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Abstract

This literature review explored Augmentative and Alternative Communication (AAC) with students who are not effective verbal communicators. AAC provides a means of communication for individuals who have disorders that impact communication. AAC is used in the form of low or high-tech device options to assist users in conveying messages to their communication partners. The focus of this review considers students with autism spectrum disorders and intellectual disabilities in the special education and general education classrooms and investigates teacher understanding of AAC, intervention options, and how AAC can be successfully implemented in classroom settings.

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CHAPTER I: INTRODUCTION

Autism Spectrum Disorders (ASD) and Intellectual Disabilities have been diagnosed at an increasingly alarming rate in the United States. Presently, the CDC lists ASD as a developmental disability that causes significant social, communication, and behavioral challenges in those diagnosed. Today, one in 54 children are identified with autism while one in six children are diagnosed with a developmental disability such as autism, attention-deficit disorder, blindness, and cerebral palsy (Center for Disease Control and Prevention). One common challenge for people with developmental disabilities are limitations in language and communication skills. Individuals with developmental disabilities display less complex language skills, have limited vocabulary, difficulty comprehending simple speech, and communication through non-verbal means (gestures, signs, facial expressions). Communication needs can also be met through the use of Alternative and Augmentative Communication (AAC). Communication abilities vary across individuals with developmental disabilities. Communication is expressed through the non-verbal means listed above or through the use of symbols (pictures and signs).

Alternative and Augmentative Communication (AAC) along with the field of Speech Language Pathology emerged in the 1950s and 60s. AAC provided individuals with communication needs the ability to communicate and share information using sign language, gestures or pictures. The history of AAC was highlighted by Hourcade who defined AAC as an integrated group of components including the symbols, aids, strategies, and techniques used by individuals to enhance communication" (Hourcade, page 235).

AAC has been utilized for communication since the 1950s. Around that time the civil rights movement led to greater acceptance for minority groups and individuals with disabilities. The country increased legislative acts throughout the next 20 years. John F. Kennedy created the President's Committee for People with Intellectual Disabilities. The committee raised public awareness and provided information about people with disabilities. Opportunities for individuals with disabilities increased due to the Education for All Handicapped Children in 1975 called Public Law 94-142/ The law has changed to include more rights for students with special needs. The most recent version is the 1991 Individuals with Disabilities in Education Act also known as IDEA. The act ensures each student with a disability receives a Free and Appropriate Public Education (FAPE). Innovative programming was utilized to ensure each student is instructed in their Least Restrictive Environment (LRE). Programming included the use of AAC in school programs across the nation (Hourcade, 2004).

AAC is made available using *unaided* communication methods such as sign language, facial expressions, gestures, and vocalizations. *Aided* communication systems are available via external communication devices such as picture communication boards and voice-out-put devices also called Speech Generating Devices (SGD). Intervention practices for AAC have shifted dramatically along with technology. For some individuals, AAC was not provided due to the belief that verbal speech would eventually develop. The lack of communication system is detrimental for children with little or no verbal communication skills during critical developmental periods. Light (2012) highlighted the past belief that AAC was determined a last resort for individuals with complex communication needs. Families had the belief that the use of AAC would negatively impact the opportunity for verbal speech development. Past clinicians also believed certain cognitive abilities had to be present for AAC to be successful. This resulted

in individuals with intellectual disabilities not included in or even considered for AAC intervention. Scientific evidence in the area of AAC has grown. This evidence supports the positive outcomes of AAC in regard to speech development and also proves cognitive abilities does not impact the success of AAC use. The growing base of evidence has increased the awareness and acceptance of AAC (Light, 2012).

The field of AAC has seen a dramatic shift in the past 30 years. The growing population of individuals who require AAC, have significantly different communication needs as well as cultural and linguistic backgrounds. Increased AAC use occurred due to the increase of autism spectrum diagnoses and medical interventions which results in increased survival rates for children with developmental disabilities. AAC use has also been utilized with older individuals who experience motor, cognitive, and language impairments which require AAC to support their communication (Light, 2012).

The Student Environment Task Tools (SETT) Framework is a collaborative evaluation approach used to identify which communication method would best meet an individuals communication needs and be accessible in environments. The SETT framework includes two parts. Part one considers these parameters: the student, environment, tasks, and communicative tools. The approach examines the student's cognitive, physical and language abilities, the instructional environment, learning goals, and what type of communication tools (high/low tech) the student has experienced or could benefit from. Once a trial environment has been identified an assistive technology system is chosen and implemented. The implementation plan consists of selecting the most appropriate resources available for the student, an implementation timeline, data collection on the effectiveness of the system, and who will be trained as a communication partner. The SETT framework provides educators with a structured method to select the optimal

communication system. When the system has been chosen, individualized plans are created to ensure that students are provided with communicative opportunities. When the student communicates, it is possible for them to demonstrate a level of understanding grade-level curriculum and socialize with same-aged peers in the least restrictive environment (Zabala, 2002).

Students who utilize AAC learn, interact, and participate with their non-disabled peers and general education teachers more frequently due to a special education mandate that supports the inclusion of special education students with their nondisabled peers (Hourcade, 2004). I was introduced to low and high tech AAC options for my students through my education and teaching experiences. The speech-language pathologist assigned to my classroom frequently reminds us, "to teach AAC, you have to speak AAC." This is a mantra I used to remind myself to consider AAC while interacting with my students who have communication challenges. My experience utilizing AAC in classroom settings is by modeling AAC, to label classroom vocabulary marked with AAC symbols and incorporating the vocabulary into daily lessons. My knowledge and competence in using AAC has grown tremendously with experience since the first time I worked in a special education classroom as a paraprofessional.

My first experience working with a student with a device was when I was a paraprofessional. One student had a simple AAC system which consisted of a binder with pictures of items she could request. This was the start of my experience learning different AAC options. The next year, the student's brother enrolled in the classroom. He used a high tech AAC device (iPad) with a specific program such as Proloquo2Go. I experienced feelings of confusion, being overwhelmed, and having no idea of how to appropriately use the device or prompt the student to use the device. As the year continued, I became more comfortable and familiar with

the device from coaching and teaching by the speech language pathologist. I learned how important it was to model language by communicating my thoughts using the deices while also acknowledging any communication attempts (vocalizations, gestures, pointing) made by the student. He and his sister were the only two students in the room using AAC to communicate at the time. This drastically changed the next two years where each student utilized an AAC device throughout the day. Providing my students with the appropriate tools, visuals, patience, and willingness to learn with them has helped me gain more experience and a sense of comfort in using and communicating with an AAC system.

One challenge that I experienced was that a student had access to AAC but did not choose to use it or used incorrectly. The incident resulted in staff who were unable to fully immerse the student in classroom discussions or activities. To meet all students' communicative needs researchers have developed intervention and implementation options and educator training ranging from low to high tech assistive devices and systems. This literature review aims to explore the attitudes of teachers towards AAC, the benefits of knowledgeable communication partners, and the intervention and instructional methods used to teach non-verbal students how to communicate.

Chapter II: LITERATURE REVIEW

LITERATURE SEARCH PROCEDURES

To find the literature and information for this thesis, searches of Google Scholar, Education Journals, American Speech and Hearing Association (ASHA), Speech-Language Pathology Journals, and ERIC were conducted for studies and publications from 1998-2019. The key words that were used in these searches included “alternative and augmentative communication (AAC), “teacher perceptions and AAC,” “AAC and communication partners,” “AAC use in schools,” “AAC and inclusive classrooms,” “AAC interventions,” “aided language stimulation,” “AAC and modeling,” “history of AAC,” “AAC and problem behaviors,” “AAC instruction, “AAC training,” “AAC and complex communication needs,” “AAC and natural environment,” and “peer modeling,” This chapter will review the literature on AAC use in school in the following order Teacher Attitudes and Perceptions of Augmentative and Alternative Communication (AAC), The Role of Communication Partners, Use of AAC to Reduce Challenging Behaviors, AAC Interventions, AAC in the Inclusive Classroom, and Instructional Methods.

Teacher Attitudes and Perceptions of Augmentative and Alternative Communication (AAC)

Dada (2002) conducted research to study the importance of teacher attitudes and perceptions of students who used Alternative and Augmentative Communication (AAC). Teachers play a primary role in facilitating communication for students in classroom settings by providing them with a range of accommodations and strategies to be successful. Due to the movement towards special education student inclusion in the general education classroom, teachers have been exposed to students with little or no functional speech (LNFS). Negative attitudes towards students with LNFS and their communication devices negatively impacted interactions and communication between the student and the teacher. This created teacher uncertainty in understanding the student's needs and overall comprehension of academic material and social events in the classroom (Dada, 2002)

Dada's (2002) research team investigated the attitudes of special education and inclusion teachers towards learners with LNFS who used either a digital speaker (Alpha Talker) or a communication board. Over a span of two weeks, the teachers who participated in the study watched a video of a learner having a conversation using a communication board. A second video showed learner having a conversation using the Alpha Talker, a digital speaker. After viewing the two videos, teachers completed the Teacher Attitude Scale (TAS) that measured their attitudes toward AAC. The TAS consisted of 35 questions which assessed teachers' perceptions of their own abilities, perceptions of the learner's abilities, classroom interactions, perceptions of the AAC device, and communication interaction. Findings from the survey showed that in general teachers positively viewed learners using AAC in the classroom. Teachers

also did not show a preference towards a specific device. The TAS showed that both the communication board and digital speaker (Alpha Talker) received positive reviews from teachers. Teachers perceptions of their own abilities in implementing AAC in the classroom revealed low scores. These scores illustrate the importance of training teachers on how to communicate with students who use AAC. Teacher training ensures confidence and motivation in teachers' abilities to provide students with AAC strategies and means to be successful in the classroom (Dada, 2002).

