dr. Matthew Erickson, Ed.D. 724-738-2452

Sheri Passarelli Saurer M.S., CCC-SLP 724-549-7486

Invitation to be Part of a Research Study

You are invited to participate in a research study. In order to participate, you must be a parent of a school-age child with a medical diagnosis of autism who stopped using an Augmentative and Alternative Communication AAC device that was recommended by his or her school. Taking part in this research project is voluntary.

Important Information about the Research Study

Things you should know:

The purpose of the study is to explore parent views of ways that AAC can be successfully implemented in schools. If you choose to participate, you will be sent an email and be asked to complete an online survey and participate in a Zoom interview from your home at a time that is convenient for you. The online survey will take about 30 minutes and the interview will take approximately 30 minutes. Following the interview, you will be contacted to ensure that your responses accurately reflect your opinions. The follow up will take about 10 minutes.

- Risks or discomforts from this research include psychological or emotional reactions associated with discussing your child's disability. Efforts to ensure confidentiality will be followed. However, there is a risk that your privacy will be jeopardized. You will be notified if any of your privacy or confidential information is threatened.
- The study will have no direct benefit to you or your child but will add to existing research in order to improve service delivery for children with Autism Spectrum Disorders in schools.
- Taking part in this research project is voluntary. You do not have to participate, and you can stop at any time.
- You must be at least 18 years of age to participate in this study.

Please take time to read this entire form and ask questions before deciding whether to take part in this research project.

What is the Study About and Why are We Doing it?

The purpose of the study is to explore issues that parents believe led to discontinuing the use of an AAC device that was recommended by the school IEP team.

Initials _____

What Will Happen if You Take Part in This Study?

If you agree to take part in this study, you will be asked to complete an online survey about your child and the AAC device that he or she currently uses. The online survey will take about 10 minutes to complete. You will also be asked to participate in a private Zoom interview to discuss what led to your decision to have your child stop using a device in the past. You will participate in the survey and interview at a time that is convenient for you from your home or another location of your choice. We expect this to take approximately 30 minutes. You will be contacted by the interviewer a second time to make sure that your interview responses were accurately recorded. The follow up is expected to take no longer than 10 minutes.

Some examples of interview questions are:

1. "Tell me how your child communicates with you and with other family members."

A member of Pennsylvania's State System of Higher Education | [rock solid education](#) | [www.sru.edu](#)

-
2. "Tell me about the challenges that you have had during IEP meetings relating to your child's communication device."

We may learn information about your child's educational experiences. We will share this information with you following your interview to check your responses for accuracy prior to the conclusion of the study. You have the right to skip any question(s) that you are not comfortable answering. You may discontinue your participation without penalty at any time.

How Could You Benefit From This Study?

Although you will not directly benefit from being in this study, others might benefit because you will provide information that may help schools develop procedures to involve parents in the process of selecting AAC devices for their child.

What Risks Might Result From Being in This Study?

You might experience some risks from being in this study. Risks to your private information may also occur. Risks to your privacy and confidentiality will be minimized by keeping all of your information in a secure location on a secure computer. There is a chance that you may experience psychological or emotional reactions when recalling negative educational experiences that you or your child may have had. If this occurs, please contact your primary care physician or SAMHSA's National Helpline for a referral to a mental health professional at 1-800-662-4357. "Please tell the researcher(s) if you have any injuries or other problems related to your participation in the study. The University may be able to assist you with obtaining emergency treatment, if appropriate, but you or your insurance company will be responsible for the cost. By signing this form, you do not give up your right to seek payment if you are harmed as a result of being in this study."

Initials _____

How Will We Protect Your Information?

We plan to publish the results of this study. To protect your privacy, we will not include information that could directly identify you.

We will protect the confidentiality of your research records by storing all information in a secure private office on a password protected computer. Your name and any other information that can directly identify you will be stored separately from the data collected as part of the project. Video recordings will be permanently deleted after they have been analyzed.

What Will Happen to the Information We Collect About You After the Study is Over?

We will not keep your research data to use for future research or other purposes. Your name and other information that can directly identify you will be kept secure and stored separately from the research data collected as part of the project.

What Other Choices do I Have if I Don't Take Part in this Study?

