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Increasing appropriate communication and reducing aggressive behaviors for students with Autism Spectrum Disorder by using an AAC device

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Increasing Appropriate Communication and Reducing Aggressive Behaviors for

Students With Autism Spectrum Disorder By Using An AAC Device

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Chapter I: Introduction

Many individuals with Autism Spectrum Disorder (ASD) have significant communication challenges, especially in the area of expressive communication. Fortunately, over the past several decades this has improved through the use of augmentative and alternative communication (AAC). It is reported that one-third to one-half of children and adults with autism spectrum disorder do not use speech and/or language functionally and are in need of speech language therapy (National Institute of Neurological Disorders and Stroke). Speech therapy covers a variety of supports, which may include the use of AAC devices and strategies. These devices are programmed to fit the specific needs of each individual user, which improves efficacy in the individuals' communication across environments (American Speech-Language-Hearing Association, 2020).

AAC devices can be both aided and unaided. Aided systems range from low technology to high technology and can have a wide range of features, which may include picture images, communication notebooks, use of keyboards, and voice output communication aids, also known as speech-generating devices (SGDs). Unaided systems do not require external tools and instead utilize more natural gestures, vocalizations, and sign language (Moorcroft et al., 2018). Other no tech options include writing, drawing, spelling words by pointing and pointing to photos and pictures, or even written work to express what is wanted or needed.

For many individuals with Autism Spectrum Disorder, AAC is the primary way of expressing their wants and needs. The purpose of this paper was to review the research literature that examines outcomes related to the use of AAC and challenging behaviors and how to implement it effectively across environments. In addition, this paper will evaluate strategies that are useful for educators and peers towards the use of AAC devices across settings.

Overview of Autism Spectrum Disorder (ASD)

Autism Spectrum Disorder (ASD) is a neurological and developmental disorder that develops in early childhood, with symptoms typically manifesting within the first three years of life, and lasts throughout an individual's lifespan. Autism refers to a wide range of different characteristics including social skills, how a person acts with others, restrictive and repetitive behaviors, and speech and nonverbal communication. (Centers for Disease Control and Prevention, 2022). ASD may impact the way an individual learns and involve delayed cognitive or learning skills, though this is not always the case. Research shows that genes and environment can play important roles with a person with ASD.

Overview of Augmentative and alternative communication (AAC)

Augmentative and alternative communication (ACC) refers to the many different ways that an individual can communicate if they are unable to talk verbally or have limited verbal expressive communication. People of all ages use differing forms of communication when they have trouble with their speech or other language impairments. AAC is utilized to help individuals with language disorders use expressive and/or receptive language. The term *augmentative* means to add to someone's speech, whereas *alternative* means to be used instead of speech. AAC is typically implemented throughout a person's lifetime (American Speech-Language-Hearing Association, 2020).

AAC involves a set of tools and strategies that are implemented throughout the day to solve an individual's everyday communication challenges. Communication can take many forms, such as speech, a shared glace, text, gestures, facial expressions, touch, sign language, symbols, pictures, and speech-generating devices with or without voice output. All people use more than one form of communication. Effective communication occurs when one person can get across

what they need to another individual and the individual understands the meaning behind the communication (International Society for AAC). Implementing AAC can result in a variety of axiomatic benefits, including improved speech, an improved overall quality of life through increased independence, increased equanimity during stressful situations, a reduction in frustration and the concomitant negative behaviors, and increased participation in daily activities.

Overview of Speech-generating devices (SGDs)

Speech-generating devices (SGDs) are used to increase language development and have had a positive impact on developing language skills with natural speech output using a communication device (Speech-generating Devices). SGDs are considered a high-tech option and often include software on an iPad or other tablet, which provides the output of a "voice" for the individual to communicate with.

AAC Assessment tools

There has been an increase of assessment tools available over the past several decades, with the use of the SETT Framework being one educators frequently utilize when making decisions about assistive technology support for students. SETT is an acronym for Student, Environment, Tasks, and Tools, and is a person-centered framework that helps guide educators in determining what assistive technology (AT) will best meet a student's unique communication needs. The SETT Framework is a four-part model that is used to make collaborative decisions in all phases of AT and how it is developed and presented to students.

When considering the *student* portion of the SETT process, questions that should be addressed during the IEP team meeting include, "What does the student need to be able to do? What is difficult or impossible to do independently at this time? What are their special needs that contribute to these concerns? What are the current abilities related to these concerns? What are

the student's interests?" (*The Sett Framework*: Guide to Assistive Technology, 2018). Regarding the *environment* aspect of the SETT process, the IEP team must consider all environments in which the student will be participating, including the home environment. The primary question of concern is, in what areas would the student benefit from the use of an AT device? The *tasks* refer to what is actually happening, and what the student will need to be successful in completing academic goals and learning activities across environments. Finally, the IEP team needs to consider the many potential *tools* available, including devices, services, and strategies to support the success of the student. These can range from no tech to very high tech devices and supports. The main question that needs to be asked is, "What needs to be included when developing a system of assistive technology tools for someone with these needs and abilities, doing these tasks in these environments?" (Zabala, 2021).

Students with Autism Spectrum Disorder often have significant communication needs that can present numerous challenges to the teachers and staff members providing them educational services. Therefore, the utilization of assessment tools is an important first step to improved communication and in turn fewer behavioral challenges for the individual.

