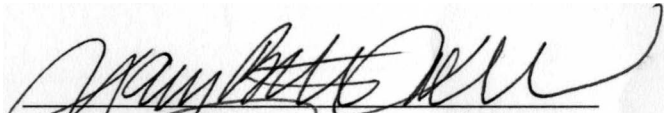St. Cloud State University

The Repository at St. Cloud State

4-2014

Augmentative and Alternative Communication Strategies for Students with Intellectual Disabilities

Hilary Larsen

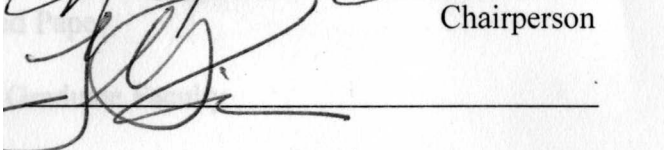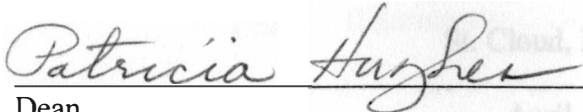This starred paper submitted by Hilary Larsen in partial fulfillment of the requirements for the Degree of Master of Science at St. Cloud State University is hereby approved by the final evaluation committee.

_____
Chairperson

_____

Marcia E. Thompson
_____

Patricia Hughes
_____
Dean
School of Graduate Studies

AUGMENTATIVE A D ALTERNATIVE COMMUNICATIO STRATEGIES FOR

STUDENTS WITH INTELLECTUAL DISABILITIES

by

Hilary Larsen

B. S., St. Cloud State University, 2007

A Starred Paper

Submitted to the Graduate Faculty

of

St. Cloud State University

in Partial Fulfillment of the Requirements

for the Degree

Master of Science

St. Cloud, Minnesota

April, 2014

TABLE OF CONTENTS

LIST OF TABLES

Chapter I

INTRODUCTION

The cognitive functioning of children and youth with intellectual disabilities

(ID) is significantly below average and is associated with concurrent deficits in

adaptive behavior that require special education and related services. One of the most

significant deficits in children with severe ID is a lack of or impairments in speech and

language skills (Charlop-Christy, Carpenter, LeBlanc, & Kellet, 2002; Radstaake,

Didden, Oliver, Allen, & Curfs, 2012). Unfortunately, when children have limited or

no speech, they often engage in challenging behaviors to communicate their emotions,

needs, or wants.

Researchers have implemented a number of interventions to teach children

communication skills as an alternative to problem behaviors (e.g., Charlop-Christy

et al., 2002; Hagopian, Contrucci, Long, & Karena, 2005). Interventions used to

supplement or replace speech are collectively referred to as augmentative and

alternative communication (AAC). AAC incorporates a student's current speech,

vocalizations, and gestures, but also enhances the ability to communicate by providing

symbols, electronic aids, and other strategies (Crissey, 2009). The purpose of this

paper was to review the literature that examines the effects of AAC strategies on the

challenging behavior of students with ID.

Terminology and Eligibility Criteria

Smith, Polloway, Patton, and Dowdy (2008) reported that the term *mental retardation* (MR) is most commonly used to describe a level of functioning that is significantly below average. The participants in Chapter II are diagnosed with various degrees of MR: mild, moderate, severe, and profound. According to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; American Psychiatric Association, 2000), mild MR is defined by an individual's IQ score ranging from 50 to 70, moderate MR is 35 to 55, severe MR is 20 to 40, and profound MR is an IQ score of 20 to 25 or below.

Although the term MR is used within some studies in Chapter II, it is no longer used in many states, just as the terms *feebleminded* and *moron* used in the early 20th century no longer describe individuals who have a significantly below average level of functioning. Although the term MR is now considered by many to be a pejorative term, 26 states still use it and 14 states use similar terms (Smith et al., 2008). The Minnesota Department of Education (2013) uses the term *developmental cognitive disability* (DCD) for educational eligibility. Prior to October of 2010, the Individuals with Disabilities Education Act (IDEA) used the term MR. It was at this time that President Obama signed Rosa's Law that changed the term MR to ID. It should be noted that the definition did not change, only the terminology changed (National Dissemination Center for Children with Disabilities, 2012).

To be eligible for special education services in the area of ID, students must display significantly below IQ and deficits in adaptive behavior that manifested during

the developmental period. Minnesota eligibility criteria mirror federal eligibility criteria. Individuals who qualify for services under the label of DCD in Minnesota must initially have a composite score at or below 15% on a nationally normed measure of adaptive behavior and have an IQ score of two or three standard deviations below the mean (IQ of 70). In most states, adaptive functioning is verified through systematic observations; assessment of cultural, medical, and educational history; and criterion-referenced tests that assess specific abilities (Beirne-Smith, Ittenbach, & Patton, 2002).

Historical Background

From medieval times to the 19th century, children and adults with disabilities were considered "stained" (Graziono, 2002, p. 11). Birth defects were thought to be a punishment for parents who strayed away from conventional standards of behavior. Children with ID and other disabilities were often given to the church, which created asylums to house them. The word asylum meant a place of refuge, protection, care, and safety.

During the 1950s and 1960s, support from advocacy and family associations such as the National Association of Retarded Children (now known as The Arc of the United States) helped the federal government develop and validate practices for youth with disabilities and their families. These practices established the foundation for effective programs and services of special education and early intervention across the United States (Beirne-Smith et al., 2002).

Prior to the 1970s, many individuals with disabilities lived in institutions for persons with mental illness or mental retardation, and these institutions quickly became overcrowded (Graziano, 2002). Many of these facilities provided minimal food, clothing, and shelter. Individuals with disabilities were typically not assessed, educated, or provided with related services such as speech therapy or physical therapy. During the 1970s and 1980s, however, deinstitutionalization and right-to-education efforts significantly decreased the number of children and youth who were placed in institutional settings (Graziano, 2002).

Over the past 40 years, significant gains have been made in developing and facilitating effective services and programs for special education, related services, and early intervention. The PARC v Commonwealth of Pennsylvania case of 1972 provided a major impetus for public education for all children with and without disabilities, and it affirmed that children's rights to education could not be removed without due process of law (Flexer, Bayer, Luft, & Simmons, 2008). PARC won this class action lawsuit, and it proved to be a significant factor in the passage of the Education for All Handicapped Children Act of 1975 (Public Law 94-142). This law provided supports to states in meeting the individual needs and rights of children with disabilities and their families and guarantees a free and appropriate public education (FAPE) in the least restrictive environment. It also ensured that each child with a disability must have an Individualized Education Plan (IEP), mandated evaluations every 3 years, and parental rights to due process (Flexer et al., 2008).

The IDEA (P.L. 100-40) defined Assistive Technology (AT) devices for the first time in 1990 (Westling & Fox, 2009). It also provided the foundation for the provision of no-cost AT devices and services to students with disabilities. IDEA 1997 added two AT mandates. First, on a case-by-case basis, if the IEP team determines a child needs access to school-purchased devices in his or her home or another setting in order to receive FAPE, the first mandate from IDEA 1997 ensures this can take place. The second mandate required that the IEP team consider whether or not all students with disabilities require AT devices in order to receive FAPE. The IEP team's decision must be documented in the IEP (Beirne-Smith et al., 2002).