Classroom teachers have a responsibility to implement AAC in the classroom so providing them with the proper training and building their knowledge gives them the guidance to take action towards facilitating AAC use. Teachers' positive views towards the AAC devices were important because the teachers are an important aspect to the implementation of the AAC. Speech therapists provided training and information sessions to assist teachers in building their skills and knowledge about AAC. They stressed that it is the teacher's duty and responsibility to implement the AAC for individual students. The study illustrated how individuals communicating with AAC users need to collaborate when planning interventions and device use (Dada, 2002).

A growing body of research indicated that it is important to have dedicated team collaboration related to the use of AAC devices in classrooms. According to Bailey (2016) "team collaboration is widely acknowledged as best practice and mandated by the Individuals with Disabilities Education Act (IDEA) to most effectively, secure, and implement AAC" (Bailey, page 139). Bailey and the research team studied how educators viewed the use of AAC in junior and senior high schools (Bailey, 2016).

High school teachers and speech pathologists were selected to share their opinions and beliefs about AAC via interviews while the research team gathered information through observations and reviewed the Individualized Education Plans (IEPs) of AAC users. The interview results gave researchers information that established parameters for effective use of AAC in schools (Bailey, 2016).

Data illustrated that team collaboration led to successful implementation and use of AAC devices. Team members included school personnel (teachers, speech language pathologists (SLP), paraeducators) and the child's family. School personnel reported that consistent communication among team members benefitted the students' use of AAC. Communication with the families provided teachers and speech pathologists an awareness of ways the device was being utilized at home and how to bridge the use between school and home. Consistent communication amongst team members increased the consistency of AAC device use across settings and gave members the opportunity to teach others and build knowledge throughout the team. Facilitating generalization of AAC use from school to home had been perceived as challenging but school personnel reported that consistent use across both environments with support resulted in increased communication by students (Bailey, 2016).

A common theme noted in the interview data was the focus on teaching functional communication. Bailey et al., defined teaching functional communication as "teaching communicative forms and functions- with the functions discoverable only in the interactive, socialized contexts in which these functions occur and are responded to by other people" (Bailey, page 151). School personnel reported that increased practice in natural communication situations gave students more opportunities to generalize the targeted communication skills being learned. To assist with generalization of these skills, school personnel ensured that each student's device

had enough vocabulary. This allowed students to participate in a variety of settings and contexts. Overall survey results showed that team collaboration was the largest indicator of successful AAC use in the classroom setting.

Participants reported that teaming throughout the process increased student success rates. The entire team frequently communicated and focused on increasing the students' communication abilities. Team perspectives were a crucial part of maintaining effective AAC use. The characteristics that led to the team strength were that team members valued the team, and relied on the knowledge and information provided by the team leader, the SLP. Researchers noted that successful team leaders created a climate where AAC use was an expected part of the student's classroom experience. This model was believed the most effective environment for successful AAC use (Bailey, 2016).

With this premise in mind, Beck (2001) stated that a child's success with communication was dependent upon the environment and the communication partners, along with exposure to a variety of attitudes and interactive styles. Negative attitudes of communication partners can create a communication barrier for the individual using AAC. Beck (2001) found, when considering previous research, that some adults may dominate conversations with children who use AAC and that children were dependent adults to ensure that AAC communication devices were programmed and readily available to them. It was shown that children who used AAC responded only during times they were obligated, and they experienced restricted communication opportunities. Overall, the communication interactions between children who used AAC and adults impacted their success in developing language (Beck, 2001).

Beck (2001) and the research team wanted to understand the factors that formed attitudes about AAC use to provide more information and assist with shaping AAC interventions.

Influences on the attitudes towards AAC devices were due to the type of AAC technique the individual used, the type of information provided about the AAC user, the length of augmented messages, and the degree of competency the AAC user demonstrated in operating a device. The research team conducted two separate studies to assess what influenced the adults' attitudes about AAC (Beck, 2001).

The first study used a measurement scale called the Professionals Attitudes Regarding Children Who Communicate Augmentatively (PARCCA). The PARCCA was administered to 289 college students majoring in speech pathology, special education, or audiology. The participants all had some information about AAC and would later experience individuals who used AAC to communicate. The overall results of the scale were positive. Researchers claimed that the participants' basic knowledge of individuals with communication needs and AAC influenced the positive scoring. Students who were further along in their program displayed advanced knowledge and gave higher scores than students just beginning their program. The research team concluded that exposure to children with disabilities and communication needs plus basic communication information impacted the responses. The results of the second study were comparable. A separate set of participants enrolled in a special education class, were shown three sets of videos. The first video was an introduction to AAC. The second video showed a child using an AAC device to interact with an adult. Each child in the video used a different AAC device and the adult practiced different AAC techniques during the interactions. The final video contained closing instructions which touched on key information from the previous two videos. The participants were then administered the PARCCA which asked for their opinions on AAC, disability level, and competency. The results of this study also had high positive scoring. Researchers concluded this was due to the basic knowledge each participant had regarding AAC

and disabilities. Many participants had previous experience working with individuals with disabilities and would gain more experience in future classrooms or work environments. The results of these two studies showed researchers that it was important to provide teachers with basic knowledge of AAC. Data showed that when more information was provided the subjects attitudes changed towards the individuals with AAC (Beck, 2001).

There has been a limited amount of research and information regarding the use of AAC in preschool and its impact on further language development. Barker and the research team sought to answer whether AAC use improved language development in children with complex communication needs. To answer this question, Barker's team created and administered two surveys to classroom teachers of children who used AAC. The first survey examined the current use of AAC in preschool classrooms and the communication partner's role in prompting and asking questions. The second survey considered further the teacher's experience with AAC and gathered more information on previous training. Along with the surveys, the research team also examined the impact that prompting, question asking, and augmented input/modeling AAC had on the language development of preschool children. The research team examined this development over a two-year period (Barker, 2013).

The first survey provided to the teachers was the AAC School Use Survey. This survey assessed the overall use of the AAC in the preschool classroom. The survey gathered information about the types of AAC being used, if the children received prompts to use their AAC, and how often teachers and peers modeled communication on the device or provided augmented input. The second survey was the Teacher and School Characteristic Survey which assessed the participating teacher experiences with AAC. The teachers answered questions about their overall experience with AAC and the type and frequency of training they received on AAC. Along with

the surveys, the research team gathered information on the expressive language of the preschool children throughout a span of two years. Prior to the two-year study, children were directly observed and participated in assessments to establish an expressive language baseline. Post study, the children were again directly observed, and their expressive language was measured by assessments that determined the language growth over two years (Barker, 2013).

The results of the AAC school Use Survey showed that most children used the Picture Exchange Communication System (PECS) in school. Sign language and speech generating devices were noted as forms of communication for the children. The survey resulted in additional information about AAC use at the school. Augmented input/modeling of AAC rarely occurred throughout the school day. The answers from the survey showed that AAC modeling/augmented input occurred an average of two to three times per day. Along with the teachers infrequent use of AAC, the children's peers also did not provide input using the device. On average, less than one child had a peer who used the device to communicate with them. The children's expressive language increased throughout the two year period. Researchers discovered a significant positive relationship with peer interaction and language growth compared to teacher interaction with the AAC. Peer interaction during instructional time provided peers the opportunity to model on the AAC device which increased the interactions the child received throughout the day. The children with AAC responded more to their peers when they attempted to use their AAC to interact. The results of the study showed that with increased social interactions, the children had more opportunities to communicate with others which increased their overall language development and AAC use. Along with social interactions, peer interactions were equally important in increasing the child's language development. The surveys from this study found that teachers

needed more training, information, and ways to support students with AAC in the classroom (Barker, 2013).

The Role of Communication Partners

Research demonstrated strong correlations between the level of partner support and modeling and increased expressive and receptive communication and overall use of AAC devices. According to Briggs (2019) by modeling AAC, the user makes connections between spoken communication and the symbols included on student devices. To further explore the link between modeling and increased AAC use, Briggs and the research team studied how communication partners impacted a child's use of AAC. The communication partners knowledge of how to properly create communication opportunities for the AAC user was one challenge for AAC users with complex communication needs. The focus of Briggs (2019) study was to facilitate communication between an AAC user and a communication partner in natural settings. Communication partners chosen for the study were familiar to the children. They included parents, teachers, paraeducators, and peers. The AAC users were children or young adults, two to 21 years old who communicated with AAC devices (Biggs, 2019).