Programs available for SGDs

There are copious programs and applications available for AAC users. One example is Proloquo2Go, which is a full-featured AAC solution for students with autism who have difficulty speaking. This application has over 7,000 vocabulary items and is fully expandable. Another example is iCommunicate, which allows users to create pictures, flashcards, storyboards, routines, visual schedules, and record audio in any language. It also has task completion and visual prompting with audio, and comes preloaded with thousands of SymbolStix pictures. Other features include printable storyboards and the ability to upload one's own pictures when needed.

Research Questions

   Two related research questions guided this review of literature.

    1. How effective are augmentative and alternative communication devices in

      reducing disruptive and aggressive behaviors for individuals with Autism

      Spectrum Disorder and other developmental disabilities?

    2. How should AAC devices be implemented with students that need to express

      wants and needs across different environments effectively?

Focus of the Paper

   The focus of the paper is to review research studies and articles that discuss the impact of

utilizing an AAC device on reducing challenging behavior for students that are non-verbal and

the analogous ability to express their wants and needs in an efficacious manner.

   The database utilized to research the literature for this paper was the Academic Search

ERIC, PsycINFO, and Google. This author used a variety of keywords with various

combinations to locate literature on the topic, including the following: *Autism Spectrum*

Disorder, Autism, AAC, Speech-generated devices, challenging behaviors, interventions, and

augmentative and alternative communication. Additionally, the book *Autism Spectrum*

Disorders and AAC was utilized.

Historical Background

   Swiss psychiatrist Paul Eugen Bleuler first coined the term "autism," using it to describe

what was at the time believed to be a childhood version of schizophrenia. Since then, the

understanding of autism has evolved significantly, and people are much better informed by

research, education and support. In the 1980s the third edition of the Diagnostic and Statistical

Manual of Mental Disorders (DSM-III) had included criteria for a diagnosis of infantile autism

for the first time. In the 1990s it was included in the Individuals with Disabilities Education Act (IDEA) to help students with autism get the appropriate support regarding their educational services. In the 2010s the updated DSM-5 combined autism, Asperger's, and childhood disintegrative disorder into autism spectrum disorder (Centers for Disease Control and Prevention, n.d.). In 2021, the Centers for Disease Control and Prevention (CDC) reported that approximately 1 in 44 children in the U.S. is diagnosed with autism spectrum disorder (ASD). According to its 2018 data, autism diagnosis occurs in approximately 1 out of 27 boys and 1 out of 116 girls, so boys are approximately four times more likely to be diagnosed than girls.

Over the last two decades individuals were often very limited regarding what was available for AAC and SGDs. One SGD developer is Tobii Dynavox, which was formed in the 1980s and has since become the leading provider of speech communication devices and symbol-adapted special education software that is used to help individuals overcome speech language and learning challenges. The company's best-known products that were first used were the Maestro, EyeMax System and Boardmaker software, which helped adapt learning activities for students.

Many early SGDs were heavy, bulky, and expensive, but in the last ten years the iPad and corresponding communication applications have been an easier and more affordable option for many users. Currently iPads are widely regarded as the best choice when there is a need for an assistive communication device, due to the ease of use, varying options, and accessibility of needed applications.

Importance of the Topic

Being a special education teacher of students with Autism Spectrum Disorder and other developmental disabilities, this author has worked with many students who are non-verbal, have

very challenging behaviors, and use an AAC device to communicate on a daily basis. In this author's experience there have been many visible challenges over the years on how to effectively reduce challenging behaviors for students related to a lack of training and misunderstanding regarding AAC. Often the staff working with students with moderate to severe speech and developmental disabilities don't have the appropriate training necessary to effectively implement and facilitate the use of AAC for students across environments, so devices are not always utilized to their full potential.

Today acquisition and use of AAC devices at younger and younger ages is becoming much more prevalent than in the past, which offers many potential benefits for students who are non-verbal. Another purpose of this literature review is to determine the best methods for AAC and SGD implementation as well as how to facilitate use of devices across settings to reduce challenging behavior.

Definition of Terms

Augmentative and alternative communication: a way that someone communicates besides talking (American Speech-Language-Hearing Association, 2020).

Autism spectrum disorder: a developmental disability that can cause significant social, communication and behavioral challenges (Centers for Disease Control and Prevention).

Assistive technology device: products, equipment, and systems that enhance learning, working, and daily living for persons with disabilities (Assistive Technology Industry Association, n.d.).

Functional Communication Training: a process of teaching meaningful and functional communication in a natural way to children with autism spectrum disorder and other developmental disorders.

Interventions: a process of creating and implementing a service, or event, that is specifically designed to bring about a desired change (Workplace).

Speech-generating devices (SGDs): defined by the Centers for Medicare and Medicaid Service (2014) as "durable medical equipment that provides an individual who has a severe speech impairment with the ability to meet his or her functional speaking needs."

Supports: can be a variety of things that can improve a person to be more successful.

Chapter II: Review of the Literature

The purpose of this literature review is to see how effective augmentative and alternative communication devices are in reducing disruptive and aggressive behaviors for individuals with Autism Spectrum Disorders and other developmental disabilities. Additionally this review of literature seeks to find the most effective means of implementing ACC devices with students that need to express their wants and needs across a variety of environments. This chapter is organized into three sections: Autism Spectrum Disorder and AAC, Functional Communication Training and Strategies and training to help teachers implement throughout the students day.

Review of Studies

In an attempt to examine the effectiveness of an Apple iPad speech generated device (SGD) for children with Autism Spectrum Disorder (ASD), Meeks (2017) utilized a single subject design study for two preschool students diagnosed with ASD in a public preschool setting in rural Georgia. This design allowed students to serve as their own control group and provided the researcher with an explanation as to whether an intervention functioned as expected. The study took place in two different classrooms, with the first intervention occuring in a self-contained special education classroom during snack time. The second intervention occurred in the general education classroom during center time.