IDEA was reauthorized in 2004 as the Individuals with Disabilities Education Improvement Act, and it included a small and important change in the definition of AT devices. Specifically, it included the exclusionary language that AT "does not include a medical device that is surgically implanted or the replacement of such device" (Westling & Fox, 2009, p. 513). This law also required schools to provide the services students need to use AT devices adequately.

Summary. Advocacy organizations such as The Arc and federal laws such as PL 94-142 have created more opportunities for individuals with ID. Subsequent to these court and legislative actions, AAC has been widely used within the school setting to assist students with disabilities improve their communication skills.

Augmentative and Alternative
     Communication

Students with ID who have limited to no speech typically require AAC to participate more fully in their schools and community (Pacer Center, 2014). AAC encompasses a wide range of aided and unaided systems to improve communication of individuals that do not speak or their speech is not intelligible (Beirne-Smith et al., 2002). Aided systems use pictures or word boards, a notebook, or a computerized aid. Unaided systems involve an individual using his or her own hands or body to communicate. For example, sign language is a mode of unaided communication. AAC also range from high-to low-tech devices. High-tech AAC is typically a device that is electronic, and a low-tech device is generally something that does not involve electronics such as picture symbols (Beirne-Smith et al., 2002).

Joy Zabala, an AT practitioner who worked as a special education teacher, created a framework to systematically evaluate students' diverse needs and abilities and determine which AT devices and services students need to demonstrate achievement (Zabala, 2010). The Individual Education Plan (IEP) team uses the SETT framework developed by Zabala (2005): Student, Environment, Task, and Tools.

Student. The IEP team needs to look at what the student needs to do, but is unable to independently accomplish at the time. The student's special needs, current abilities, interests, and preferences need to be taken into consideration.

Environment. The IEP team needs to consider the environments that are typical of the student in order to complete IEP goals and objectives. Within each environment the team needs to consider available materials, physical arrangement, instructional arrangement, supports, and resources available to the team to support the student, and attitudes and expectations of staff and parents working with the student.

Tasks. After the student and environment sections are completed, the team needs to consider what activities within the environment are critical to the student's success. General participation and activities related to IEP goals and objectives are both important.

Tools. The last step in the SETT Framework is to determine what devices, training, services, accommodations, and modifications are essential in order to help the students achieve success

Summary. In addition to these critical components, Zabala (2005) emphasized the importance of shared knowledge, collaboration, communication, and multiple perspectives as part of the planning process. These skills are important as part of any comprehensive assessment. They are particularly important in helping an IEP team determine the most appropriate AAC mode or service for each student. When students are not able to communicate effectively, challenging behavior is more likely to occur.

Research Question

One research question guides the development of this literature review: What are the effects of AAC strategies on reducing the challenging behavior of individuals with ID?

Focus of Review

I reviewed 10 studies published from 1999 to 2012. Studies were included for review in Chapter II if they included participants from ages 3 to 18 with ID. I reviewed only studies conducted in the United States.

Academic Search Premier and PsychINFO were used to locate studies on the topic using a variety of keywords and keyword combinations: *developmental disabilities, autism, challenging behavior, behavior, mental retardation,* and *communication.* In addition to reviewing studies from a variety of journals, I explored the tables of contents for the past 2 years of the *Journal of Applied Behavior Analysis* and *Augmentative and Alternative Communication.*

Importance

As a special education teacher with a license in Developmental Disabilities and a graduate certificate in Autism Spectrum Disorders, I have the opportunity to work with children who have impairments in speech and language. Their inability to communicate often results in challenging behavior that appears to be frustrated attempts to communicate their needs. Unfortunately, when students engage in disruptive and sometimes aggressive behaviors, educators must intervene to address

the challenging behavior in a reactive rather than proactive manner. My goal as an educator is to provide my students with the AAC strategies that will enable them to communicate their thoughts, needs, and wants appropriately. As a result, challenging behavior will likely decrease and learning will increase.

AAC AND AT DEFINITIONS

A variety of AAC and AT devices are used within the studies in Chapter II. This section provides a definition of each device.

Activity-Specific Language Board. Individual boards for specific activities are made using language that has been observed to be used among same-aged peers for each specific activity. The board is divided into sections. An academic board has sentence subjects such as *what, you,* and *no* on the far left, followed by verbs such as *quiet, pour,* and *taste.* Objects consisted of various food items (Cafiero, 2001).

Eye Gaze. Eye Gaze is a communication mode for individuals who are nonverbal but have the ability to move their eyes in order to communicate. For example, an individual could use an eye gaze board with pictures on it. The individual looks at a specific picture in order to communicate a message to his or her communication partner (The Bridge School, 2010).

Natural Aided Language. Natural aided language involves speaking and pointing to a corresponding picture on a communication board, while interacting with the participant (Cafiero, 2001).

Photographic Cueing. A photographic cue consists of using a photo to signal a message to a participant. For example, a photo of the next activity during the school day is shown to a child prior to the transition to the next activity (Schmit, Alper, Raschke, & Ryndak, 2000).

Picture-Based Reinforcer Choice Board. A picture-based reinforcer choice board is a mode of communication that uses symbols in grids with the corresponding text. The pictures displayed offer a variety of choices from which the participant can choose. The participant is given a choice after completing a designated task or displaying appropriate behaviors (Cafiero, 2001).

Picture Choice Board. Picture choice boards are used to give nonverbal people choices of preferred activities as a way of reinforcing appropriate on-task behavior (Cafiero, 2001).

Speech-Generating Device (SGDs). SGDs are programmable digital devices that have voice output when a user activates the device by selecting a message. SGDs are a way for individuals with no speech or limited speech to communicate and learn language (Trottier, Kamp, & Mirenda, 2011).

Springboard Lite. Springboard Lite is a high-tech speech output device with multiple options for picture vocabulary ranging from four to 32 words depending upon the user. Visual scenes are available for learning language and new concepts. This device can be used for more than one user and has the ability to save multiple vocabularies on one device. Springboard Lite has a variety of access options that

include direct selection, switch scanning, key guards, and USB connectivity (Snell & Brown, 2011).

Vantage Lite. Vantage Lite is a high-tech speech output device that has multiple options for picture vocabulary ranging from four to 84 words. The device has pre-stored activity rowed categories, vocabulary builder, context scenes for language and concept learning, a built-in media player, and Bluetooth connectivity for hands-free options such as phone, stereo, and computer (Snell & Brown, 2011).

BEHAVIORAL THEORY TERMINOLOGY

Throughout Chapter II a variety of behavior strategies are used. These strategies are used in conjunction with different modes of AAC and approaches to teaching communication.

Antecedent. An antecedent is what happens prior to the behavioral occurrence (Maag, 2004).