The communication partners were taught three separate modeling strategies to implement while conversing with the AAC users; augmented input, modeling through prompts, and modeling through instructional demonstrations. The three strategies were taught through oral instruction, modeling of instructional strategies, and the communication partners received support via feedback during training and after conversing with the AAC users. The natural communication modeling provided AAC users with more opportunities to increase and develop

their AAC skills. Peers and parents increased their AAC modeling attempts using augmented input while school personnel relied on prompts as models. Throughout conversations, the communication partners also used a range of additional strategies. Communication partners were observed adapting the environment. This involved placing items out of reach providing the AAC user more opportunities to practice requesting items. Other strategies included expectant/time delay, open-ended questions, and turn-taking. Creating natural communication opportunities through modeling for individuals with AAC devices provided educators and families situations that encouraged communication across a range of settings (Briggs, 2019).

Furthermore, Kent-Walsh (2015) argued the importance of partner instruction in the use of AAC. Kent-Walsh and the research team attempted to gather information on the complex relationship between the AAC user and the communication partner. The purpose of the research was to determine how partner instruction impacted the communication of individuals using AAC. The research systematically reviewed previous research and data analysis to determine whether any moderating variables influenced participant intervention or outcome characteristics for individuals with complex communication needs who used AAC (Kent-Walsh, 2015).

Seventeen single-case design studies were found which included 53 individuals with complex communication needs. The study participants used high and low tech AAC options, including voice output devices. The communication partners included caregivers, educational assistants, parents, peers, and teachers. The systematic data review discovered two widely used instructional methods, strategy instruction and individual skill training. The strategy instruction method used the communication partner to teach the communication skills throughout a multi-step process. In individual skills training, the communication partner taught a variety of skills in a less structured process or setting. The communication partners taught skills through modeling

communication using AAC, verbal rehearsal, created opportunities for individuals to practice targeted skills, and guided instruction; where a communication partner reduced the levels of prompting and support (Kent-Walsh, 2015).

Moderate, large, or exceptionally large effects on the Improvement Rate Difference (IRD) for the individuals using AAC were noted in the intervention results. Individuals under the age of 12 had the highest levels of improvement following the interventions. Aided AAC modeling, expectant delay, and open-ended questions resulted in the highest instructional success across the interventions. The results of the analysis concluded that communication partner instruction positively affected the communication abilities of individuals with complex communication needs using AAC. The findings showed how the communication partner's participation during the intervention benefitted communicators. Kent-Walsh stated, "partner instruction should be viewed as an integral part of AAC instruction" (Kent-Walsh, page 280). The communication partner instruction had the possibility of being implemented across a range of individuals including education assistants, family members, peers, and teachers (Kent-Walsh, 2015).

In a follow up study, Brady (2010) stated that young preschool children are faced with the challenge of being introduced to a new form of communication using AAC while also navigating their new school environment. Brady (2010) discussed the challenges teachers faced when implementing AAC in the classroom. Teachers may not have had sufficient AAC training or the means to fully implement AAC into the classroom instruction. The research team considered these challenges and investigated communication opportunities for preschool children using AAC to further generate appropriate training methods and increase AAC use in the classroom (Brady, 2010).

Thirty preschool children were selected for this study. Baseline data showed that the children used less than 20 different words, symbols, or signs. Each child also had an IEP goal that included the use of AAC. The research team sought to answer questions regarding teacher input and the classroom environment. To answer the first question, does teacher input affect the communication of students using AAC; the research team conducted observations of the children in the classroom as they interacted with adults throughout the day. During each observation session the researcher recorded any communicative behavior, initiation, or response, made by the child and any communication initiation, prompt, or response directed towards the student made by the adult. Any communication response was recorded within three seconds of the initiation during each observation. The second research question considered whether the classroom environment impacted the child's communication. To assess the classroom environment, the research team used the Early Childhood Environment Rating Scale- Revised (ECERS-R). This tool measured the overall quality of the classroom program. The ECERS-R data was collected through teacher interviews and also observations of the classrooms as a whole (Brady, 2010).

The results of the ECERS-R showed that the participating classrooms scored in the high-quality environment range. The research team did not find a strong relationship between the environment and the children's communication opportunities. More information was provided through observations of interactions between the adults and the children. The children's response rates were higher than their initiation rates. The majority of communication was initiated by the adults while the children initiated communication (by any mode) once every 10 minutes and responded to adult initiated communication every two minutes. The observation results showed fewer communicative opportunities for children using AAC in preschool environments. The findings suggested that further investigations would be helpful to increase

communication input to preschool children using AAC and noted that adult input increased the language development in children. The research team suggested that intervention techniques such as 1:1 teaching, milieu teaching, and encouraging any communication made by the children provided the opportunity to increase language production skills (Brady, 2010).

The growing body of research and information surrounding AAC strategies showed that communication trainers, including peers, teachers, and family members were important to communicative success. Communication trainers provided opportunities for training in natural environments. The Communication Partner Instruction (CPI) method promoted AAC learning in adults. Ogletree and the research team analyzed CPI implementation in a group of adults with intellectual disabilities. CPI provided specific instructional guidelines to assist trainers with learning, generalizing, and maintaining strategies that supported communication" (Ogletree, pg. 137). The research focused on increased AAC use by communication partners to build the participant's initiation skills (Ogletree, 2016).

The study included four females with intellectual disabilities, a teacher, and two resident staff members. Objects such as board games and laundry preparation materials were provided for video sessions. Each participant had access to a picture communication symbol book. Researchers conducted three periods of data collection that included the success of partner training, an analysis of baseline, pre and post probe sessions data, and how often participants initiated communication using AAC. The CPI partner training consisted of 1) assuring ease of system, 2) providing communication opportunities within daily routines, and 3) modeling access when communication opportunities arose. Resident staff interacted with participants through board games, preferred readings, and daily living activities. The CPI seven-step program was implemented over 11 weeks. Throughout training, communication boards were used while

interactions were videotaped. The researchers analyzed the participants ability to initiate conversations independent from staff prompts. Staff completed a communication questionnaire which analyzed their satisfaction with the AAC system (Ogletree, 2016).

The study to determine the success of Communication Partner Instruction (CPI) training with individuals who had intellectual disabilities showed that the training increased communication opportunities for participants. Data indicated three of the four participants showed a significant increase in modeling. Inclusive evidence was found for ease of system use. Researchers hypothesized that participants did not access AAC during enjoyable activities. The participants showed increased ability to initiate conversation using AAC. The questionnaire responses determined that staff supported the training program and implementation at the facility (Ogletree, 2016).

Thiemann-Bourque (2012) studied the benefits of using peer-mediated interventions to increase the communicative acts for children with autism. Peer-mediated social interactions benefitted children's communicative engagement including increased requests, comments, secures for attention, offers to share or help, expression of affection, and organizing play. Thiemann-Bourque (2012) designed a two-peer- mediated program with AAC instruction integrated into the program. The program goal was to teach peer communication partners how to use different AAC systems and how to create a successful AAC environment within the classroom.

The study was divided into two parts. One study focused on the children who communicated using the Picture Exchange System (PECS). The second focused on the children who used a Speech Generating Device (SGD) for communication. Preschool children with autism and peers without disabilities were chosen for both studies. The children selected for the

focus group demonstrated low numbers of communication acts prior to the study. Study one and study two had similar agendas. The peers selected were each trained to use the PECS or the SGDs dependent on which study they were assigned. The researchers overall goal was to teach the peers how to be responsive communication partners. The term “stay-play and talk” was used throughout the training and during the communication sessions. When the focus child handed a picture to the peer, the peer verbally stated the name of the picture and then handed the requested item to the child. For the SGD group, the peers were trained to use the device and then modeled how to locate the word on the device (Thiemann-Bourque, 2012).

Through this study, Thiemann-Bourque found many strategies that enforced effective AAC use in the classroom. The study showed that teaching AAC strategies, creating interesting activities for children, and creating smaller groups resulted in shorter wait time and successfully increased the children’s communication acts. Thiemann-Borque also noted that increased opportunities for children to communicate throughout the day increased their expressive communication. The results of the study showed that the communication of the children with autism significantly increased compared to the limited number of communication acts they used prior to the study. The peers’ communication acts also increased, yet peers did not utilize the PECs system as frequently as the SGD. The SGD study showed significant increases in the children's use of requests, gestures, and initiating communication. The SGD displayed a more balanced communication interaction compared to using PECs. The results concluded that many variables indeed impacted the success of AAC implementation (Thiemann-Bourque, 2012).

Moreover, research completed by Midtlin (2014) indicated that communication was a fluid process heavily dependent on the individuals who participated. Data for AAC users has showed communicative challenges with differing outcomes related to communication

interactions. Due to this difference building communication skills for both partners to create a successful communication exchange was deemed essential. To address these challenges, Midtlin (2014) assessed the opinions of AAC users and investigated the strategies they wanted their communication partners to utilize during conversation.

The study consisted of nine child participants with intellectual disabilities who used AAC to communicate. In addition, each child had access to a Talk Mat (a communication mat which consisted of multiple symbols). The researchers asked the participants questions about what communication strategies their partner used, how they liked to initiate conversation, and background questions about school, home, family, and friends. The questions were presented in an open-ended format, for example, "what do you think about…" and "do you like…" The participants answered the questions using Talk Mats with statements "like," "unsure," and "do not like" (Midtlin, 2014).