Specifically, an Apple iPad with the Go Talk Now communication application was utilized to address requesting skill deficits for the two students. Data was collected using event recording, and the research showed a functional relationship between the implementation of the SGD and an increase in communicative behaviors (requesting skills) for both preschoolers. However, with only two study participants, the generalizability of the results is limited, though it is consistent with similar research. Based on this research, there is a probable correlation

between the use of SGDs and improved communication among students with ASD and limited spoken language skills.

In another study involving preschool aged children with ASD, a mixed methods design with multiple sources of data was utilized by Dorney and Erickson (2019) to examine the changes in the communication skills that resulted from an intervention featuring three evidence-based, transactional approaches to AAC. These approaches included attributing communicative meaning to student behaviors, providing aided language input, and focusing on graphic symbols representing core vocabulary. The convergent mixed-methods design provided specific data regarding changes in child communication in the context of the transactional exchanges between the educator and child participants. This study involved three teacher participants and thirteen children between the ages of three and six.

Researchers found that the biggest increase in student use of the aided language board occurred in the classrooms where teachers provided the most frequent individual access to the board and were observed providing aided language input most frequently. The preschool students in the study made overall gains in the level of their communication complexity, although researchers noted the participating teachers did not apply all of the practices they were taught in their professional development sessions and missed many opportunities to support communication development for the students. For example, students often used vocalizations, body movements, and emotional affect in ways that could have been viewed as efforts to communicate refusal or protest but many of these behaviors were simply viewed as maladaptive and efforts focused on eliminating them rather than teaching more conventional alternatives. Based on this research it is reasonable to conclude that preschool children with ASD can learn to use abstract graphic symbols representing core vocabulary to request and increase their use of

conventional communication, but only when educators attribute meaning to their behavior and demonstrate the use of graphic symbols representing core vocabulary through aided language input.

Alzrayer and Banda (2017) looked to provide support to teachers by establishing guidelines to ensure the right device was selected for the right student, as well as provide overall support in implementing communication devices more effectively in the classroom. Researchers studied numerous communication device options utilizing different assessment tools, including the Student Environment Task Technology (SETT) Framework and the Symbol assessment tool, which is an evaluative checklist for mobile touch-screen devices as AAC system implementation for students with autism.

Selecting an appropriate app for a given student is imperative for them to be successful, and the app should be motivating for them to use. Preference assessments are conducted to make sure that the student's interests are on the device in order to support implementation and increase motivation. If there is a lack of motivation it is unlikely to be an effective long term communicative solution for the student. Teacher and parent feedback is crucial for teams to ensure the student's preferred items and activities are a part of device programming. Once assessments are done to determine what device or application should be used and how it should be set up for the student, it then becomes time to introduce it to the student.

Interventions were implemented and the students were taught to make requests using preferred and non-preferred items. Teachers reported that the interventions were effective in teaching students to use the communication device based on systematic instructional methods, such as least to most prompting, which is when minimal help is initially provided, and then the support is increased incrementally depending on student need. Other instructional methods

utilized were a time delay intervention, which increased students' opportunity to respond more independently and effectively, and discrete trial teaching, which helps the students learn with the use of prompts, time delay, and reinforcements in order to request preferred items.

The four main steps of the intervention were: presenting the two preferred items to the students and asking them, "What do you want to play with?", observing the student to see their response, providing a prompt when it's needed for the student to be successful, and finally giving the reinforcement to the student when the request process is complete. The interventions from Alzrayer and Banda resulted in data showing they were effective with using an SGD to improve students' communication skills. This study shows the effectiveness of FCT with students with challenging behaviors and shows a positive result when presented with the interventions. There were a limited number of participants, so expanding the number of people that the students are working with to have more communication opportunities due to the sample maintenance data might be beneficial. Maintaining these challenging behaviors to a lower number is the goal and it is important to determine if these interventions continuously help the students long term.

In a study by Waddington (2017) baseline data was provided to determine if students with ASD could use a communication device to communicate their needs in different environments. This research involved one male participant and focused on teaching the student to request with the use of his communication device. Preferred items and activities were utilized throughout the student's day to increase the likelihood of communication. Interventions that are known to have a true effect need to be successful in different environments. Researchers used a speech generating device (SGD) with the application Proloquo2go, which displayed a preferred toy and a non-preferred item. Multiple trials were completed to see if the student was able to effectively choose the preferred item and once this was taught in the clinic it was applied across

different environments. A different environment produced the same result, as he increased his responses to communicate what he wanted in both school and home.

The overall results also showed that the student was able to locate the SGD when placed out of reach and could request what was needed. He was able to do this across settings and with both the teacher and parents. It appeared that learning the skill in one location first was beneficial, and once the intervention was implemented there the student can then move to other locations to practice the skill. The results suggested that students may be more successful and acquire the skills more quickly in certain environments relative to others. Although the intervention was taught in a clinical setting the student was able to implement the use of the communication device faster in the school setting.

One limitation of this study was that it focused on just one student, so a bigger sample size may have revealed more challenges in the use of the intervention. Another limitation was ambiguity over whether or not the student's success in locating and utilizing the device was due to the intervention, or an ability the student already possessed. The social interaction with the student was limited and indicated that it will increase when it is taught more explicitly.