Competing Stimuli. Competing stimuli gives the participant access to antecedents that reduce or eliminate challenging behavior. An assessment can help determine which stimuli are associated with the lowest rates of challenging behavior when compared to a no-stimulus control condition (Hagopian et al., 2005).

Consequence. A consequence is what happens after the behavior takes place (Maag, 2004).

Delayed Prompting. Delayed prompting happens after successful trials that include the teacher modeling or physically assisting the participant with task

completion, small amounts of time are inserted between prompts. This allows the participant opportunities to complete the task without too much or no assistance (Snell & Brown, 2011).

Differential Reinforcement. A variety of types of differential reinforcement are used, depending on the behavior to decrease, replace, or eliminate (Maag, 2004).

Differential Reinforcement of Incompatible Behavior (DRI). DRI involves choosing and reinforcing a behavior that is incompatible with the identified behavior deemed to be inappropriate (Maag, 2004).

Differential Reinforcement of Other Behavior (DRO). DRO consists of reinforcing an individual for not engaging in inappropriate behavior for a predetermined time frame (Maag, 2004).

Extinction. Extinction refers to withholding of reinforcement for a conditioned response and consists of two parts: (a) the previously reinforced response is not followed by the typical consequence, and (b) the person is more unlikely to perform the previously reinforced response when he or she encounters the same type of situation (Maag, 2004).

Fading. As the participant gains independence in task completion, prompts are faded to less intrusive prompts to allow for increased independence. The goal is for the participant to independently complete the task with only natural task stimuli (Snell & Brown, 2011).

Forward Chaining. The first step(s) is taught until the individual masters the skill. During this time, the teacher or caregiver completes the rest of the steps for the

individual until he or she has mastered the first step for the task. The student or individual is taught the second step and is expected to the do the first and second step until both are mastered. This process is continued until the individual has mastered all of the steps for the task (Snell & Brown, 2011).

Functional Analysis. This process examines the relationship of the antecedent, the behavior itself, the possible desired outcome of the behavior, and the consequence (Hagopian et al., 2005).

Functional Behavior Assessment. The functional analysis is part of a broader functional behavioral assessment (FBA). The FBA explores environmental factors that might be contributing to performance of the behavior and the outcome the behavior serves. In addition to the functional analysis, the FBA includes interviews with the child, parent, and teachers and/or other staff and also includes behavioral observations and motivational assessments. The purpose of these assessments is to identify the function of the behavior and identify an appropriate replacement behavior that will meet the student's needs (Maag, 2004).

Functional Communication Training (FCT). FCT involves teaching a person to produce an alternative communication behavior to obtain the reinforcer that is maintaining the challenging behavior while challenging behavior is concurrently placed on extinction (Hagopian et al., 2005).

FCT with Extinction and Competing Stimuli. FCT is done while challenging behavior is concurrently placed on extinction. Competing stimuli gives the participant

access to stimuli that reduces or eliminates challenging behavior (Hagopian et al., 2005).

Fixed Ratio (FR). A participant is given reinforcement each time a set number of specific behaviors are performed. An FR-1 means reinforcement is delivered each time the behavior is performed. An FR-10 means the participant would be given reinforcement after the desired behavior is performed 10 times (Maag, 2004).

Overcorrection. Participant(s) repeatedly perform appropriate behavior after inappropriate behavior (Maag, 2004).

Positive Reinforcement. Any stimulus that is given after the behavior that increases the likelihood of the behavior occurring again (Maag, 2004).

Schedule Thinning. This process requires an increase in response requirements for reinforcement (Hagopian et al., 2011).

Variable Ratio (VR) Schedule. In VR schedules, the number of responses/desired behavior(s) required for reinforcement for a specific behavior is unpredictable. The number of behaviors prior to reinforcement varies around some mean value. For example, a VR-8 schedule means the average number of responses/desired behavior(s) required for reinforcement is 8 (Maag, 2004).

DISABILITIES

In Chapter II I review studies that include participants with a number of developmental disorders. These disorders are described briefly in this section.

Angelman Syndrome (AS). AS is a neurodevelopmental disorder that is caused by an absence of maternal genes in the region 15q11-13. Severe ID, ataxia, absence of speech, shaky, and jerky movements and distinctive behaviors such as frequent smiling and hand flapping are common (Radstaake et al., 2012).

Autism Spectrum Disorders. Autism Spectrum Disorders (ASD) falls under the umbrella of ID, but is defined by specific characteristics. ASD is a neurodevelopmental disorder that affects how children process information and view the world. ASD impacts three general areas: socialization and reciprocity, repetitive behaviors, and communication (Aspy & Grossman, 2008).

Cerebral Palsy. Cerebral palsy (CP) is an impairment in functional mobility that is associated with signs of brain dysfunction. CP is a disorder of movement and posture that is caused by nonprogressive abnormalities of the immature brain. Common characteristics include delayed motor movement, increased or decreased muscle tone, atypical reflex patterns, involuntary movements, and spasticity (Batshaw, Pellingro, & Roizen, 2007).

Cornelia de Lange Syndrome. Cornelia de Lange symptoms include abnormal facial features, short stature, low birth weight, small head, and developmental delays ranging from mild to severe. Eighty-five percent of people with this disability have gastroesphageal reflux, behavioral issues, limb differences in comparison to typical people, and other system abnormalities such as communication or hearing impairments (Cornelia de Lange Syndrome Foundation, 2010).

Chapter II

REVIEW OF THE LITERATURE

In this chapter, I review the literature that examines the impact of augmentative and alternative communication (AAC) on the challenging behaviors of students with ID. The first section of Chapter II presents findings of studies that incorporate a variety of strategies. The second section reviews studies that involve the use of Picture Exchange Communication System (PECS).

Studies that Examine Multiple Strategies

A variety of strategies have been used to decrease challenging behavior among individuals with ID. Six studies are included in this section that evaluate the use of various strategies, many in combination with functional communication training (FCT).

Durand (1999) conducted a three-part study to evaluate the effectiveness of FCT as an intervention for challenging behavior both in school and the community. The study was designed to: (a) conduct a functional assessment, (b) teach students to use assistive devices to ask for stimuli that maintained their challenging behaviors within the classroom, and (c) teach students to use assistive devices to ask for stimuli that maintained their challenging behaviors within community settings.

Participants included five children and youth from Pennsylvania and New York who demonstrated frequent challenging behavior (e.g. aggression, self-injury, tantrums) and had a need for an assistive device for communication purposes. Matt was 5-years old and diagnosed with moderate cerebral palsy and moderate mental retardation (MR). He had no verbal language and pointed to express himself. Allison was 15-years old and was diagnosed with CP and severe MR. She was able to follow one-step commands and used eye gaze and head nods to communicate. Mike was 3-years old and was diagnosed with severe MR. His mode of communication consisted of nonverbal gestures, biting his own hand, and throwing objects when he was upset. Ron was 9-years old and was diagnosed with autism spectrum disorder (ASD) and severe MR. He did not use words if prompted, but could verbalize some words that were often out of context. David was 11-years old and was diagnosed with ASD and severe MR. He could verbalize a few words, but they were often out of context.