The interviews occurred in a familiar setting for participants with one researcher who asked the questions. The Talk Mat contained visual symbols representing the questions and provided visual symbols representing a variety of answers. The interviewer asked questions and provided a visual symbol that corresponded to the question asked. The participant placed the symbol or pointed to their answer on the mat. The interviewer marked which answers would be further analyzed. The interviews were also videotaped to review any non-verbal communication attempts the interviewer may have missed (Midtlin, 2014).

The answers to the background questions showed that the participants preferred having conversations with people they knew and who had knowledge about their communication methods. Participants stated they did not like when their communicative attempts were overlooked (vocalizations, movement, laughing, or smiling). The participants also shared they

liked when their communication partners initiated conversation with them. An analysis of conversational topics showed that some participants liked being asked “yes” or “no” questions while others expressed that they wanted more opportunities to express themselves and share their interests throughout conversations. The participants also disliked when they were not provided enough time to answer questions or finish talking (Midtlin, 2014).

Use of AAC to Reduce Challenging Behaviors

Children with intellectual disabilities who were unable to communicate their needs developed challenging behaviors. Researchers found a strong correlation between problem behaviors and communication deficits and stressed the importance of communication interventions that teach appropriate communication to meet basic needs. Hetzroni (2013) stated, AAC intervention builds strategies and abilities that increases communication acts and decreases challenging behaviors. Hetzroni and the research team investigated a school-wide positive behavior support plan surrounding AAC implementation. The goal of the positive behavior support plan was to increase the communication of children with intellectual disabilities and decrease problem behaviors due to communication difficulties (Hetzroni, 2013).

The study took place at a school in Israel for students with intellectual disabilities who demonstrated moderate to severe developmental disabilities that resulted in consistent communication difficulties and problem behaviors as observed over a two-year span. The speech-language pathologists (SLPs) at the school were utilized to train the teachers through workshops based on communication profiles of the students. The teachers received information about AAC, including AAC models of high-tech and low-tech devices, assessment and intervention, symbol sets, and how to enhance the use of symbols for communication in the classroom. The positive behavior support plan was described in detail and teachers were made aware that the overall goal was to increase the communication skills of the selected students. The

teachers created individual positive behavior support plans for each student based on their communication abilities, behaviors, data, and AAC plan. The positive behavior support plans were implemented in the classroom. The SLP participated in classroom activities throughout the year and plans were implemented to assist the teachers and students with AAC (Hetzroni, 2013).

The study results showed students problem behaviors decreased from 35 to 26 occurrences at the end of the year. The increased communication opportunities eliminated the following problem behaviors, hitting, biting, and lying on the floor. The research team investigated each classroom and found no significant differences in results across classrooms. The only difference noted was the number of symbols used in each classroom. Teachers implemented symbol use into the daily classroom routine. Symbols were displayed through visual schedules, activities, and visual aids. As the year progressed, an increased number of students began using symbols to communicate, resulting in the IEP team creating communication boards based on the symbols used throughout a student's day. The results concluded that AAC training and intervention increased overall student communication resulting in decreased problem behaviors (Hetzroni, 2013).

Bingham (2007) highlighted the importance of training paraeducators to assist students in using their AAC devices to decrease the challenging behaviors displayed in place of appropriate communication. Paraeducators in the study were trained to prompt students to use their AAC devices to communicate, respond to student requests or intent to communicate, and to facilitate the overall use of AAC. Paraeducators also gained more information about the relationship between behaviors and communication and were asked to self-evaluate while working with the students and their AAC devices (Bingham, 2007).

The study included three paraeducators who worked with students with severe/profound disabilities, used AAC to communicate, and had a history of challenging behaviors. The paraeducators received training in a staff development classroom. Once the paraeducators received adequate training, they then began working with the students using AAC devices in natural classroom situations. Throughout this time, the paraeducators prompted the students to use their AAC device to express their wants or needs and responded to the students' communicative intent within three seconds. Baseline data from this study showed that paraeducators prompted their students to use AAC an average of zero-one prompts. After they received training, paraeducators averaged seven-16 prompts to students to use their AAC devices. The baseline data was like the paraeducator responses to student's communication attempts. Prior to the training paraeducators responded to communications attempts less than one time during the observation sessions. After receiving the training paraeducators responded to student's communication attempts an average of five-15 times. The paraeducator training highlighted the relationship between behavior and communication and ways to facilitate communication with students using the AAC device resulted in decreased challenging behaviors displayed by the students. The results of this research further support the importance of communication partner support in building and facilitating communication with AAC and illustrates the benefits for students and staff when these steps are taken (Bingham, 2017).

Binger (2010) argued that educational assistants (EAs) receive minimal instruction on ways to facilitate their students' AAC. Furthermore, EAs spend the most time with students, are an integral part of the AAC team, and carry out educational and communication plans. Binger (2010), implemented a communication instructional program that taught educational assistants how to instruct their students who use AAC devices. Binger explored the effectiveness of the

Initiative for Model Practices in Augmentative and Alternative Communication Program (ImPAACT) and what abilities EAs need to implement, generalize, and maintain the skills learned throughout classroom activities. They included the programming impact on multi-symbol productions created by the students (Binger, 2010).

The study consisted of three educational assistants and three students who used AAC devices. Storybooks were presented to the students and EAs. Each student had a speech-generating device (SGD) with matching symbols related to each story. A vocabulary display board with vocabulary related to the main characters, setting, and plot was presented during reading time. Data was collected through two measures: "the percentage of strategy steps correctly implemented by the EAs on each page of the storybook and the frequency of multi-symbol messages produced by students" (Binger, page 111). Baseline data was collected by EAs who had access to the students SGDs. They noted details of specific interactions between the EA and students during a story reading session (Binger, 2010)

The ImPAACT program followed an eight-step process: 1. Pretest and solicit the EA's commitment to learning the targeted strategy. 2. Describe the strategy. 3. Demonstrate use of the strategy. 4. Provide verbal practice of the strategy steps. 5. Practice implementing the strategy in controlled contexts (i.e., in role plays with the first author). 6. Practice implementing the strategy in natural contexts (i.e., book reading with the children). 7. Complete posttest and solicit the EA's commitment to long-term implementation of the strategy. 8. Demonstrate generalized use of the strategy (Binger, page 112). The implementation of the ImPAACT Program included two phases. The first taught the EA how to use the interaction strategy and the second evaluated the EA's performance using the strategy and how it impacted the students' ability to create multi-symbol utterances. Each EA worked with one instructor and was taught the read, ask, and answer

strategy. The EA prompted strategies until the student independently responded using their SGD. Throughout the story, the EA provided the student with an expectant delay after asking a question. This delay acknowledged that it was the students' turn to answer. The EA responded to any communication attempts made by the student throughout the reading. In addition, the ImPAACT Program focused on errorless learning. This method provided the EA with an instructional coach who provided guidance and feedback throughout the reading activity. Generalization and maintenance probes were collected weeks after the study and the trends listed above were replicated exactly without the instructional coach provided to the EA (Binger, 2010).

The results showed that the EAs followed the strategy steps with 80-100% accuracy by the end of the study. The students demonstrated significant increases from not producing multi-symbol utterances to producing at least 10 multi-symbol utterances throughout the sessions. The generalization and maintenance probes showed that the EAs correctly followed the steps of the strategy and the students created multi-symbol utterances. A feedback measure found that the EAs had a positive experience and would recommend the training to other EAs. The imPACCT Program positively demonstrated the EAs ability to successfully implement the AAC strategies that resulted in students increased use of their SGD (Binger, 2010).

Investigators (e.g. Mirenda, 1997) believed that Functional Communication Training (FCT) reduced communication challenges for individuals using verbal methods. Mirenda (1997) assessed the impact of FCT for users of AAC who displayed challenging behaviors. "FCT involved both the assessment of the function of the problem behavior and the teaching of a more appropriate form that serves the same function" (Mirenda pg. 207). The research was collected through a review of previous studies (Mirenda, 1997).

The research team reviewed 21 studies which included 52 participants who used AAC and displayed challenging behaviors. Challenging behaviors included, self-harm, physical aggression, off-task behaviors, non-compliance, screaming, and yelling. They investigated the function of the participants behaviors with interviews, functional analysis, Motivation Assessment Scale (MAS), and observations with data collection. The functions of the behaviors included escape, attention seeking, and sensory motivation. AAC techniques previously used by the participants were manual signing, gestures, communication books, and voice output communication aids (VOCA). The FCT implementation taught communication skills which directly tied to the challenging behavior. This method was described as a response match. "The new communication behavior must serve the same function as the challenging behavior in order for the latter to be reduced" (Mirenda, 1997).

For escape motivated behaviors, students were taught the terms "go," "break," "help," "stop," and "please." Students were also prompted to gain the teacher's attention or to choose their next break activity. Students who sought attention were taught the terms "pay attention to me," "come here," and "more." Staff interacting with students were taught response mastery. Response success was measured by requiring responses and recognizing any communicative intent. Responses showed a reduction in challenging behaviors (Mirenda, 1997).