A study by Nam et al. (2018) provided an overview of the effectiveness of major augmentative and alternative communication (AAC) systems by analyzing 92 single subject studies. All studies examined involved the employment of systematic methods, evaluated single-subject studies involving participants with developmental disabilities including autism, compared one AAC system to another, and were published in peer reviewed journals.

Overall, researchers found that aided systems such as picture exchange (PE) or SGDs enable children to acquire the target skills quicker and are generally preferred by children over manual signing, especially for those with fine motor limitations. SGDs hold a number of

advantages over other communication systems. One example discussed is that spoken messages can be understood by a communication partner who is not looking at or in close proximity to the child, and SGDs on iPads may be more socially accepted and less stigmatized than a dedicated AAC system such as PECS. Another significant advantage is the ability to potentially store an almost limitless number of pictures or icons in an efficient manner. However, most systems have advantages and disadvantages, so finding a one size fits all AAC system that is best for all children is not realistic. Rather, practitioners should focus on matching the child's skills with the features, advantages, and disadvantages of a given AAC system.

Therrien and Light (2018) researched the effects of using an iPad with a communication application on social interaction for children with complex communication needs (CCN) and autism spectrum disorder. Involved in the study were five pairs of students, with a multiple probe design used to evaluate the effects of the intervention. Each pair of students included one student with CCN and one non-disabled peer, all of whom were preschool age and from an early childhood center in Pennsylvania. Researchers were concerned with peer training taking on a hierarchical nature due to the possibility of the peer acting as a "helper" to the child with CCN, and thus dyadic turn-taking training that combined child-centered and peer-mediated components was utilized to promote equality during interactions.

Researchers chose the app GoTalk NOW as the intervention application because it supported the use of both grid-based and visual scene displays, which can lessen the metalinguistic demands of AAC use. Because the study only included a total of five participants with CCN and ASD, external validity is limited, and one pair lacked a significant effect from the intervention. That being said, the overall results of the study indicate that this multicomponent intervention can effectively increase communicative turns within a one-on-one back and forth

interaction and may also affect the quality of the interaction by increasing joint engagement. Four out of five participants with CCN and ASD experienced a positive effect on the frequency of turns relative to the baseline.

Limitations in this study would be the small sample size of only 5 participants and a limited student skillset with all participants having similar baseline skills. There was no data showing the maintenance of the students' skills with the intervention so the effects of the intervention were unknown at the time. Communication is very important for relationship development for young students, but many communication opportunities were missed and this created barriers in regard to the students learning to communicate with non-disabled peers.

Researchers studied a single-case involving Functional Communication Training (FCT) and Augmentative and Alternative Communication (AAC) in the school setting (Walker et al., 2018). Challenging behavior can have a significant impact on students' learning in the school setting, and the intervention in this study sought to identify the communicative function of the behavior, select an appropriate communicative alternative, and then teach that alternative to the student. This process is designed to help students implement effective strategies that work to decrease the challenging behavior in a school setting.

The study included a variety of different interventions involving the use of FCT. The interventions used included a system of least to most prompts, time delay, and most to least prompting, which involves giving the most support initially and then fading the prompts over time. Graduated guidance is giving physical guidance to assist the student in getting to the correct response when learning what the task expectations are. The participants were in kindergarten through 5th grade, with the majority of them being male. 65% of the students had an intellectual disability and 28% had ASD. The most common behavioral functions reported

were escape/avoidance (43%), followed by gaining attention (17%) and gaining a tangible item or object (11%).

The data showed that FCT involving AAC reduces challenging behaviors when there is an increase in the use of aided and unaided AAC across settings. In an inclusive school setting the students experienced greater improvement then those in a non-inclusive setting. This conceptually supports the idea that the use of a communication device can be more effective when taught and supported with peers in a mainstream setting. The primary limitation of this study was that it focused on a single case study rather than a larger group of participants in the same environment.

Students with ASD often experience significant barriers relating to communication and use of language. Teaching students socially acceptable communication skills with the use of a communication device to increase communication is indispensable for students and their families. This study by Sigafoo et al. (2013) focused on two nonverbal boys with ASD and their use of communication, examining whether they were able to request a preferred item with the use of symbols from an iPad device with the Proloquo2Go software.

During the study the procedures that were successful in the past included the following: behavior chain interruption, time delay, and various response prompting techniques, which include modeling, gradually fading away, and then reinforcement. When introducing preferred toys to the students in 30-second intervals they were told, "My turn," when the time was up, and within 10 seconds the students had a negative response, hitting and reaching for the toy. The iPad was introduced by the teacher touching the toy symbol, creating the voice output. The toy was then immediately returned to the student.

At the start of the trial the students were not showing any interest in using the device. Once the intervention was introduced the students engaged in the use of the device with the teacher prompting and then returning the toy. Consistent results were observed throughout the trial with different motivating items. Using motivating items appeared to improve student responses with the device and helped them learn how to communicate their wants more effectively.

A study by Muharib et al (2018) examined the effectiveness of using communication training interventions with the use of reinforcements on students with challenging behaviors. Challenging behaviors involved in the study included self-injurious and disruptive behaviors, and the researchers wanted to see if the introduction of a communication device would result in a decrease in the behaviors of the students. Functional Communication Training (FCT) is a way to help students with challenging behaviors. An important aspect of FCT is understanding the process to assess behavior by the use of functional assessments, then teaching new ways to deal with the behavior response with the use of a communication device. FCT teaches that if adults can find more appropriate ways to respond to student behavior then this will benefit students by helping them understand that their needs can be met in a positive way. A crucial facet of FCT is identifying the function of a behavior and determining potential reinforcement.