Prior to the study, a variety of behavioral interventions had been used with the students in an attempt to reduce challenging behavior and were found to be ineffective. These interventions include DRO and DRI, time-out from positive reinforcement, restraint, overcorrection, and medical interventions.

All assessments and interventions took place in the students' classrooms and in their local communities. Teachers, other related staff, and parents attended workshops on FCT. All teaching sessions were videotaped and then scored using continuous 10-second interval observations.

Part 1 consisted of conducting a functional analysis and administration of the *Motivation Assessment Scale* (Durand & Crimmins, 1992) to determine the variables that may have been maintaining these students' challenging behaviors. The functional analysis consisted of four conditions: reduced tangible items, low attention, control, and difficult tasks.

Results from the functional analysis indicate that Matt participated in hand biting and screaming more often during difficult task sessions. Allison participated in crying and screaming more often during reduced tangible item. Mike participated in hand biting and object throwing more often during the reduced tangible item condition. Ron's aggression occurred more often during low-attention sessions.

Results from the MAS mirrored the results from the functional analysis. Matt's highest score was during the escape condition. The tangible condition was the highest for Allison. Mike received the highest scores for the tangible condition. Ron's scores were highest during the low attention condition. David received the highest mean score during the escape condition. The authors noted that the teacher-conducted functional analysis and administration of the MAS pointed out social influences on students' challenging behavior. The results were used in Part 2 to select alternative communicative behaviors to teach the students.

Part 2 involved having classroom teachers teach the participants to use their communication devices to request access to variables that were thought to be maintaining the challenging behavior. Because Matt and David's challenging behaviors were recorded most often during difficult tasks, they were taught to use their

devices to ask for help with their work. Allison and Mike's challenging behaviors were thought to be maintained by tangible consequences, so their devices were set up so they could request additional food during meals and snacks. Ron's challenging behavior was thought to be attention seeking and his device was set up so he could ask for attention when he needed help. The communicative responses stayed in the devices during Parts 2 and 3 of the study.

Devices were selected after meeting with each student's parents, teacher, and paraprofessional. Introtalker was selected for each student because it required less force to press buttons, which was difficult for some of the students. Allison was given a head pointer so she could activate the buttons more easily.

During baseline, teachers videotaped the students 2 hours each week during instructional sessions. Videos were 30 minutes in length and were divided into 10-minute observational sessions for scoring challenging behavior. When the intervention started, teachers used conditions that were the highest for producing challenging behaviors among the participants. During the intervention, the classroom routines and academic activities were not changed. The devices were placed within reach of each student, but specific training was not provided at this time.

Classroom teachers then taught each student how to use his or her device own device. Training took place over 4 weeks during normal classroom routines. Teachers planned activities that would result in a situation where students had demonstrated the highest level of challenging behavior during the functional analysis. For example, David's teacher had a lesson on preparing a meal. The teacher assisted

him with this task, but then backed off when it became difficult for him. The teacher then verbally and physically prompted him to press the pad on the device that said "I need help." The teacher responded to his request and assisted him. The teachers responded only to the consequences (e.g., teacher assistance on difficult tasks for Matt) that were requested by the participants. Prompts were withdrawn by using a combination of fading and delayed prompting and the prompts were faded until students used their devices without prompts. Students met criterion when they activated their devices in appropriate contexts without prompts five consecutive times.

Results indicated the challenging behavior for all five participants declined following FCT. The mean percentage of intervals for Matt's challenging behaviors were 41% prior to intervention and 2% following FCT. Allison's challenging behavior was 42% prior to intervention and 7% following FCT. Mike's challenging behavior was 18% prior to intervention and 2% following FCT. Ron's challenging behavior was 42% prior to intervention and 0.5% following FCT.

Part 3 of the study occurred concurrently with Part 2 of the study and was designed to evaluate the effectiveness of the in-school training for the use of assistive devices on the communicative and challenging behaviors of the students outside of the classroom setting.

Before the introduction of FCT during Study 2, teachers took students to places in the community. Introtalkers were made available for students during the community visits. While out in the community, students were often placed in situations that were problematic for them. For example, Matt needed help when

purchasing items at the store. When he had difficulty taking out his money, he would often become upset when he could not take what he wanted and leave.

Once FCT was used in the classrooms, teachers introduced it in the community. Employees of the community settings had visited the classroom settings prior to the outings. They were familiar with the students, but they were not told how to respond to verbal and nonverbal attempts to communicate.

Challenging behavior for all five participants decreased in community settings after FCT was implemented as an intervention in the classrooms. Matt's challenging behaviors were 12% prior to intervention and 0.5% following FCT. Allison's mean for challenging behavior was 27% prior to FCT and 3% following FCT. Mike's mean for challenging behavior was 19% prior to FCT and was 1% following FCT. Ron's mean for challenging behavior was 32% prior to FCT and was 5% following FCT. David's mean level for challenging behavior was 63% prior to FCT and was 1% following FCT.

Durand's three-part study was effective in reducing challenging behavior among five participants. A combination of functional analysis and MAS prior to FCT was effective in identifying why the challenging behavior(s) occurred. The individualized Introtalker devices and training gave participants an opportunity to communicate their needs and resulted in a decrease in challenging behavior in the school setting and community.

Schmit et al. (2000) evaluated the effects of using photographic cueing paired with verbal prompts during routine school transitions to decrease the challenging

behaviors and increase compliant behaviors of a 6-year-old boy with ASD. Alex was diagnosed with high levels of lead in his blood system since the age of 4.

Alex displayed tantrum behavior during transitions throughout the school day. Tantrum behaviors included screaming, hitting an adult, and/or falling to the ground and refusing to walk. On a daily basis Alex had nine opportunities to participate in transitions in three different settings: (a) moving from one activity to another within a classroom, (b) moving from outside the building to inside the building, and (c) moving from inside the classroom to another area of the building.

A multiple baseline study was used across settings. During baseline Alex was given a verbal cue of "time to go to _____." Staff waited 5 seconds for him to move to the next activity. If Alex exhibited tantrum behavior, staff physically supported him and facilitated his walking to the next activity. Alex typically calmed himself down within a 1- or 2-minute time frame and participated in the activity. The intervention consisted of adults using a verbal cue and a 35-mm photographic cue that represented the next activity. Alex was shown the photographic cue at the end of an activity and prior to the transition to the next activity. Verbal cues were used with photographic cues to indicate the name of an activity and the inside or outside location.

Results revealed that the number of tantrums during transition from one activity to the next within classroom decreased from a mean of 2.83 during baseline to a mean of .23 during the intervention phase and to .17 during maintenance. The number of tantrums during transitions from outside to inside of the building decreased

from a mean of 2.62 during baseline to a mean of .84 during the intervention, and to .50 during maintenance. Baseline data for transitions between rooms in the building was 2.5, which decreased to zero during intervention and maintenance.

The use of photographic cueing paired with verbal prompts and advanced warnings was effective in decreasing challenging behaviors during transitions for Alex. Because of the effectiveness of the strategy in the school setting, Alex's parents used it at home.