If you choose not to participate, there are no alternatives.

Your Participation in this Research is Voluntary

It is totally up to you to decide to be in this research study. Participating in this study is voluntary. Even if you decide to be part of the study now, you may change your mind and stop at any time. You do not have to answer any questions you do not want to answer. If you decide to withdraw before this study is completed, all of the information that you provided will be permanently deleted and destroyed.

Contact Information for the Study Team and Questions about the Research

If you have questions about this research, you may contact Dr. Matthew Erickson, matthew.erickson@sru.edu, 724-738-2452.

Contact Information for Questions about Your Rights as a Research Participant

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the following:

Institutional Review Board
Slippery Rock University
104 Maltby, Suite 008
Slippery Rock, PA 16057

Phone: (724)738-4846

Email: irb@srp.edu

Initials _____

Your Consent

By signing this document, you are agreeing to be in this study. Make sure you understand what the study is about before you sign. I will give you a copy of this document for your records. I will keep a copy with the study records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

I understand what the study is about, and my questions so far have been answered. I agree to take part in this study. I understand that I can withdraw at any time. A copy of this signed Consent Form has been given to me.

Printed Participant Name	Signature of Participant	Date

By signing below, I indicate that the participant has read and to the best of my knowledge understands the details contained in this document and have been given a copy.

Printed Name of Investigator	Signature of Investigator	Date

Photo/Audiotape/Videotape Release Form:

We request the use of video recording material of you via Zoom as part of our study. We specifically ask your consent to use this material, as we deem proper, specifically, for news releases, professional publications, websites and pictorial exhibits related to our study. We also emphasize that the appearance of these materials on certain media (websites, professional publication, news releases) may require transfer of copyright of the images. This means that other individuals may use your image. Regarding the use of your likeness in video recordings, please check one of the following boxes below:

- ☐ I do...
☐ I do not...
☒ unconditional permission for the investigators to utilize video recordings of me.

Print Name	Participant Signature	Date

PLEASE NOTE: Should you choose not to allow your image or voice to be used, we can still benefit from your inclusion as a research study participant.

Appendix E=IRB Approval



TO: Dr. Matthew Erickson
Special Education

FROM: James Preston, D.Ed., Vice Chairperson
Institutional Review Board (IRB)

DATE: November 11, 2020

RE: Protocol Approved

A handwritten signature in blue ink that reads "James A. Preston".

Protocol #: 2021-006-88-B

Protocol Title: Preventing Abandonment of Augmentative and Alternative Communication (AAC) Devices for Students with Autism: Parent Perspectives for Successful Implementation

The Institutional Review Board (IRB) of Slippery Rock University has received and reviewed the requested modification(s) to the above-referenced protocol utilizing the expedited review process. The IRB has approved the protocol effective November 11, 2020.

You may begin your project as of November 11, 2020. Your approved protocol will expire on November 10, 2021. You will need to submit a Progress/Final Report at least 7 days prior to the expiration date.

Enclosed are copies of the approved consent and assent forms to be copied for participants to sign. (if applicable)

If you complete the study within the next year, please notify the IRB with a Final Report. The Final Report form and instructions can be found on the IRB website.

Please contact the IRB Office by phone at (724)738-4846 or via email at irb@sru.edu should your protocol change in any way.

Appendix F-Survey Instrument

AAC Survey

Q1

Welcome to the research study!

CONSENT TO PARTICPATE IN RESEARCH

Preventing Abandonment of Augmentative and Alternative Communication (AAC)
Devices for Students with Autism: Parent Perspectives for Successful Implementation

Dr. Matthew Erickson, Ed.D. 724-738-2452

Sheri Saurer, M.S., CCC-SLP 724-549-7486

Invitation to be Part of a Research Study

You are invited to participate in a research study. In order to participate, you must be a parent of a school-age child with a medical diagnosis of autism who stopped using an AAC device that was recommended by his or her school. Taking part in this research project is voluntary.