Researchers studied two individuals with ASD who were non-verbal, and prior to the intervention neither student had any previous experience with an SGD. Their only experiences involved accessing an iPad for educational games in the classroom. The study occurred in an elementary school setting and iPads with the GoTalk Now application were utilized. This application allows for significant customization based on individual student abilities and needs.

Prior to the study a functional behavioral assessment was completed to determine the students' behaviors, and a preference assessment was completed to determine what the students enjoyed. The interventions were implemented with the preferred reinforcement being a highly motivated toy. Results show that functional communication training using GoTalk Now on iPad for the two students with challenging behaviors was effective, as it taught the students to use the device to request preferred items, decreasing the challenging behaviors in both students.

Students with disabilities can have issues with onerous behavior, which may cause aggression, property destruction and self-injurious behavior for some students. As with the preceding study in this review of literature, a study by Chezan, Wolfe, & Drasgow (2017) examined functional communication training and its effectiveness in decreasing the severity of problematic behavior while increasing the response to communication. In the 310 cases that were analyzed, 144 of the cases met standards that were evaluated, 79 cases showed strong evidence of the effects of FCT, and only 4 cases provided moderate evidence when it came to the use of alternative communication response (ACR). 55 cases provided no evidence of the effects of FCT. With further investigation into a variety of different cases it was determined that overall FCT was effective in decreasing problem behaviors.

Based on the data FCT interventions appeared to be highly effective in increasing the ACR. The What Works Clearinghouse (WWC) standard was used to evaluate the studies in this meta-analysis and calculated the effect sizes using Tau-U, a quantitative approach for analyzing single case studies to examine the effectiveness of the intervention phase. The findings indicated that FCT is more effective when the function of the problematic behavior is determined using a functional behavioral assessment. There were limitations to this meta-analysis and some of the individual cases had conflicting results. It was determined that more than half (26 out of 44) of

the studies using WWC standards met the FCT design quality needed, while the remaining 18

did not. Overall implementing FCT decreased challenging behaviors while increasing the use of

ACR.

There is often an increase in challenging behavior with students with ASD when they are

unable to express their wants and needs effectively, so training on implementing communication

systems and strategies is crucial. Research indicates that staff training plays a cogent role in the

outcomes of student response regarding AAC and can in turn reduce their challenging behavior.

Without qualified and felicitous training, implementing FCT and AAC can be a considerable

challenge. Staff coaching and the provision of feedback after training has been beneficial for

developing the skills needed to teach students effectively and with fidelity. It is exigent to utilize

AAC to teach students to express their needs and wants using a communication system rather

than through their salient negative behavior.

In a study by Walker et al. (2021) researchers did a multiple baseline design across

participants to support staff and help them implement FCT in order to address challenging

behaviors among three students with ASD. FCT is an evidence-based intervention for students

with ASD that relies on staff learning and teaching. Prior to implementing FCT behaviors need

to be identified through the use of a functional behavior assessment (FBA) or similar assessment

tool. FBAs often include interviews, data, observations, and surveys to determine the function of

the behavior.

Students in the study had a diagnosis of ASD and complex communication needs with

analogous challenging behaviors, and three staff members were recruited to participate in the

training. Prior to training staff were providing support to students within a school setting. When

implementing the training observations were recorded for instructional purposes. Each student

had an FBA completed to identify the functions of their behavior. All three students demonstrated problematic behavior when presented with difficult tasks, indicating a function of escape/avoidance.

Based on the information gathered, the coach and teacher developed an FCT intervention that would benefit the students' responsiveness to constant time delay and errorless learning when it came to new communication responses. The baseline for participating staff involved no training, and after baseline training was provided and interventions were implemented with the students. Procedures observed in each session included video modeling, instruction, modeling, rehearsal, and feedback.

The study's purpose was to examine the effectiveness of staff training and follow-up coaching in terms of its impact on student success. Results indicated that the staff who used the interventions, implemented FCT, and received follow-up coaching had positive results and all students showed an increase in prompted communication, though there was no increase in independent communication. Although research was limited in scope, it did demonstrate that support staff serve an important role assisting special education teachers and other professionals in helping with behavior support. The research suggests that support staff can implement FCT successfully with coaching and support with interventions.

Limited communication for children with ASD can be challenging and lead to a lack of expressing wants and needs, which in turn increases negative behavior. A study by Mancil et al. (2016) examined the use of an iPod touch to see if it can be used as an SGD for Functional Communication Training (FCT) purposes. There were three participants aged 4-5 years old, and the materials utilized included a DynaVox and an iPod touch with the GoTalk application. The school district provided the DynaVox Vmas, which has some drawbacks including being very

heavy and costly (about $9,000). The iPod Touch is smaller, easier to transport and costs roughly $400 dollars. The study's focus was on how well students could use the iPod Touch in different environments.

Based on data from the study, peer social interactions increased in all settings and lasted longer compared to the Dynavox as an SGD. Aside from the obvious advantage of being less expensive, the study showed that the iPod Touch had a higher impact of use across settings during interventions and maintenance conditions.