Cafiero (2001) evaluated the effects of using a natural aided language approach and picture communication boards paired with verbal language input. The participant was Timothy, a 13-year-old African American boy with ASD. Timothy was nonverbal, demonstrated some vocalizations, and displayed challenging behaviors such as screaming, urinating in public, tantrums, non-compliance, mouthing objects, rocking, grinding his teeth, spitting, throwing objects, and bolting. Natural aided language was used in a variety of environments that were familiar to the participant. Activity-specific language boards were used within the student's classroom, mainstream environment, and within transition environments between home and school.

Prior to the intervention, Timothy used a picture-based reinforcer choice board with 16 words. Special education instructional assistants used natural aided language by speaking and pointing to the corresponding pictures on the communication board, while interacting with Timothy. During the intervention staff simply modeled the use of the language board and waited for Timothy to use the board to express himself. In

addition to using natural language boards for everyday activities, Timothy was given a choice of preferred items. The choice board was used when he successfully maintained the designated time on task. The beginning schedule for reinforcement was 30 seconds, which was then increased to 5 minutes for in-seat behavior.

Results indicated that natural aided language paired with a picture communication board was effective in reducing Timothy's challenging behavior. The baseline mean for bolting behavior was five times per day, which decreased to three times per day 2 months after the language intervention took place. The mean for tantrum behavior prior to natural aided language was four times per day and decreased to two times per day after the intervention.

Cafiero (2001) noted that a limitation of this study was that it only had one participant. This makes it impossible to generalize the effectiveness of the natural aided language intervention across other subjects. The natural-aided language intervention should be replicated through multiple baseline, single-subject design, in order to generalize its effectiveness.

Kelley, Lerman, and Van Camp (2002) evaluated the efficacy of FCT with extinction and without extinction when challenging behavior took place. The study included three participants who had been diagnosed with severe MR: Roger a 10-year-old boy who hit others and participated in hand clapping; Gary, 9-years-old with ASD who displayed physical aggression; and Jennifer, a 10-year-old girl with Cornelia de Lange syndrome who threw objects.

A functional analysis prior to FCT determined Roger's aggression was maintained by access to tangible items, Gary's aggression was maintained by escape from demands, and Jennifer's disruptions were maintained by escape from demands and access to attention. During the study, response-per-minute frequency data were collected on all target behaviors.

The effects of FCT with and without extinction were analyzed using reversal and multiple baseline across single subject design. FCT without extinction was used for Roger. Challenging behavior continued to be reinforced on the terminal VR using a VR schedule, and reinforcement for communication response was thinned to a VR-8 schedule. FCT with extinction was used for Gary and Jennifer. Regardless of any disruptions or aggression, escape was not provided. Communication responses were reinforced each time they occurred on a FR-1 schedule. The therapist blocked Jennifer's attempts to throw materials by holding her arm or taking the object away from her.

The effectiveness of various conditions was documented for each participant. FCT without extinction reduced challenging behavior for Roger, but was not effective for Gary or Jennifer. FCT with extinction was effective in reducing challenging behavior for Gary and Jennifer. FCT with extinction and response blocking reduced challenging behavior for Jennifer, but FCT with extinction had a greater impact on decreasing challenging behavior. Table 1 presents observational data for the mean rates of challenging behaviors per minute in each of the four conditions.

Table 1

Challenging Behaviors Across Various Conditions

X= not used

Participants	Baseline	FCT without Extinction	FCT with Extinction	FCT with Extinction and Response Blocking
Roger	2.9	2.3	X	X
Gary	2.5	6.64	1.36	X
Jennifer	3.7	3.8	1.2	2.6

FCT with extinction was the most effective intervention for Gary and Jennifer.

Results indicate Roger's challenging behavior reduced by .6 during FCT without extinction. Roger had a total of 32 sessions of FCT without extinction, and Gary and Jennifer had 100 sessions of FCT with extinction. Researchers' attributed less-than-satisfactory results for Roger due to a lack of lengthy exposure to FCT with extinction.

Hagopian et al. (2005) compared the effects of FCT with extinction to FCT with extinction and access to competing stimuli. This study included three participants who were admitted to an inpatient unit for the assessment and treatment of aggressive behaviors and/or self-injurious behaviors (SIB) and disruptive behaviors. Stephen was 13 years old and had a diagnosis of pervasive developmental disorder, attention deficit hyperactivity disorder (ADHD), and mild MR. SIB included picking and head banging, and aggressive behaviors included hitting, kicking, pinching, hair pulling, and throwing objects. He also banged on surfaces, threw objects, and destroyed property. James was a 12-year-old boy who was diagnosed with ASD and

mild MR. His SIB included biting his hand or finger and hitting himself with his own hands or an object, and aggressive behaviors included hitting, kicking, scratching, and biting. Disruptive behaviors included throwing objects, knocking over furniture, and banging on hard surfaces. Matt was 7 years old and diagnosed with ASD, ADHD, and moderate MR. He engaged in aggressive behaviors that included hitting, kicking, scratching, hair pulling, pinching, pushing, grabbing, and throwing objects at other people.

During Phase I, a functional analysis was completed for all participants. Stephen's results indicated that his challenging behaviors were driven by positive reinforcement and social attention. Challenging behaviors occurred more often during the ignore condition (M = 3.2 per minute). James had the highest rates of targeted behaviors during the tangible condition (M =1.6 per minute), and his challenging behaviors were maintained by having access to an item of preference. Matt had the highest rate of challenging behavior during the attention condition (M = 2.9) and low rates of challenging behaviors during toy play. Matt's challenging behaviors were reinforced by verbal attention, physical attention, and tangible items.

During Phase II a reinforcer survey was completed by care providers to identify potentially preferred stimuli, followed by a competing stimulus assessment. Matt and Stephen's challenging behavior resulted in having access to attention, and James's behaviors resulted in having access to a video game. All three students displayed the highest levels of problem behavior during the control condition where no object was available. Participants engaged in FCT training sessions. Stephen was

taught to request attention by saying, "I need your attention," "I would like to talk," or "I have something to say." James was taught to use a picture communication book to communicate. Matt was taught to hand over a picture symbol card to the therapist and verbally state, "I want to play" in order to request verbal and physical attention.

Phase III also consisted of FCT with extinction, FCT with extinction and competing stimuli, and schedule thinning. During FCT with extinction, problem behaviors were ignored and appropriate communication response resulted in 30 seconds of reinforcement. Reinforcement included attention for Stephen, access to video games for James, and verbal and physical attention for Matt. FCT with extinction and competing stimuli conditions were the same during FCT with extinction condition, except that stimuli associated with the lowest rates of problem behavior were provided non-contingently and continuously for participants. Schedule thinning consisted of creating a predetermined schedule for each participant.

The combination of FCT with extinction and competing stimuli was effective in reducing challenging behavior for all participants. All participants reached their individual treatment goal. Table 2 documents each participant's baseline, treatment goal, and if the goal was reached.