The results showed that some participants demonstrated a gradual reduction in challenging behaviors while others showed no changes. Researchers hypothesized this was due to ineffective implementation by staff. Follow-up studies after 17 months showed positive results and a decrease in challenging behaviors. Successful implementation and maintenance were attained by including 1) natural settings for instruction, 2) distributed practice trials, 3) selection of FCT/AAC behaviors that were efficient, acceptable, and recognized by others. The results

proved that FCT should be considered as an instructional method to address challenging behaviors. According to Mirenda, communication and behavior are parallel. Another way to conceptualize this is 'Behavior is Communication'. Education personnel need the required training to implement communication intervention to address the communication and behavior relationship (Mirenda, 1997).

AAC Interventions

Research emphasized the importance of having a communication partner when students communicate using AAC. Typically individuals using AAC receive spoken language input from their communication partners. This creates an asymmetrical relationship between the communication input the AAC user receives and the communication output they generate. AAC users are multi-modal communicators. They have many output choices (AAC devices, gestures, vocalizations, facial expressions, and writing). Past research pointed to a wide variety of training methods available for AAC implementation. O'Neil (2018) investigated how interventions impacted the use of AAC. The interventions included aided input, aided language modeling, and aided language stimulation. The interventions chosen for this study were based on rebalancing the asymmetry between the communication input and communication output between AAC users and their communication partners. O'Neil defined aided AAC input as "interventions in which partners point to (or activate) aided AAC symbols (on communication boards, SGDs, or mobile technologies) while speaking with an individual who uses AAC" (O'Neil, page 1744).

Individuals with developmental disabilities who used AAC devices, including communication boards, AAC devices or other speech generating devices to communicate were chosen for this study. Communication partners were assigned to each participant. Researchers, paraprofessionals, parents, and peers implemented the intervention to the AAC users. Most of the

sessions used key-worded input when modeling on the communication board or AAC device. Few studies used aided input with full phrases. The communication partners modeled using the AAC device as they spoke. The communication partners were instructed to use different intervention strategies to increase the communication opportunities for the AAC users. Expectant delay, open-ended questions, and prompting (gestural, physical, or spoken) were intervention strategies the partners were instructed to use (O'Neil, 2018)

The results of the study showed that aided AAC supported comprehension in individuals who used AAC devices. The intervention methods provided AAC users a model of the expressive output which in turn increased their expressive output on the AAC device. Pairing the spoken word with the AAC symbol balanced out the asymmetry between input and output. The AAC user received a multi-modal form of communicative input through the intervention techniques. Researchers also noted that modeling the AAC system by the communication partner slowed down the pace of the interaction which may have provided the AAC user increased time to process and comprehend the communicative input. The results of the study showed successful interventions amongst a range of ages. Interventions for older adults and young children were not as successful as the other age groups in the study. Researchers hypothesized this may have occurred due to the inappropriate communication symbols for children learning language and communication. The older population of AAC users may have experienced failure and learned helplessness in the past which may have affected the results. (O'Neil, 2018)

Overall, the research team saw more successful interventions that included a speech generating device. When using the aided language paired with a non-SGD, the AAC user received two forms of input throughout the conversation. The use of aided language paired with a voice output device provided the AAC user with three input methods, verbal input from

communication partner, use of AAC symbol, and the auditory input from the voice output device. Researchers further stated that the results of aided language paired with the voice output device helped rebalance the asymmetry the AAC users experienced prior to the study. They also stated that the voice output device or a non-SGD (communication board) results showed high effect sizes for the AAC users. This meant that the use of aided language input was successful for individuals using a voice output device or non-SGD (O'Neil, 2018).

Furthermore Kasari (2014) investigated ways to create opportunities to increase spontaneous communication and participation for minimally verbal children. Previous research indicated that the focus of increasing children's communication use of AAC had been by teaching them to request items from an adult. Kasari and the research team sought to discover ways to increase children's overall social interactions using AAC, specifically, speech generating devices (SGD) (Kasari, 2014).

The team investigated the implementation of two intervention treatments. The first intervention was Joint Attention and Symbolic Play Engagement and Regulation (JASPER). According to Kasari, JASPER "focuses on early social communication skills including coordinate joint attention and gestures" (Kasari, page 7). Throughout the intervention the researchers attempted to maintain joint attention with the children and taught them requesting skills using the SGD in a naturalistic play setting. During this intervention, the communication partner attempted to respond to any communication attempts made by the child. The second intervention implemented was Enhanced Milieu Teaching (EMT). EMT follows seven core strategies that teach children language. Kasari defined EMT as "following the child's lead in conversation and play, responding to communicative initiations from the child with target language, expanding child utterances by adding words to increase complexity while maintaining

the child's meaning, and arranging the environment to support and elicit communication from the child" (Kasari, page 7). The research team attempted a blended intervention approach using the two interventions to increase the children's abilities to create novel and spontaneous utterances using the SGDs (Kasari, 2014).

The children selected for the research study demonstrated communication needs and were minimally verbal. The researchers combined the two intervention approaches and exposed the children to the treatment design over a span of 12 weeks. The interventions were implemented during play activities where the therapist instructed the child, facilitated joint attention, and engaged in symbolic play and social use of language. Each child had access to an SGD with preprogrammed vocabulary related to the play setting. Throughout the sessions, the therapist modeled language on the SGD. The research team included parents by creating observation opportunities, providing training, and participating in the interventions with their child (Kasari, 2014).

The study findings showed that the children's total production of utterances significantly increased. The results revealed that the children's utterances doubled compared to their baseline scores. The research team hypothesized that introducing the SGD at the beginning of the intervention resulted in increased production of novel utterances compared to using only spoken language to communicate. Another hypothesis for the increase in utterances was due to the child directed approach. Previous research focused on teaching the child to follow directions and request wanted items. This adaptive intervention program exposed the child to a variety of communication opportunities using novel vocabulary and modeling language. This approach resulted in the children showing an increased variety of communicative utterances, words, and

functions. The results concluded that interventions should occur in the child's natural environment with frequent access to an SGD (Kasari, 2014).

Individuals with complex communication needs communicate through means that are difficult for the communication partners to fully understand. The communication barrier causes negative interactions and produces challenging behaviors for these individuals. To address these challenges, researchers discussed the importance of increasing the functional symbolic nature of communication and implementing AAC in the individual's daily communication. Research has demonstrated the success of aided language stimulation (ALS) used to increase the functionality of communication. Beck (2009) investigated the use of ALS and determined that ALS was an effective communicative tool for adults with developmental disabilities (Beck, 2009).

The study consisted of adults with developmental disabilities who had complex communication needs. Individuals with verbal speech were also included in the study. The research team hoped these individuals could provide communication models for the targeted subjects. The main intervention goal was to increase the participants' functional communication skills. To reach the goal, the researchers provided everyone with a Go-Talk communication device, communication boards, and individual picture or graphic symbols. Each group of investigators was led by a licensed speech language pathologist (SLP). The study began with an informal evaluation. Subjects were presented with a list of pictures to select on the ACC device. Data collected measured how accurately the individuals completed each task presented via a picture on AAC device. The experimental portion of the study consisted of written scripts presented to the participants during an introduction routine and music time. Participants had access to a Go-Talk device or a communication board during all activities. The group leader demonstrated the activity by using a communication board or AAC device to model

communication by pointing to specific pictures or symbols. Participants responded by answering questions. Everyone had access to vocabulary related to their chosen activity. The participants were encouraged to communicate throughout the activities. The researchers provided an expectant delay following a question or prompting a response. Staff members observed during all activities and learned the intervention techniques being taught to the participants (Beck, 2009)

Individual participants demonstrated increased turn-taking, use of aided AAC, and communicative attempts. The results of the study showed that the participants maintained the skills when the intervention was discontinued. The participants also displayed more variability in their speech topics when communicating. The results of the study determined that using ALS for a communication intervention was successful. Modeling functional communication and encouraging communication participation in the activities proved beneficial and increased the communicative acts for each participant (Beck, 2009).

Dada (2009) agreed the mode of communication input impacted the overall communication and spoken comprehension abilities of the child. Dada (2009) explicitly stated, "the comprehension of spoken language provides an essential foundation upon which language production competence can be built" (Dada, pg. 50). The input provided to the child should be formed surrounding the mode of language they used to communicate. Dada and the research team further investigated this idea and ways Aided Language Stimulation (ALS) affected the vocabulary acquisition of children with little or no functional speech (LNFS). In this study, ALS was defined as pointing to picture symbols coinciding with verbal communication (Dada, 2009).

To investigate the effects of aided language stimulation, children with LNFS were selected to participate in a three-week group language stimulation program. Prior to the program, the research team measured the children's current language abilities and selected 24 target

vocabulary words. The researchers agreed that the children did not have prior knowledge of the 24 target vocabulary words. During the study, researchers provided a spoken target word to the child while simultaneously pointing to the symbol on a communication board. The researchers attempted to conduct this study in the children's natural environment. ALS was provided to the children during typical activities like story time, food preparation and art activities. The communication boards had symbols that corresponded with the children's activities. A probe test assessed the children's acquisition of the 24 target words by having them match the spoken label to an object (Dada, 2009).