Table 1

Summary of Chapter 2 Table

Authors	Study Design	Participants	Procedure	Findings
Meeks, J. H. (2017).	Qualitative	2 preschool students w/ASD	Implementing communication across setting with the use of AAC	Both students demonstrated an increase in communication with AAC (GoTalk Now app)
Dorney, K., & Erickson, K. (2019)	Qualitative	3 classrooms 120 students	To implement interventions to increase communication use of core vocabulary with student w/ASD	Students are able to learn the use of core vocabulary to communicate with some purpose. Educators had challenges in adapting to new training
Alzrayer, N. M., & Banda, D. R. (2017)	Qualitative	Students w/ASD	Finding the right SGD for students and implementing in during their day	SGDs are an effective method to improve communication skills in students

				w/ASD.
Waddington, H., Van der Meer, L., Carnett, A., & Sigafoos, J. (2017)	Qualitative	8-year old boy with ASD	Learn how to use a speech generated device across environments	Student was able to locate the SGD when placed out of reach and was able to request what they needed across settings
Nam et al. (2018)	Qualitative	92 single subject studies	Involved the employment of systematic methods, evaluated single-subject studies involving participants with DD, autism, compared one AAC system to another	It was found that aided systems enable children to acquire the target skills quicker then not having the devices
Therrien, M. C., & Light, J. C. (2018)	Multiple probe design	5 children participated	Effects of intervention on communicative turns expressed by children with CCN and ASD in interactions w/peers	4 out of 5 increased independent communicative turn-taking with peers with the use of communication interventions
Walker, V. L., Lyon, K. J., Loman, S. L., & Sennott, S. (2018)	Meta- analysis	Student w/ASD 46 participants a variety of different case reviews	Implementing FCT and AAC in school settings to see the effectiveness in reducing challenging behaviors.	FCT involving AAC can improve students and help reduce the challenge behaviors. This was effective across participants and settings.

Sigafoos, J et al. (2013)	Qualitative	2 boys with Autism 5 and 4 years old	Implementing interventions to increase communication and what their want and need are	Intervention was introduced the boys were quick to understand that by push the voice output button they would get the toy then when they didn't success in natural setting
Muharib, R., Correa, V. I., Wood, C. L., & Haughney, K. L. (2018)	Qualitative	2 students w/ASD	Implementing device w/GoTalk Now and placing interventions	Use of a device and interventions to help students decrease the challenging behaviors.
Chezan, L. C., Wolfe, K., & Dragow, E. (2017)	Meta-analysis	310 cases were analyzed	WWC standard was used to evaluate the studies and it was calculated using effect size with Tau-U	The findings indicated that FCT is more effective when the function of the problem is determined with the use of a functional assessment. Implementing FCT decreases challenging behavior when increasing the use of ACR.

Walker et al. (2021)	Qualitative	3 students and 3 staff members	Supporting staff to implement FCT to address challenging behaviors with students with ASD	Results indicate that staff training has played a significant role in the outcomes of how students are responding to the use of AAC devices and reducing the challenging behaviors.
Mancil et al (2016)		3 participants aged 4-5 yr old	To see if the use of an iPod touch can be used as an SGD for FCT proposes	Results show that peer interactions with the use of iPod touch has higher impact across settings compared to the Dynavox as a SGD

Chapter III: Conclusions and Recommendations

The purpose of this research paper was to examine the impact of utilizing an AAC device on reducing challenging behaviors for students that are non-verbal and the analogous ability to express their wants and needs in an efficacious manner. Chapter I provided background information on the topic and Chapter II presented a review of the research literature. In this chapter the findings, recommendations, and implications of the research will be discussed.

Twelve studies were reviewed related to the effectiveness of AAC devices on reducing disruptive and aggressive behavior for individuals with ASD and other developmental disabilities, and how to most effectively implement AAC across settings. A review of these studies provides a better understanding of the strategies and interventions most effective in helping improve students' ability to use an AAC device to express their wants and needs and in turn reduce negative behaviors.

Conclusions

The review of the first four studies focused on implementing communication across settings with the use of AAC devices (Meeks, 2017; Dorney & Erickson, 2019; Alzrayer & Banda, 2017; Waddington et al., 2017). One study demonstrated the effectiveness of AAC over other aided systems such as Picture Exchange Communication System (Nam et al. 2018). The following seven studies discussed focused on the effects of interventions using communication devices, how FCT and AAC are implemented in the school setting, and how staff should be supported with training so that these strategies can be implemented with fidelity (Therrien & Light, 2018; Walker et al., 2018; Sigafoos et al., 2013; Muharib et al., 2018; Chezan et al., 2017; Walker et al., 2021; Mancil et al., 2016).

The first four studies examined student responses to specific, implemented interventions. Meeks (2017) utilized a single subject design study for two preschool students diagnosed with ASD in order to assess the effects of an SGD would improve student communication. Interventions were used in two different settings, with one being a self-contained classroom and the other a general education classroom. The results indicated the SGD was effective but the small sample size was a significant limitation. Dorney and Erickson (2019) examined the changes in the communication skills resulting from an intervention featuring three evidence-based, transactional approaches to AAC. Results indicated there is a significant increase with students at a young age, and they have the ability to learn and use AAC to improve their expressive communication. Interventions were implemented and the students were taught to make requests using preferred and non-preferred items in the study by Alzrayer and Banda (2017). As with Meeks' 2017 study, this study has the significant limitation of being a small sample size, though it did indicate that students with ASD can use a communication device to communicate their needs across different environments. The study by Waddington (2017) focused on learning the skills necessary to communicate. All four studies reviewed indicated the interventions were effective but had small sample sizes so generalizability was in question for each. Generally the results were the same across the four studies, showing that when students are introduced to and taught to use an SGD with particular interventions in place, they are able to effectively decrease behaviors and communicate their needs.