Table 2

Results for Challenging Behaviors Per Minute for FCT
with Extinction and Competing Stimuli

Participant	Baseline	Treatment Goal	Goal Reached
Stephen	7.9-17.1	Maintain rates of problem behavior at or below 0.2 per minute for two consecutive sessions under 240-s delay to reinforcement	Yes
James	0.5-1.7	Maintain rates of problem behavior at or below 0.2 per minute for two consecutive sessions under 300-s delay to reinforcement	Yes
Matt	0-6.4	Maintain rates of problem behavior at or below 0.4 per minute for two consecutive sessions under 9-minute extinction and 1-minute FR 1 component durations	Yes

The combination of FCT with extinction and competing stimuli was effective

in reducing challenging behavior among participants. The steps leading up to FCT

with extinction and competing stimuli were effective in identifying conditions that

were reinforcing to participants and their preferred stimuli. This study revealed that

competing stimuli can facilitate during the process of schedule thinning with FCT.

Authors noted that a limitation of this study is that it did not take place in

community settings. They suggested that future research is needed in order to

determine if the application of FCT can be used in community settings.

Trottier et al. (2011) evaluated the effects of peer-mediated instruction to teach

the use of speech-generating devices (SGDs) to students with ASD so that they could

play social games. The study included Ian and Max, two 11-year-old boys with ASD

who participated in general education classrooms. Ian's challenging behaviors

included minor self-injury, bolting, hitting, and screaming. Max demonstrated a

number of challenging behaviors including hitting others, repetitive vocalizations, hand flapping, and jumping. Three typically developing peers, referred to as confederates, were selected to teach Ian and Max how to use SGDs in order to play social games.

Phase I consisted of peer-mediated training in a 15-minute SGD orientation. All sessions were videotaped. A variety of games were selected based upon participants' interests, and edible treats were provided at the end of each game session. Participants used SGDs with which they were familiar. Ian used a Vantage Lite and Max used a Springboard Lite 10. Once the study began, all symbols or messages that were uploaded on their devices for social games were new to Ian and Max. During Phase II, the confederates supported SGD use for the students with ASD. The 10-minute game sessions during Phase II occurred two to four times per week.

Specific data were not provided. However, the authors reported that both challenging behavior and inappropriate spontaneous SGD use decreased during the intervention. Max and Ian were able to participate in social games when using their individualized SGD. This study was included in the review because there were so few studies within my target age range and disability category of ID.

One limitation of this study is that it did not provide specific data regarding challenging behavior. Another limitation is that the study does not document if the confederates continued to support SGD use in the general education classrooms.

Studies Involving PECS

This section includes four studies that evaluate the use of PECS to decrease students' challenging behavior. PECS is often used in combination with a variety of other interventions to decrease challenging behavior among participants. PECS is a commonly used alternative communication strategy that involves six phases and is low tech. Pictures used can be individually selected for each participant's unique communication needs. According to Overcash, Horton, and Bondy (2010), the prerequisite for Phase I involves completing a reinforcement assessment to identify an individual's preferences. Phase 1 consisted of teaching children to exchange a picture. During Phase 2, children are taught how to initiate communication to a partner who is not immediately next to them. Phase 3 teaches participants to discriminate between pictures. Phase 4 teaches participants to use a sentence starter such as, "I want" or "I see." Phase 5 uses attributes (e.g., "I like") and Phase 6 teaches participants to make comments about interesting stimuli within in the environment.

Charlop-Christy et al. (2002) conducted a study to evaluate the effects of PECS on challenging behavior for three boys with ASD. One of the participants did not engage in challenging behaviors and was excluded from this review. Jake was a 3-year old boy with delayed speech who displayed several challenging behaviors: tantrumming, leaving his seat during work, grabbing objects from other people, throwing, and kicking. These behaviors typically took place when preferred items were unavailable and only non-preferred items were available. Kyle was a 5-year-old

boy with delayed speech who engaged in similar challenging behaviors under the same conditions.

Jake and Kyle participated in biweekly videotaped sessions in the child's home, classroom, and after-school program. Each participant's preferred items were in a clear container that was set on the table. Free-play sessions took place once per week for each week prior to, during, and after PECS training. Academic sessions took place once per week for each week before, during, and after PECS training. PECS materials included the use of a three-ring binder that was used as a communication board to teach participants to use PECS. The binder had Velcro strips and cards that indicated "yes," "no," "I want," "I see," and black-and-white pictures of preferred items. PECS training materials were not used during academic tasks in order to assess any additional gains related to PECS.

During both academic and play sessions the therapist gave each participant five spontaneous speech opportunities and five verbal imitation opportunities. During these opportunities the therapist held up a desired object and waited 10 seconds for the participant to vocalize. If the participant vocalized appropriately, he was given the desired object. If the participant did not make vocalizations, play or academic demands continued with no access to the object. When verbal opportunities occurred, the therapist modeled a word or phrase. The participant was given access to the object only if he imitated the word or phrase. When challenging behavior occurred the therapists used planned ignoring, a contingent "no" and DRO.

PECS training consisted of 15-minute training sessions two times per week. Free play and academic sessions continued during PECS training. Prompting and differential reinforcement was used during a six-phase PECS training procedure. The criterion for each phase was 80% accuracy without prompts in a 10-trial block. Post-training sessions took place several weeks following completion of the PECS training protocol and long-term follow-up took place for Alex.

Results indicated that during the academic sessions, Jake displayed an average of 24 disruptions and grabs per session during baseline and an average of 9.5 per session following PECS training. Tantrums and out-of-seat behavior decreased from an average of 14% of intervals during baseline to 5% of intervals. Kyle's average of 12.3 disruptions and grabs per session during baseline decreased to an average of 2.6 per session following PECS. Tantrums and out-of-seat behavior occurred in 7% of intervals during baseline and reduced to an average of 0.5% of intervals.

During free-play sessions Jake displayed an average of 1.7 disruptions per session during baseline and no disruptions following PECS training. Tantrums and out-of-seat behavior in the play sessions decreased from 15% of intervals during baseline to 2% of intervals. Kyle had an average of 2.7 disruptions per session during baseline, which decreased to an average of 0.2 per session following PECS training. Prior to intervention, tantrums occurred an average of 13% of intervals, and no tantrums were recorded following intervention.

Researchers concluded that 10 of the 12 behaviors were reduced by 70% or more. A total of four behaviors were eliminated.

Anderson and Moore (2007) determined the effectiveness of PECS to teach functional language skills in the home setting. In addition to language skills, the authors also evaluated the effects of PECS on non-targeted behaviors.

Todd was a 6-year-old boy with severe ASD. He spent large amounts of time engaging in repetitive tapping and drumming and did not engage in meaningful play. He also spent excessive amounts of time watching TV, to the point that he was inaccessible for social interaction and instruction.

Training sessions occurred and free play sessions were videotaped in the living room. Materials for this study consisted of a PECS communication folder that included 25 to 30 symbols with Velcro strips for the symbols that Todd was to use to request something. One of the symbols indicated "I want," and the other symbols had pictures of preferred activities and food. Researchers used a four-phase design: Baseline 1 (Phase 1) consisted of observations with no demands or communicative initiations; Baseline 2 (Phase 2) consisted of a readiness assessment of Todd's ability to comply with requests; Compliance Training (Phase 3) consisted of Todd learning how to follow a 3-step request sequence that involved forward chaining; and Phase 4 involved PECS training.