The results showed a slight increase in language during children's activities when supported with ALS. Previous research noted that providing children ALS, 70% per interaction, increased communication output. The frequency of ALS in this study was an average of 76% to 93% of the time across the range of activities. The story time activity displayed the largest acquisition of vocabulary words. The research team hypothesized this was due to the repetitive nature of the story and the frequent exposure to the target vocabulary words. ALS was hypothesized to be effective due to the activity-based nature of the program. The children accessed the language input in a natural environment across a variety of activities that increased their contextual learning and ability to generalize the vocabulary words. Dada shared, "learning was facilitated through social interactions or processes and through the active participation of the child" (pg. 57). The research team further stated that vocabulary acquisition was highly dependent on experience including interactions and exposure (Dada, 2009).

In a follow-up study, Dodd (2013) considered that the overall goal of AAC interventions and implementation was to assist users in becoming effective and efficient communicators. Dodd and the research team discovered a disconnect between the language model provided to the AAC

users, limited communication opportunities, and unclear desired outcomes for intervention. Dodd further stated that typically developing children learn language as they are exposed to it through interactions. Children with AAC differ during this learning process by learning language on their AAC device while also receiving language through a different input mode. Dodd explained that during this time of development, children participated in "code switching" between the AAC language and their exposure to verbal input. This confused and challenged children who were developing language who had not mastered either communication mode. Dodd (2013) sought to create an immersive language rich intervention to meet the AAC needs of developing communicators (Dodd, 2013).

An intervention phase was created to introduce vocabulary words. Dodd found it was useful to customize the vocabulary based on the child's AAC needs. Dodd explained that it was important to include vocabulary words consistent within the child's environment to provide more opportunities to engage and create novel utterances. The intervention phase included individual training to gain enough training and time with the intervention plan. Throughout the intervention phase, an AAC rich environment was created. An AAC rich environment provided the child with multiple opportunities to communicate which exposed them to meaningful vocabulary. Picture schedules, choice boards, and adapted stories were created during the intervention phase (Dodd, 2013).

During the implementation phase, the child was guided and encouraged to create novel utterances using a variety of communicative functions. As the child was exposed to an increased number of vocabulary words the adult slowly faded prompting that resulted in building the child's AAC independence. The adults were guided to follow the child's lead during communication interactions and to couple verbal speech with specific AAC communication

modes. The intervention and implementation phases created an individualized plan in which the child using the AAC developed meaningful vocabulary knowledge while being exposed to language using the AAC device. Dodd used and applied the findings to AAC implementation during classroom instruction. Teachers modeled language on AAC devices during one-to-one opportunities. Providing the child frequent access to the device and providing enough vocabulary words increased the overall language knowledge and communication opportunities. Dodd also stated that AAC users were strong visual learners and interventions should be based on this strength and exposed to consistent visuals and symbols based on their specific AAC type (Dodd, 2013).

Similarly, Wu (2013) addressed the way individuals with complex communication needs using AAC received information from their communication partners. Individuals received input from communication partners through verbal speech but were expected to learn advanced expressive methods through pictures, symbols, and signs. Wu expressed concerns about the asymmetry of this method and expressed ways ALS assisted in solving this challenge. Previous research studies measured the effectiveness of teaching ALS to individuals through a 1:1 ratio design. Wu and the research team attempted to investigate ALS in a real classroom environment where group teaching was the most commonly used instructional method (Wu, 2013).

The study took place in a special education classroom for students with moderate to severe cognitive disabilities and complex communication needs. The instruction was presented by a teacher and one teaching assistant. The teachers presented two picture books with selected vocabularies and matching picture communication symbols. Each student had personal access to a high-tech voice output device (Go-Talk). Aided language stimulation was the primary instructional method during the class activity. ALS was defined as “pointing to key symbols on

the learner's communication display in conjunction with all ongoing verbal language stimulation being directed toward the learner" (Wu, page. 11).

Prior to the intervention, baseline data was taken in the form of vocabulary comprehension probes. When the teacher prompted with a phrase such as "show me __," the student located the vocabulary word on the Go-Talk device. During instruction, the teacher pointed to specific words or pictures from the story while simultaneously pointing to the matching symbol on the student's communication device. Following the teacher modeling students were directed to find the words on their devices. If students were unable to find the symbols, the teacher practiced one-to-one ALS instruction with them until they could locate the symbols independently. These steps occurred for each of the stories presented in the classroom. The post-test phase, like the pre-test phase determined how well the students maintained and generalized the skills after the intervention and a year later (Wu, 2013).

The students demonstrated significant vocabulary acquisition during the post-test and generalization phases. The teachers reported that they gained confidence in teaching students with moderate to severe cognitive disabilities and better understand students' receptive language levels. The results showed that ALS could be taught during both individual and group sessions. ALS solved the asymmetrical communication barrier many students experienced while using AAC in classroom settings. ALS provided the students visual and auditory input aligned with their output method. This resulted in increased symbol knowledge for the students (Wu, 2013).

In other words, ALS increased symbol comprehension and symbol production in individuals who used AAC. Harris (2004) along with other researchers understood the disconnect between language input in the children's language development when they used AAC. Harris (2004) and the research team questioned the impact that ALS had on AAC users

with moderate cognitive disabilities regarding their symbol comprehension and symbol production using the device (Harris, 2004)

Harris (2004) chose three preschool children with moderate cognitive disabilities who produced 30 or less communicative utterances. Twelve target vocabulary words were selected for the study with which the children had no prior knowledge. Following baselined data collection, the researchers and teachers discussed student's preferred activities. During the intervention, the researchers created scripted routines for each preferred activity while implementing aided language stimulation using the communication display. The researcher pointed to each symbol associated with the target vocabulary words on the communication display. Once exposed to the words, the researcher pointed to objects during the activity and requested that the child locate the associated symbol on the communication display. The researchers assessed comprehension by conducting daily probes before introducing new activities (Harris, 2004).

The data results concluded that each child gradually increased symbol comprehension and production. The act of exposing the children to verbal and symbol stimuli proved that children were attuned to both sets of stimuli. The research team suggested that further research should target the relationship between language comprehension and AAC production. The results of this study showed that children with moderate cognitive disabilities can acquire symbol comprehension and production skills through the implementation of ALS (Harris, 2004).

Duggan (2019) supported ALS by stating, "AAC systems rely on consistent, skilled implementation to promote use of functional vocabulary in various environments, often using an Aided Language Stimulation (ALS) approach" (Duggan, page, 30). ALS was also defined as modeling. The communication partner interacted and utilized the communication system while

conversing with the user. This approach required the communication partner to have significant knowledge and training on the communicative device and how to fully utilize ALS. Duggan and the research team addressed the importance of ALS during AAC intervention and assessed how to effectively teach educational staff to use ALS to increase communication opportunities for AAC users and how to increase overall understanding of AAC use in schools (Duggan, 2019).

The study took place at the Independent Specialist College which supported students with learning disabilities, autism, multi-sensory impairment, and complex communication needs. Most of the students in attendance used AAC devices to communicate. Twelve students and one teaching assistant from each class selected participated in the training delivered through the use of workshops where participants were provided an 'AAC Pack.' This included various resources surrounding the use and application of AAC (Duggan, 2019).

The participants were taught how to use core modeling skills in the form of "repeat, expand, and emphasize," while communicating with a person using AAC. Throughout the training, the participants were provided video models of AAC communicative interactions. The participants then analyzed the video models and evaluated how well they repeated what was being said, expanded on a topic, and emphasized the statements made by the AAC user. Once viewed, the participants reviewed videos of themselves interacting with AAC and self-evaluated their performance and use of techniques. The participants then reviewed the AAC resources provided (Duggan, 2019).

The evaluation results showed that the teaching assistants rated themselves as having increased confidence when using AAC. Culture, learning processes, and barriers were three common themes discovered during the study. The participants stated that an environment which supported AAC was beneficial to enhancing communication opportunities amongst the AAC

users. The participants also stressed the importance of “creating an environment where communication is not a barrier” (Duggan, page 31).

AAC Use in the Inclusive Classroom

Schools around the world had been moving towards more inclusion in the classroom environment for individuals with disabilities. Individuals have faced challenges in inclusion and the ability to fully participate in the general curriculum. Uys (2007) quoted Pendlebury and Enslin, stating “without educational inclusion, individuals are deprived of opportunities for developing those capabilities essential to living a fully human life” (Uys, page 29). Uys and the research team addressed the inclusion challenge in South Africa by viewing how changes in educational setting and teacher training benefitted the communication abilities of students in that environment (Uys, 2007).

Phase one of the intervention began with training the teachers who participated in the study. The research team trained 80 preschool and first grade teachers in schools in South Africa. The training increased the teachers' awareness of individuals with disabilities and introduced them to several ways to stimulate communication, which increased their overall teaching strategies (Uys, 2007).

The research team implemented an activity-based intervention. The activity-based intervention was defined as “a transactional approach that uses naturally occurring actions and reactions to develop functional skills by embedding children’s learning in play activities or routines, which are often child initiated” (Uys, page 29). The intervention method focused on the child’s participation in meaningful activities that assisted in building functional communication skills. The child’s environment was an integral component of the intervention. Researchers closely viewed how the child interacted within the environment and then created the

intervention. By utilizing the child's relationship with the environment, the child was provided the opportunity to generalize the skills being taught. Throughout the activity-based intervention, the research team used aided language stimulation to teach the communication skills. The teacher simultaneously pointed to symbols on a communication board and provided verbal language to the group. This method provided the students with visual input along with verbal language. Teachers were provided with a communication board, symbols for the activities, scripts to guide the activities, and were trained how to use the ALS boards. Teachers received guidance while implementing the activities and participated in self-rating the classroom interaction patterns (Uys, 2007).