The review article by Nam et al. (2018) investigated the overall efficacy of communication devices with students and their improvement in expressive communication. This review clarified that the sooner an AAC system is introduced to a student the more of an impact it will have on the student's life. Relative to previous articles this study had a large sample size

including 330 individuals with developmental disabilities ages ranging from 2 to 52 years old.

The article reiterated the importance of understanding that AAC devices are different for all

students and that they can and should be customized to fit each student's unique needs.

The seven following studies appraised the effectiveness of FCT and AAC and noted that

when implementing these interventions there is a discernible difference in student

communication and behavior compared to no FCT/AAC interventions. Participants within the

remaining seven studies ranged in ages from preschool to high school. The predominant

behavioral functions in the studies were escape/avoidance, gaining attention, and gaining a

tangible item or object.

The interventions used throughout the seven studies involving FCT were overall very

consistent with reducing challenging behavior. They also focused on improving students'

responses with the devices which helped them learn to communicate their wants and needs more

effectively. Different interventions examined across these seven studies included least to most

prompting, most to least prompting (giving the most support initially and then fading the

prompts over time), time delay, graduated guidance (giving physical guidance to assist the

student in getting to the correct response when learning what the task expectations are), behavior

chain, interruption, and various response prompting techniques such as modeling, gradually

fading away, and then reinforcing.

Therrien and Light (2018) used GoTalk Now as the intervention for five participants and

as such the sample size was limited. The intervention was successful at increasing

communicative turn taking when practicing one-on-one back-and-forth interaction with others,

which helped with joint engagement with four out of five participants. Muharib et al. (2018)

also focused on the GotTalk Now app and implemented the interventions explained previously,

focusing on functional and preference assessments. Staff witnessed a decrease in behaviors when interventions were implemented with fidelity. Unlike the first two studies, the study by Sigafoo et al. (2013) focused on the use of Proloquo2Go software. Differing AAC was shown to be effective in both studies, indicating that various AAC applications can be effective for different individuals and each individuals' unique needs should be taken into account. Choosing the optimum one for each student has a cogent impact on the student's ability to communicate their wants and needs and in turn reduce challenging behavior. Mancil et al. (2016) introduced the iPod touch as an SGD for FCT purposes, and these results showed that peer interactions with the use of an iPod touch have a more significant impact across settings compared to the Dynavox as an SGD.

Walker et al. (2018) were involved in an FCT and AAC study in a school setting, with the goal to reduce challenging behaviors. Interventions were focused on identifying the communicative function of the behavior and designed to implement strategies to decrease challenging behavior in the school setting. Data showed that challenging behaviors are reduced when use of AAC is increased across settings. These interventions were implemented and staff were trained in a follow up study by Walker et al (2021), demonstrating that if staff are appropriately trained with the necessary skills then students can be successful in reducing behavior by being taught to more effectively communicate.

The study by Chezan et al. (2017) reviewed 310 cases and of those, 144 of the cases met standards that were evaluated. 79 cases showed evidence of the effects of FCT and only 4 cases provided moderate evidence. Chezan et al.'s review indicated that FCT interventions were highly effective at increasing communication. Consistently across these seven studies it was evident that

when FCT and AAC were implemented the students' challenging behaviors decreased and they were able to communicate their needs effectively.

Recommendations for Future Research

Based on the articles reviewed, a small sample size was a common limitation for many, so additional research is needed to include larger numbers of students and ensure there is a maintenance period to examine the long-term effects of the interventions. Another focus could be going back to review the interventions after implementation and having checkpoints to ensure the maintenance of the interventions are still reducing the behaviors. As research continues it would be beneficial to expand the scope of research beyond just school settings to evaluate how to best implement communication devices in homes or the community for transitioning students and examine what if any differences should apply with interventions in these settings. Currently based in school settings, implementation and transitioning from one place to the next doesn't appear to affect the students' learning and maintains a decrease in behavior.

Implications for Practice

Research supports the idea that the use of a communication device will help students express their wants and needs and reduce challenging behavior when interventions directly related to communication are in place. Studies have shown over years of technology development that there are a variety of different options for students to expressively communicate and that by testing and trialing different devices it is possible to figure out what works best with a particular student as it is not a one size fits all. The best tool that was used throughout the studies was the SETT Framework. Functional and preference assessments were other tools used to determine strategies to be implemented with the students.

My focus was to find articles that discuss the impact of utilizing an AAC device on reducing challenging behavior for students that are non-verbal and the analogous ability of expressing their wants and needs in an efficacious manner. I believe that in my readings I have found research that supported what my focus was on. I learned that when using a communication device effectively, students will be able to increase communication skills in letting people know their wants and needs and when able to express these needs the students' behaviors will decrease. Having effective communication is very important to students' success and with that being said it is critical to ensure that staff are trained properly in order to implement the interventions effectively. Based on my findings, training is becoming more available but still something that needs to be addressed and hopefully continued throughout students' schooling.

In my profession I have worked with many students who are non-verbal, have very challenging behaviors, and use an AAC device to communicate on a daily basis. Staff training has always been a struggle, largely due to staff turnover and putting so much training into a staff member for them to just move on to something else which again does not help the students be successful. All training needs to be consistent and we need to make sure that we are taking the time to train staff so that the students can be successful. It isn't reasonable or even realistic to expect students to demonstrate the desired communicative behaviors if the staff themselves don't understand how to do it.

Summary

Challenging behavior with non-verbal students has been a concern for many years, though has improved over time with interventions and having the proper training for staff. Research indicates that with the use of a condign communication device students will be able to express their wants and needs and show a reduction in challenging behavior.