Important Information about the Research Study

Things you should know:

The purpose of the study is to explore parent views of ways that AAC can be successfully implemented in schools. If you choose to participate, you will be sent an email and be asked to complete an online survey and participate in a Zoom interview from your home at a time that is convenient for you. This will take approximately 30 minutes. Risks or discomforts from this research include psychological or emotional reactions associated with discussing your child's disability. Efforts to ensure confidentiality will be followed. However, there is a risk that your information can be breached. You will be notified if a breach of confidentiality occurs or is suspected. The study will have no direct benefit to you or your child but will add to existing research in order to improve service delivery for children with Autism in schools. Taking part in this research project is voluntary. You do not have to participate, and you can stop at any time. Please take time to read this entire form and ask questions before deciding whether to take part in this research project.

What is the Study About and Why are We Doing it?

The purpose of the study is to explore issues that parents believe led to discontinuing the use of an AAC device that was recommended by the school team.

What Will Happen if You Take Part in This Study?

If you agree to take part in this study, you will be asked to complete an online survey about your child and the AAC device that he or she currently uses. This will take about

10 minutes. You will also be asked to participate in a private Zoom interview to discuss what led to your decision to have your child stop using a device in the past. You will participate in the survey and interview at a time that is convenient for you from your home or another location of your choice. We expect this to take approximately 30 minutes. You will be contacted by the interviewer a second time to make sure that your interview responses were accurately recorded. The follow up is expected to take no longer than 10 minutes.

Some examples of interview questions are:

1. “Tell me how your child communicates with you and with other family members.”
2. “Tell me about the challenges that you have had during IEP meetings relating to your child’s communication device.”

We may learn information about your child’s educational experiences. We will share this information with you following your interview to check your responses for accuracy prior to the conclusion of the study.

How Could You Benefit From This Study?

Although you will not directly benefit from being in this study, others might benefit because you will provide information that may help schools develop procedures to involve parents in the process of selecting AAC devices for their child.

What Risks Might Result From Being in This Study?

You might experience some risks from being in this study. Breaches to confidentiality may occur. Your privacy and confidentiality will be minimized by keeping all of your information in a secure location on a secure computer. There is a chance that you may experience psychological or emotional reactions when recalling negative educational experiences that you or your child may have had. If this occurs, please contact your primary care physician or SAMHSA’s National Helpline for a referral to a mental health professional at 1-800-662-4357.

“Please tell the researcher(s) if you have any injuries or other problems related to your participation in the study. The University may be able to assist you with obtaining emergency treatment, if appropriate, but you or your insurance company will be responsible for the cost. By signing this form, you do not give up your right to seek payment if you are harmed as a result of being in this study.

How Will We Protect Your Information?

We plan to publish the results of this study. To protect your privacy, we will not include information that could directly identify you.

We will protect the confidentiality of your research records by storing all information in a secure private office on a password protected computer. Your name and any other information that can directly identify you will be stored separately from the data collected

as part of the project. Video recordings will be permanently deleted after they have been analyzed.

What Will Happen to the Information We Collect About You After the Study is Over?

We will not keep your research data to use for future research or other purposes. Your name and other information that can directly identify you will be kept secure and stored separately from the research data collected as part of the project.

What Other Choices do I Have if I Don't Take Part in this Study?

If you choose not to participate, there are no alternatives.

Your Participation in this Research is Voluntary

It is totally up to you to decide to be in this research study. Participating in this study is voluntary. Even if you decide to be part of the study now, you may change your mind and stop at any time. You do not have to answer any questions you do not want to answer. If you decide to withdraw before this study is completed, all of the information that you provided will be permanently deleted and destroyed.

Contact Information for the Study Team and Questions about the Research

If you have questions about this research, you may contact Dr. Matthew Erickson, matthew.erickson@sru.edu, 724-738-2452.

Contact Information for Questions about Your Rights as a Research Participant

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the following:

Institutional Review Board
Slippery Rock University
104 Maltby, Suite 008
Slippery Rock, PA 16057
Phone: (724)738-4846
Email: irb@sru.edu

By clicking the button below, you acknowledge:

Your participation in the study is voluntary. You are 18 years of age. You are aware that you may choose to terminate your participation at any time for any reason.

☐ I consent, begin the study (1)

☐ I do not consent, I do not wish to participate (2)

What is the highest level of school you have completed or the highest degree you have received?