The results of the study showed that the teachers involved demonstrated gains from practicing and refining their skills throughout the study. Teacher's attitudes and behaviors towards the presentation and materials also improved as demonstrated by their increased use of classroom management strategies and frequency of interaction using ALS. The research team concluded that teachers who used intervention and ALS created more opportunities for communicative and social interactions in the classroom. Training should be implemented amongst teachers and within classrooms to address the communication challenges presented by individuals with disabilities in inclusive settings (Uys, 2007).

It is challenging to ensure that students with severe disabilities and complex communication needs receive an appropriate education in their least restrictive environment (LRE). According to Calculator (2009), students, classmates, and teachers had an impact on the success of the AAC use in the classroom. Calculator and his research team compiled best evidence practices to gather information and determine how to implement AAC successfully in the classroom. In this study, best practice was defined as "evidenced by successfully including

students in general education classrooms where they participated in the general education curriculum (Calculator, page 329).

Information was obtained through database sources including, EBSCOhost, Academic Search Premier, and Cochrane Database Systematic Reviews. The researchers analyzed journal articles, books and book chapters, manuscripts, papers, and other sources. The key words "augmentative and alternative communication," "inclusive education," and "students with severe disabilities" were used for the searches. To determine evidence of best practice, researchers reviewed the material and considered whether it directly or indirectly impacted AAC use. To be considered as best practice the researchers created inclusionary criteria. Each practice had to be discussed implicitly or explicitly as a best practice, with clear implications for AAC; was able to be qualitatively or quantitatively measured; and was supported at a level of evidence of five or higher on Schlosser and Raghavendra hierarchy of EBPs. The hierarchy of EBPs included evidence of best practice and educational expertise in the implementation of assessments and intervention that were effective and efficient for the individual (Calculator, 2009).

Following the best practice data search, the researchers separated the evidence into best practice categories. The best practice categories included promoting inclusive values, collaboration between general and special educators, collaboration between educators and related service providers, choosing and planning what to teach, scheduling, coordinating, and delivering inclusive services, assessing, and reporting student progress, and instructional strategies. Once each practice was assigned to a category, multiple external raters examined the practices and determined whether the placement was appropriate. The raters' opinions were compared to the researcher's assignments and they agreed with the researchers' assignments (Calculator, 2009).

The final categories displayed themes surrounding the use and success of AAC in general education classrooms. The importance of teaching AAC skills to build the individual's participation in community, school, and relationships with peers was discovered in the category of prompting inclusive values. Experts cited programs focused on social interaction but also needed to promote building friendships between AAC users and peers. Another frequently cited practice was the collaboration between general and special educators. The overall census in this category was that general educators were in charge of each student's education. The experts noted that general education teachers needed to spend time collaborating with the special education teacher to accommodate the student's needs. Comments related to choosing and planning what to teach showed an overall shared opinion that designing AAC programs focused on connecting both the general education curriculum and functional life skills to work towards future goals and build communication skills. Experts in multiple studies rejected the use of pullout strategies as an instructional strategy. Instead they preferred that service providers integrated therapies in more natural environments. All themes found by the research team benefitted students, families, and education providers (Calculator, 2009).

Under the Individuals with Disabilities Education act (IDEA), school-based interventions must follow and be aligned with peer-reviewed research (Ganz, 2013). Ganz (2013) gathered research information that evaluated how the setting and type of AAC influenced the communication outcomes for individuals who received intervention services. specifically Speech Generating Devices (SGDs) and Picture Exchange Communication System (PECS) (Ganz, 2013).

Researchers systematically reviewed most recent literature using the following search parameters: ASD diagnosis, outcomes which included communication skills, social skills,

academic skills, challenging behaviors, and aided AAC interventions. Three separate parameters were considered: setting (home, school therapy room) type of AAC (PECS or SGD) and specific ASD component (sensory, communication, social, behavior). The research team compared baseline and post intervention data. The data results focused on the special and general education settings which produced moderately strong effects and overall better performance in communication compared with interventions completed in the home setting. Both SGD and PECS demonstrated positive effects. PECS moderately improved challenging behaviors while SGDs had a strong effect on challenging behavior. Overall, SGD and PECs most significantly affected overall communication compared to other AAC options.

The research concluded that the setting significantly contributed to the success of an intervention. Researchers hypothesized that the positive results in the general education classroom were due to the students' skills levels and the increased opportunities for communication and interactions between students. The SGDs significantly increased communication skills and decreased the number of challenging behaviors. Researchers hypothesized that SGDs and PECS aided the users' communication (Ganz, 2013).

Harding (2011) conducted a research study to delve further into the planning and implementation process of providing appropriate AAC and supports to children with profound and multiple disabilities. In this study, profound and multiple disabilities was defined as "individuals who have a cognitive impairment while also having multiple disabilities" (Harding). In this definition, multiple disabilities included physical, sensory, or other health related disabilities. Individuals with profound and multiple disabilities are frequently socially isolated. Their unique way of communicating distances them from peers as they rely on others to aid with their communication attempts. The research study sought to find AAC strategies to increase the

communication of children using AAC and increase their experience using multi-modal forms of communication (Harding, 2011).

For this study, two, six-year-old children with profound and multiple disabilities were selected. Through assessment and observations, the research team found that children demonstrated communication using vocalizations, gestures, babble and responded to others. The children displayed strengths in specific areas of instruction, including attention to visual cues, objects, photographs, gestures, and also use of touch or simplified language. The researchers used the children's strengths to plan the intervention along with their communication and cognitive ability levels. Motivating vocabulary words were presented to children during free play time, music time, and at lunch (Harding, 2011).

The individualized implementation approach showed increases in the children's expressive, social, and receptive skills. By providing the children with access to AAC they had more opportunities to demonstrate communicative intent. This resulted in more opportunities to interact with adults, take turns, and make choices. The research team also noted decreased challenging behaviors demonstrated by the children. The study findings highlighted the importance of creating Individualized Education Plan (IEP) goals focused on children's communication abilities relative to cognitive levels and areas of strength. It should be noted that this study also took place in the child's most natural environment. This choice made by the research team proved to support the acquisition of communication skills learned (Harding, 2011).

Stoner et al. (2010) discussed creating an individualized implementation approach in the inclusive classroom. Stoner (2010) explored the benefits of a voice output communication aid (VOCA) which produced understandable speech for communication partners. To facilitate the use of the VOCA devices, Stoner (2010) capitalized on the need to make accommodations for

communication in general education classrooms. Previous AAC implementation led to the abandonment of devices due to inadequate training and overall implementation in the classroom. To answer his question about how AAC systems worked in high school settings, Stoner and the research team investigated the use of VOCA in an inclusive high school setting (Stoner, 2010).

A 16-year-old boy with cerebral palsy participated in the case study. Stoner (2010) noted that the participant utilized assistive technology (AT) from kindergarten and through high school. The participant was fully enrolled in general education classes. A speech language pathologist (SLP), special education teacher, teaching assistant, and three general education teachers participated. The lead researcher acted as an educational consultant to the participants' family and IEP team. Data was collected through academic and personal records and by measured pre and post implementation data. The pre-implementation interview showed that teachers positively viewed the participant's use of AAC in the classroom. The interview revealed concerns surrounding the teachers' role in implementing AAC and having adequate knowledge to fully utilize AAC in the classroom (Stoner, 2010).

AAC training was provided to the participant in one-hour sessions. Members of the study decided that the participant would teach the teachers and staff how to use the AAC. Special education teachers kept a running tally of total times the device was used throughout class. Teachers reported that the participant frequently used the device at the beginning, but his use decreased throughout the semester. Teachers hypothesized that communicative opportunities decreased and the AAC was used frequently for social communication compared with communicating about academics (Stoner, 2010).

Post-interview results concluded that the participant was interested in the device and the teachers understanding of AAC increased. The participant displayed the ability to utilize

different strategies while using the device across a variety of settings. Barriers reported were portability, accessibility, and volume control. The results of this study showed that AAC had provided significant benefits and barriers through its use. The AAC increased the participant's speech intelligibility and provided opportunities for staff to engage in conversations. The study also identified barriers to AAC implementation. The research team discovered that members had to be proactive and address any challenges which occurred. Along with assessments and selecting an appropriate device, adequate training was needed during the implementation process (Stoner, 2010).

Instructional Methods

In response to the increased numbers of children with communication needs being included in the general education setting, McCarthy (2001) argued that children may be present in the classroom but their true skills and abilities were not being accessed. Efforts have been made to enhance communication and create more opportunities for social interaction in inclusive settings for children with communication needs using AAC. Research notes that participation in theater arts programs results in increased communication, social interaction, and artistic expression for individuals with complex communication needs. According to McCarthy, "in theater activities, children have the opportunity to build collaborative learning skills develop appreciation of the motivations and perspectives of others and explore new situations in a non-threatening context" (McCarthy, page 88). The activities provided in theater were adapted and focused on language structures and vocabulary individualized for each participant. McCarthy and the research team analyzed the results of an instructional two-week program with two children who used AAC and their non-disabled peers (McCarthy, 2001).