References

Alzrayer, N. M., & Banda, D. R. (2017). Implementing tablet-based devices to improve communication skills of students with autism. *Intervention in School and Clinic*, *53*(1), 50–57. https://doi.org/10.1177/1053451217692569

American Speech-Language-Hearing Association. (2020). *Augmentative and alternative communication (AAC)*. Augmentative and Alternative Communication (AAC). Retrieved from https://www.asha.org/public/speech/disorders/aac/

Centers for Disease Control and Prevention. (2022, August 8). *Autism spectrum disorder (ASD)*. Centers for Disease Control and Prevention. Retrieved from https://www.cdc.gov/ncbddd/autism/index.html

Chezan, L. C., Wolfe, K., & Drasgow, E. (2017). A meta-analysis of functional communication training effects on problem behavior and alternative communicative responses. *Focus on Autism and Other Developmental Disabilities*, *33*(4), 195–205. https://doi.org/10.1177/1088357617741294

Dorney, K., & Erickson, K. (2019). Transactions within a classroom-based AAC intervention targeting preschool students with autism spectrum disorders: A mixed-methods investigation. *Exceptionality Education International*, *29*(2), 42–58. https://doi.org/10.5206/eei.v29i2.9401

Mancil, G. R., Lorah, E. R., & Whitby, P. S. (2016). Effects of iPod Touch[TM] Technology as Communication Devices on Peer Social Interactions across Environments. *Education and Training in Autism and Developmental Disabilities*, *51*(3), 252–264. http://www.jstor.org/stable/24827522

Meeks, J. H. (2017). Using an Apple ipad and communication application to increase communication in students with autism spectrum disorder. *Georgia Educational Researcher*, *14*(1). https://doi.org/10.20429/ger.2017.140106

Moorcroft, A., Scarinci, N., & Meyer, C. (2018). A systematic review of the barriers and facilitators to the provision and use of low-tech and unaided AAC systems for people with complex communication needs and their families. *Disability and Rehabilitation: Assistive Technology*, *14*(7), 710–731. https://doi.org/10.1080/17483107.2018.1499135

Muharib, R., Correa, V. I., Wood, C. L., & Haughney, K. L. (2018). Effects of functional communication training using gotalk nowtm ipad® application on challenging behavior of children with autism spectrum disorder. *Journal of Special Education Technology*, *34*(2), 71–79. https://doi.org/10.1177/0162643418783479

Nam, S., Kim, J., & Sparks, S. (2018). An Overview of Review Studies on Effectiveness of Major AAC Systems for Individuals with Developmental Disabilities Including Autism. *Journal of Special Education Apprenticeship, 7*(2), https://files.eric.ed.gov/fulltext/EJ1185374.pdf

Resources/sett downloads. (n.d.). mysite. Retrieved from https://www.joyzabala.com/links-resources

Sigafoos, J., Lancioni, G. E., O'Reilly, M. F., Achmadi, D., Stevens, M., Roche, L., Kagohara, D. M., van der Meer, L., Sutherland, D., Lang, R., Marschik, P. B., McLay, L., Hodis, F., & Green, V. A. (2013). Teaching two boys with autism spectrum disorders to request the continuation of toy play using an iPad®-based speech-generating device. *Research in Autism Spectrum Disorders*, *7*(8), 923–930. https://doi.org/10.1016/j.rasd.2013.04.002

Speech generating devices. CMS.gov Centers for Medicare & Medicaid Services. (2014).

Retrieved from https://www.cms.gov/medicare-coverage-database/view/medicare-coverage-document.aspx?MCDId=26 *The Sett Framework*. Minnesota Guide to

Assistive Technology. (2018, June 26). Retrieved from https://mn.gov/admin/at/getting-started/ready-sett-go.jsp

Therrien, M. C., & Light, J. C. (2018). Promoting peer interaction for preschool children with

complex communication needs and autism spectrum disorder. *American Journal of*

Speech-Language Pathology, *27*(1), 207–221. https://doi.org/10.1044/2017_ajslp-17-

0104

Waddington, H., van der Meer, L., Carnett, A., & Sigafoos, J. (2016). Teaching a child with

ASD to approach communication partners and use a speech-generating device across

settings: Clinic, school, and home. *Canadian Journal of School Psychology*, *32*(3-4),

228–243. https://doi.org/10.1177/0829573516682812

Walker, V. L., Lyon, K. J., Loman, S. L., & Sennott, S. (2018). A systematic review of

functional communication training (FCT) interventions involving augmentative and

alternative communication in school settings. *Augmentative and Alternative*

Communication, *34*(2), 118–129. https://doi.org/10.1080/07434618.2018.1461240

Walker, V. L., Carpenter, M. E., Lyon, K. J., Garcia, M., & Johnson, H. (2021). Coaching

paraeducators to implement functional communication training involving augmentative

and alternative communication for students with autism spectrum disorder. *Augmentative*

and Alternative Communication, *37*(2), 129–140.

https://doi.org/10.1080/07434618.2021.1909650

Assistive Technology Industry Association. (n.d.). *What is at?* Retrieved from

    https://www.atia.org/home/at-resources/what-is-at/

What is an intervention? - Definition from workplacetesting. (2019). WorkPlaceTesting.com.

    (n.d.). Retrieved from https://www.workplacetesting.com/definition/293/intervention

Zabala, J. (2005). *Using the SETT framework to level the learning field for students with*

    disabilities. Retrieved from http://www.joyzabala.com/uploads/Zabala_SETT_

    Leveling_the_Learning_Field.pdf.