- ☐ Less than high school degree (1)
 - ☐ High school graduate (high school diploma or equivalent including GED) (2)
 - ☐ Some college but no degree (3)
 - ☐ Associate degree in college (2-year) (4)
 - ☐ Bachelor's degree in college (4-year) (5)
 - ☐ Master's degree (6)
 - ☐ Doctoral degree (7)
 - ☐ Professional degree (JD, MD) (8)
-

Choose one or more races that you consider yourself to be:

- ☐ White (1)
 - ☐ Black or African American (2)
 - ☐ American Indian or Alaska Native (3)
 - ☐ Asian (4)
 - ☐ Native Hawaiian or Pacific Islander (5)
 - ☐ Other (6) _____
-

Please provide your best estimate of your family's yearly income.

- ☐ \$30,000 to \$39,999 (2)
 - ☐ \$40,000 to \$49,999 (3)
 - ☐ \$50,000 to \$59,999 (4)
 - ☐ \$60,000 to \$69,999 (5)
 - ☐ \$70,000 to \$79,999 (6)
 - ☐ \$80,000 to \$89,999 (7)
 - ☐ \$90,000 or more (8)
 - ☐ prefer not to answer (9)
-

What is your child's gender?

- ☐ Male (1)
 - ☐ Female (2)
 - ☐ Other (3) _____
 - ☐ prefer not to answer (4)
-

What is your child's grade level?

- ☐ Elementary (grade K-5) (1)
 - ☐ Middle School (grade 6-8) (2)
 - ☐ High School (grade 9-12) (3)
-

What is your child's current educational placement?

- ☐ self-contained classroom (classroom located in a building in the school district that your child attends) (1)
- ☐ resource classroom (2)
- ☐ general education classroom (3)
- ☐ separate special education school (a school that is not located in your child's home school district or is operated by an outside education agency). (4)
- ☐ homebound instruction (5)
- ☐ other (6) _____
-

Please rate the usefulness of the device that your child CURRENTLY uses. Please respond to all items.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
It helps my child communicate effectively. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is useful. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It gives my child more control over the activities in his/her life. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It makes communication easier. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It saves time when I use it. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It meets my needs. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It does everything that I expected it to do. (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please rate the ease of use of the device that your child CURRENTLY uses. Please respond to all items.

Please rate your satisfaction with the device that your child CURRENTLY uses. Please respond to all items.

	strongl y disagre e (1)	Disagre e (2)	Somewha t disagree (3)	Neither agree nor disagre e (4)	Somewha t agree (5)	Agre e (6)	Strongl y agree (7)
I am satisfied with it. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would recommen d it to a friend. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is fun for my child to use. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It works the way that my child wants it to work. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is wonderful. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is pleasant to use. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel like my child needs to have it. (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: Informed Consent

Appendix G-Interview Questions

1. Tell me about the language skills of your child.
 - a. Follow up question: How would you describe their vocabulary skills and ability to speak in complete sentences?
2. Tell me how your child communicates with you and with other family members.
3. Tell me how your child communicates at school.
4. Tell me how your child communicates in the community.
5. How do other family members communicate with your child?
6. How do teachers and school staff communicate with your child at school?
7. Tell me how community members communicate with your child.
8. Tell me about your expectations about the speech and language development of your child.
9. Tell me about your child's current speech/language IEP goals and objectives.
10. Talk about communication devices that have been recommended by the school and tried in the past.
 - a. Are they still using this device?
 - b. If yes, move to question 9. If no, move to question 8c.
 - c. Tell me about why they are no longer using this device.
11. Tell me about your role in selecting your child's current communication device.
12. What does your child like about their current communication device?
13. Tell me what helps facilitate your use of the communication device with your child.
14. Tell me what difficulties that you or your child have with the communication device.

15. Tell me about the ongoing support that you receive from the school regarding the use of your child's communication device.
16. Tell me about the positive experiences that you have had during IEP meetings relating to your child's communication device.
17. Tell me about any challenges that you have had during IEP meetings relating to your child's communication device.
18. How is your child's current AAC device preferred over the device that was used in the past?
19. What advice would you give to other families who have received communication devices from the school?