The research study included children between the ages of six and 10. One group of children selected used AAC to communicate while the other group was considered non-disabled. To meet inclusion criteria children had to have participated in an imaginative play prior to the study. Each day the children were presented activities based on theater arts techniques including ensemble building, pantomime, unscripted role play, and scripted role play. Enrichment activities were also presented to further challenge the children. Prior to the study, the researchers selected vocabulary words that were represented in each theme/activity. To provide the AAC users access to the vocabulary words, the researchers programmed the words into the voice output devices. Throughout the study, the researchers facilitated many conversations by creating communication opportunities initiated by direct questions, questions to the group, spontaneous comments directed to an individual or to the group, or extended pauses. The researchers assessed successful communication when children initiated any communication and someone responded to the attempt (McCarthy, 2001).

The study results showed that participation in theater activities was an effective, instructional intervention for the children involved. Children's engagement and participation increased throughout the activities. The increased rate of including and promoting opportunities for the children to communicate resulted in the children attempting to communicate once per minute during each activity. Researchers found that was important to create materials and goals that assisted the children in generalizing the learned skills. The theater activities also provided the children an adaptive and unique opportunity to be presented with new vocabulary and different concepts across a variety of activities compared to a one-on-one teaching model (McCarthy, 2001).

In addition to a theater arts program, Mechling (2000) investigated another mode of instruction to create an adaptive learning tool for AAC users. Research has commonly indicated independent functioning as a goal for individuals with intellectual disabilities. To build these skills, photographs cued students to what they should do next (task analysis) and assisted in increasing their independent skills. Photographs had previously been used as concrete examples to teach the steps in food preparation, self-care, shopping, and social skills. Photographs were also used to teach functional communication that targeted greetings, protests, and requesting items and objects. Researchers found that teaching these skills was limited due to the lack of opportunities to create meaningful context and experiences in the classroom. Mechling (2000) investigated what effect a computer-based program had on the selection of images for individuals with intellectual disabilities.

Two individuals with intellectual disabilities who used AAC to communicate were selected for the study. Prior to the study, photographs were selected, and personalized video recordings were created which corresponded to the photographs. During the sessions, participants were provided with the three pictures on a computer screen and given the direction "point to." When participants made their selection, a video followed which corresponded with the picture selected. To generalize this skill, participants were directed to select the target photograph or activity on their AAC device which then activated the computer program or provided the object, person, or activity requested (Mechling, 2000).

The results of the computer-based program showed increased communication performance for the two participants. The video modeling increased the participants' understanding of the task being completed which resulted in an increased number of correct responses. Each participant then demonstrated ability to generalize the information on their

device by selecting the corresponding AAC picture. The research team concluded that computer-based programs could be used for functional AAC training in classrooms. Mechling hypothesized that computer-based video technology may be used to teach students with intellectual disabilities meaningful contexts alternatively if they are not yet able to attend to symbols. In the classroom, teachers can more easily pair context through the use of technology and video anchors (Mechling, 2000).

Chapter III: SUMMARY OF LITERATURE

AAC use in special and general education classrooms has continued to expand. The knowledge of teachers and supporting academic educators is an integral part of ensuring that student's communication needs are being met to achieve academic success. Access to communication also provides individuals increased overall quality of life. Inconsistencies in staff training has proven to be a challenge in achieving consistent AAC use. As mentioned in previous chapters, teachers and paraeducators had positive views surrounding the student's use of AAC. Teachers reported they needed more AAC training to increase their confidence and abilities when interacting with students. In addition to teacher training, providing staff the opportunity to collaborate produced more consistent AAC use across a variety of settings. In addition to training teachers, paraeducators also need sufficient AAC training. Paraeducators assist in the implementation of academic, behavioral, and communication plans. Training paraeducators in the use of AAC provides more opportunities for consistent practice, decreased behaviors, and increased communication acts (Dada, 2002, Bailey, 2016, Hetzroni, 2013, Bingham, 2016, Mirenda, 1997).

Teacher and paraeducator participation in the use of AAC proves the importance of communication partners. Communication partners can facilitate communication opportunities for AAC users. Communication support is provided by modeling spoken language and pointing to the related AAC symbol. Communication partner instruction can be implemented with school

personnel and across a variety of settings and individuals. Increased communication partner participation displayed higher AAC use in the individuals. Along with this, communication partners are trained in a variety of intervention methods which are dependent on the communicator's unique AAC needs. Creating an AAC rich environment provides students with more opportunities to communicate and be exposed to more language. In addition it allows students to become more independent (Kent-Walsh, 2015, Ogletree, 2016, Thiemann-Borque, 2012).

The use of Aided Language Simulation (ALS) was discussed in previous chapters. ALS is an intervention method proven to increase the use of AAC and language in students. ALS fixes the asymmetry of language input and output students with AAC experience. As noted previously, multiple researchers discussed how different individuals with communication deficits receive information. ALS is an option to address the symbolic communication AAC users utilize and increases the communication partners use of symbols. ALS was determined successful when targeted vocabulary words were presented during typical day-to-day activities (Beck, 2009, Dada, 2009, Wu, n.d., Harris, 2004, Duggan, 2019).

The unique communication needs individuals with intellectual disabilities has presented a challenge in the general education classroom or their Least Restrictive Environment (LRE). AAC has been used to bridge the communication gap between students and their peers/teachers. Information gathered showed that there are practices and options to successfully implement AAC in the classroom. Overall teacher collaboration creating lessons that encourage social interaction between AAC users and their non-disabled peers have been successful in the classroom. Creating individualized service plans with accommodations also improved AAC use. AAC instructional methods such as, engaging students in interaction and facilitating opportunities to communicate

with the AAC device. Creating meaningful materials and participation across a variety of settings encouraged the generalization of taught skills (Uys, 2007, Calculator, 2009, Harding, 2011, Stoner, 2010)

Professional Application

I came to find that AAC use in the classroom is highly dependent on teacher training and collaboration. Throughout my research, I discovered that there is a misconception that if a student has an AAC device they automatically know how to use it. The research discussed illustrates the value of teacher and paraprofessionals training to successfully implement high or low-tech AAC. I strongly agree with the research findings that teachers need more training and adequate practice to learn the various AAC systems. The importance of collaboration between teachers and speech pathologists is one way to address lack of knowledge and AAC use. Strong collaboration also improves AAC knowledge amongst paraprofessionals. The research highlighted the importance incorporating AAC in the classroom to reduce challenging behaviors in students. Professionally, I have witnessed nonverbal students display physical acts of aggression due to the frustration of not having their communication needs be met. This creates a challenge of physical aggression being a way for them to communicate their needs. The research highlighted the importance of incorporating AAC to reduce challenging behaviors in students. This information will further guide me to assist my students and also paraprofessionals in the classroom to always utilize AAC to ensure communication is being heard. The amount of intervention and instructional methods available to implement AAC can be overwhelming but dedication to learning AAC leads to increased communication, decreased behaviors, and overall more understanding in students.

Limitations of Research

A limitation of this research was lack of information provided from general education classrooms. Most of the research was taken from either special education classrooms or facilities which specialized in intellectual disabilities. Increased environment options would have been beneficial to providing more information on how schools and communities view AAC and implement. More research was needed in the general education setting across a range of classrooms, disabilities, and ages. Increased research in different academic subjects (math, language arts, gym) could provide more information on how to incorporate AAC throughout a range of activities (i.e. counting, reading, writing, physical activities). Few articles were gathered from different countries but lacked information on cultural backgrounds in the use of AAC. Cultural implications for individual students could be a factor in the implementation success of AAC. I believe that increasing the scope of research to different communication possibilities for students could provide more information and motivating ways to engage children and parents to implement AAC.

Implications for Future Research

Additional research about how people from diverse communities or cultures perceive AAC to discover what families believe regrading communication would assist the special education team in developing AAC that would generalize to many settings. Further research should be conducted to study AAC in different community settings. Expanding the research field to more students with diverse cultural backgrounds could provide researchers insight into how families view their child's disability and AAC use. Gathering this information could assist in creating ways to provide families and students with more resources to learn about AAC and to find success.

Implications for Professional Application

I came to this topic because in my years of being a special education teacher there has been an increase in the use of AAC. I have experienced the positive impact AAC has on students with communication needs but I have also experienced the sense of overwhelming confusion when attempting to create meaningful lessons and opportunities for my students to increase their communication and also daily living skills. I approached this topic to gain information for myself on ways to fully incorporate AAC in my classroom. The information I have gathered has shown me that all students have the opportunity to learn and communicate when the right tools are provided for them. This research will also assist me while collaborating with general education teachers, specialists, and related service providers about ways they can implement student's AAC into their lessons and classroom activities.

Throughout my years teaching and attending Bethel University I have seen the value of being a special education teacher. I have the unique opportunity to be a voice for my students while also helping them find theirs. As I stated previously, "to teach AAC, you have to speak AAC." Having a communication difference does not mean the student is un-teachable. As an educator, I am going to take the steps to learn, use, and understand how my student's best communicate. All students have the words but it takes time and patience to help them find their own voice, whatever output method that may be.

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