Results revealed that after PECS training, minutes of watching TV decreased and minutes engaged in play increased. Prior to the intervention, Todd engaged in TV watching during Baseline 1 and 2 with mean levels of 75% and 91%. When compliance training was introduced, Todd's TV watching decreased to a mean of 28%. When PECS training was introduced, TV watching decreased to a mean of

3.8%. In the area of play, 0% was observed during Baselines 1 and 2. During compliance training the mean for play was 26%, which increased to a mean of 45% during PECS training.

PECS acquisition for Todd was associated with a decrease in concomitant challenging behaviors within the home setting. However, the authors cautioned that part of the decrease in concomitant challenging behaviors may have been from compliance training and not totally due to PECS training.

Ganz, Parker, and Benson (2009) investigated the impact of using PECS with three preschool and kindergarten-aged boys with ASD who displayed delays in communication and maladaptive behaviors.

Ethan was 3 years old, had difficulty engaging in a variety of tasks, moved around the room often, and attempted to hit and bite the examiners. Adrian was 6 years old and hit his own head when a toy of his liking was removed. Jarek was 5 years old and repetitively twisted string in between his fingers, hit himself on the head with his hand, threw toys on the ground, and screamed.

Materials included a variety of toys that were needed for preferred activities and were kept in a clear container with a cover so the participants could view them. A communication binder consisting of Velcro strips and pictures for communication was on the table during all phases of the study. Data were collected for communication attempts and incidents of screaming, aggression, and leaving the table.

Prior to baseline, a reinforcement assessment was conducted to determine items of preference used during baseline, intervention, generalization, and

maintenance. During baseline each participant was presented with one preferred toy at a time. The experimenter showed the participant the toy and a corresponding picture. If the child showed interest, the experimenter waited 5 seconds to determine if the child would verbalize something and the child was given 10 seconds to play with the toy. If the child did not show any interest after viewing the toy and corresponding picture within 10 seconds, the experimenter presented another toy with a corresponding picture.

The intervention began with Phase I, which consisted of ten 5-minute sessions of PECS training with each participant. During this phase the experimenter presented a toy and its corresponding picture. Physical prompts were given if the participant did not reach for the picture and hand it to the experimenter. The experimenter held up the corresponding picture next to the toy, said the name of the toy, and praised the child. The child was given access to the toy for 10 seconds. Once the child started to independently use the corresponding picture or use word approximations to make a request for a toy, the experimenter immediately gave the child the toy with lots of praise, and was allowed 20 seconds to play with the toy.

After 10 initial intervention sessions, a 5-minute probe data session was conducted without prompts. The experimenter verbally modeled the names of the items. If a participant showed interest in a toy, the experimenter waited 5 seconds to see if the participant would use a picture or verbal request. If no verbal request was made, the experimenter stated the name of the toy, gave praise, and allowed 10 seconds of access to the toy. If the participant used the corresponding picture, the

experimenter waited 5 seconds for a verbal request, and toy access was given for 20 seconds. If the participant verbalized the corresponding word, phrase, or word approximation, the child was immediately given the toy for 20 seconds. Probe data collection continued until the participant used at least five pictures to make a request during three consecutive data collection sessions. After the criterion was met, one generalization probe was conducted and maintenance data were collected for all participants.

Results showed that the use of PECS was not significantly effective and that data were variable throughout the study. Table 3 shows data that were collected for baseline, intervention, generalization, and maintenance.

Table 3

Challenging Behavior Per Minute

Participant	Baseline	Intervention	Generalization	Maintenance
Ethan	1.75	2.8	0	6 weeks = 2 23 weeks = 0
Adrian	0.6	0.8	4	5 weeks = 0 11 weeks = 3
Jarek	3	2.3	0	6 weeks = 2

The authors suggested that a functional analysis would have been helpful in order to determine if participants' behaviors were related to a desire for toys. In addition, the authors also suggested that future research should examine generalization across a variety of symbols and settings.

Radstaake et al. (2012) conducted a FBA to determine the function of challenging behavior and to determine whether FCT was effective in reducing challenging behavior. Participants included four children with Angelman syndrome (AS) who ranged in age from 5 to 18 years and who demonstrated challenging behavior at least one time per day. Participants were nonverbal and typically reached for desired items or pointed toward objects when trying to request the object, although Participant C used pictures to request preferred activities. The setting for this study took place at a day-care facility.

The first step, the FBA, consisted of a control condition, an attention condition, tangible-edible condition, tangible-toys condition, and a demand condition. The next phase of the study consisted of FCT in which participants were taught to exchange a referent object or picture to request the object that maintained challenging behavior during the FBA. If a participant reached for a referent object, the participant was prompted to exchange the referent with the therapist. During this time the experimenter paid close attention to precursors that were identified through a precursor analysis. Behavior that was identified as a precursor to challenging behavior included eye contact, looking at a tangible, physical initiation, and reaching for a tangible. If a participant displayed one or more precursors, the experimenter initiated FCT. Prompt fading was used until participants independently facilitated an exchange. Once a participant independently exchanged a referent object or picture at least 80% of trials during two consecutive sessions, prompting ended. Consequences

were not scheduled for challenging behaviors, which created an environment where

extinction took place.

Data were collected using an ABAB design with a 3-5 month follow-up

design. Cohen's *d* was calculated in order to determine which experimental condition

the most challenging behavior occurred in comparison to frequency of challenging

behavior during the control condition. The authors noted that 0.2 indicates a small

effect, 0.6 indicates a medium effect, and values higher than 0.8 indicate a large effect.

The authors also determined the probability of a certain behavior occurring before,

during, and after the target behavior.

FBA results indicated large effect sizes for all four students. Child A and B

demonstrated the highest rates during the attention condition. Child C's challenging

behavior was highest during the attention condition and tangible edible condition.

Child D's challenging behavior was highest during the tangible toys condition. FCT

results also revealed large effect sizes. The results implied that FCT with identified

precursor behavior (e.g., eye contact) as the starting point for FCT training is effective

in decreasing challenging behavior in children with AS. For example, if an

experimenter noticed eye contact, this was a good indication that challenging behavior

would take place. Once eye contact was noticed, the experimenter implemented FCT

to replace challenging behavior. Effect sizes are presented in Table 4.

Table 4

Effect Sizes

Participant	Condition(s) with Largest Effect Size for FBA	Effect Size for FCT
A	$d = 1.19$ for attention condition	$d = -1.27$
B	$d = 2.57$ for attention condition	$d = -1.44$
C	$d = 1.48$ for attention and tangible edibles conditions	$d = -1.49$
D	$d = 2.65$ for tangible toys condition	$d = -2.06$

Authors noted results should be interpreted with caution when generalizing the results to other people with AS because of the few participants. One recommendation for future research is for a study to be conducted in more natural settings instead of a clinical setting.