Appendix E-Recruitment Brochure

Preventing Abandonment of Augmentative and Alternative Communication (AAC)

Devices for Students with Autism: Parent Perspectives for Successful Implementation

Investigator: Dr. Matthew J. Erickson,

Chairman and Associate Professor of Special Education

114 McKay Education Building, Slippery Rock University of PA, Slippery Rock, PA, 16057

724-738-2452

matthew.erickson@sru.edu

Sheri Passarelli Saurer, M.S., CCC-SLP, BCBA

The purpose of this research study is to investigate parent perspectives of their child with ASD who uses high-tech AAC in educational settings.

<u>Contact Information</u>	To participate in this study, you must:
<p>To find out more about this study, please contact:</p> <p>Sheri Passarelli Saurer 724-549-7486 Sas1036@sru.edu</p>	<ul style="list-style-type: none"> • Be a parent or guardian of a school age child with ASD as diagnosed by a licensed medical professional • Have a child who attends a public school or approved private school that is funded by your child's school district • Have discontinued using a speech generating device that was recommended by your child's school

To participate in the 10-minute survey, please use the link:

https://qfreeaccountssjc1.az1.qualtrics.com/jfe/form/SV_3xeUHNzmnByW1et

Appendix F-Interview Email

Email to send interview participants upon request.

Dear _____,

Thank you for contacting me about your interest to participate in an interview regarding your child's experiences with AAC in his or her school. The interview will last about 30 minutes. In order to ensure that your responses are accurately recorded and interpreted, you will be contacted after the interview to review your responses and be given the opportunity to edit or clarify your responses.

Attached to this email is a consent to participate in the interview. There is also a consent to videotape the interview. The videorecording is being conducted to allow the researcher to accurately record your responses. The videos will remain private and will be deleted after you have reviewed and confirmed the accuracy of your responses. Please sign and return the consent forms so that we may schedule the interview at any time that is convenient for you. You have the right to refuse consent to participate and may withdraw your consent at any time. You must be 18 years of age to participate. The study is estimated to take about 30 minutes of your time.

Please contact me if you have any questions about this phase of the study.

Sas1036@sruc.edu. 724-549-7486

Investigator: Dr. Matthew J. Erickson,
Chairman and Associate Professor of Special Education
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Sheri Passarelli Saurer
Doctoral Candidate
Department of Special Education
Slippery Rock University

Appendix G-Initial Framework for Successful Implementation of High-Tech AAC

AAC Evaluation and Implementation Checklist

To be completed by school teams:

	Yes	No
A multi-disciplinary evaluation was conducted.		
More than one SGD was considered.		
The child's communication was observed at home or in the community. (This can be conducted in-person or via video recording).		
At least two devices were reviewed with the child's family.		
The child's family was provided an opportunity to share their opinion about the strengths and limitations of the recommended SGD(s).		
The child's family was provided with information regarding the device including:		
1. Warranty		
2. Length of time that the device remains charged		
3. Technology support by the manufacturer or app developer		
4. Symbol system used by the app or device		
5. The district's policy about transporting the device between school and home		
6. Training options and opportunities provided by the school district		
7. Community resources for AAC users		
The family was provided a demonstration of how to effectively communicate with their child while using the device and opportunity to practice with the SLP.		

To be completed by parents:

	Yes	No
My child's communication was observed at home or in the community. (This can be conducted in-person or via video recording).		
At least two devices were reviewed with me.		
I was provided an opportunity to share my opinion about the strengths and limitations of the recommended SGD(s).		
1. The device made communication easier for my child.		
2. The device meets the communication needs of my child.		
3. It is easy for my child to use.		
4. It is user-friendly.		
5. It is easy for my child to learn to use.		
6. My child learns to use it quickly.		
7. I feel like my child needs to have it.		
8. It works the way that I want it to work for my child.		
I was provided with information regarding the device including:		
1. Warranty		
2. Length of time that the device remains charged		
3. Technology support by the manufacturer or app developer		
4. Symbol system used by the app or device		

5. The district's policy about transporting the device between school and home		
6. Community resources for AAC users		
I was provided a demonstration of how to effectively communicate with my child while using the device and opportunity to practice with the SLP.		