Chapter II Summary

In this chapter, I reviewed 10 studies to determine the benefits of using augmentative and alternative strategies with participants with challenging behavior. Table 5 summarizes the findings of these studies, which are discussed in Chapter III.

Table 5

Summary of Chapter II Findings

AUTHOR(S) (date)	STUDY DESIGN	PARTICIPANTS	PROCEDURE	FINDINGS
STUDIES INVOLVING MULTIPLE STRATEGIES				
Durand (1999)	Quantitative	Five students ranging from 3 ½ - 15 years old with frequent problem behavior	Study 2: Introtalker devices were selected for all five students. FCT took place over 4 weeks. Study 3: FCT was used within classrooms. Community experiences occurred with the use of FCT.	Study 2: Matt, Allison, Mike, Ron, and David's maladaptive behaviors decreased dramatically following FCT. Study 3: Problem behaviors for all participants declined in the community settings after FCT was taught.
Schmit, Alper, Raschke, &Ryndak (2000)	Quantitative Study	A 6-year-old boy with ASD and identified as having high levels of lead in his blood	A 35 mm photographic cue was presented prior to the next activity, along with a verbal cue.	Challenging behavior decreased from baseline to maintenance across settings.
Cafiero (2001)	Quantitative	A 13-year-old African American boy with ASD	Natural aided language intervention was implemented within the general education environment: language board with pictures and picture reinforce board	Out-of-seat, bolting, and tantrum behaviors decreased following intervention.

42

Table 5 (continued)

AUTHOR(S) (date)	STUDY DESIGN	PARTICIPANTS	PROCEDURE	FINDINGS
Kelley, Lerman, & Van Camp	Quantitative	Three children diagnosed with MR and demonstrated challenging behaviors	FCT without extinction (all participants), FCT with extinction (one participant), and FCT with extinction and response blocking (one participant) were used.	Roger's aggression decreased during FCT without extinction. Aggression remained low when the reinforcement schedule was thinned for clapping. Gary's aggression was high and variable during 24 sessions of FCT. Aggression decreased with extinction. Jennifer's disruptions remained high with FCT and decreased with FCT with extinction.
Hagopian, Contruci, Long, & Karena (2005)	Quantitative	Three boys ages 7, 12, and 13 with multiple diagnosis	Three treatments were compared: FCT with extinction, FCT with extinction and competing stimuli, and schedule thinning.	All participants successfully decreased their challenging behavior and met individual treatment goals.
Trottier, Kamp, & Mirenda (2011)	Quantitative	Two 11- year old boys with ASD	Peer-mediated training with SGDs.	During Phase II appropriate behavior increased and challenging behavior that interfered game playing decreased.

Table 5 (continued)

AUTHOR(S) (date)	STUDY DESIGN	PARTICIPANTS	PROCEDURE	FINDINGS
STUDIES INVOLVING PECS				
Charlop-Christy, Carpenter, LeBlanc, & Kellet (2002)	Quantitative	Three boys with ASD from an afterschool behavioral treatment program	Ten minutes of free-play took place once per week. 10-minute academic sessions took place once per week. Sessions were videotaped. Participants received PECS training.	Tantrums, out-of -seat, disruptions, and grabs decreased for both Jake and Kyle.
Anderson & Moore (2007)	Quantitative	6-year-old boy with ASD	PECS was used to teach functional communication.	During compliance training and PECS training, TV watching decreased and play increased.
Ganz, Parker, & Benson (2009)	Quantitative	Three young boys between 3-8 years old with ASD, speech delays, and challenging behaviors	Reinforcers were assessed. Baseline (Phase 1) Readiness Assessment (Phase 2) Compliance Training (Phase 3) PECS Training (Phase 4) Generalization probe with unfamiliar adult.	Ethan, Adrian, and Jarek's maladaptive behaviors were variable throughout the study.
Radstaake, Didden, Oliver, Allen, & Curfs (2012)	Quantitative	Four children with Angelman syndrome between the ages of 5-18 years	A functional behavior analysis was conducted. FCT involved the use PECS.	Challenging behavior decreased for all participants.

Chapter III

CONCLUSIONS AND RECOMMENDATIONS

The purpose of this paper was to investigate the effects of augmentative and alternative communication strategies on challenging behavior of individuals with intellectual disabilities (ID). In this chapter, I discuss the findings of the 10 studies reviewed in Chapter II. Specifically, I derive conclusions from the research I read, make recommendations for future research, and examine implications for my own teaching practice.

Conclusions

All 10 studies reviewed in Chapter II used a single subject design to measure outcomes. The number of participants ranged from one participant to five participants. Chapter II studies were organized according to studies involving multiple strategies and studies involving picture exchange communication systems (PECS). Six studies assessed the effectiveness of different types of AAC devices, and four studies evaluated the effectiveness of PECS.

Studies involving multiple strategies. The six studies in this section used a variety of assistive technology (AT) devices in conjunction with behavior strategies. All six studies were successful in reducing challenging behavior among participants

44

(Cafiero, 2001; Durand, 1999; Hagopian et al., 2005; Kelley et al., 2002; Schmit et al. (2000); Trottier et al., 2011). Table 6 illustrates which AAC devices were used in combination with specific behavioral strategies.

Table 6

Variety of Behavior Strategies and AT

AUTHOR	AAC	BEHAVIOR STRATEGY	DECREASE IN CHALLENGING BEHAVIOR
Durand (1999)	Introtalker	Functional Analysis and FCT	Yes
Schmit et al. (2000)	Photographic Cues	Verbal Prompts	Yes
Cafiero (2001)	Picture Boards	Natural Aided Language and Verbal Input	Yes
Kelley et al. (2002)	Pictures	Functional analysis prior to FCT for each participant. FCT without extinction (1 participant) FCT with extinction (2 participants)	Yes
Hapogian et al. (2005)	Picture Book	Functional Analysis, competing stimulus assessment, and compared the effects of FCT with extinction to FCT with extinction and access to competing stimuli.	Yes FCT with extinction and competing stimuli was effective for all participants.
Trottier et al. (2011)	Vantage Lite and Springboard Lite	Peer-Mediated Instruction	Yes

The findings from Table 6 indicate that individuals with ID who display challenging behaviors can learn to communicate appropriately when given AAC in conjunction with behavior strategies. In addition, the results show that a variety of AAC devices paired with behavior strategies are effective in decreasing challenging behavior.

Studies involving PECS in conjunction with behavior strategies. Four Chapter II studies used PECS along with other behavior strategies. Three out of four studies were successful in decreasing challenging behavior among participants (Anderson & Moore, 2007; Charlop-Christy et al., 2002; Radstaake et al., 2012). Ganz et al. (2009) were not successful in reducing challenging behavior. Table 7 presents findings of the studies that used PECS in conjunction with behavioral strategies.

Table 7

PECS with a Variety of Strategies

AUTHOR	STRATEGY	DECREASE IN CHALLENGING BEHAVIOR
Charlop-Christy et al. (2002)	PECS paired with prompting and differential reinforcement of other behavior	Yes
Anderson & Moore (2007)	Compliance Training Prior to PECS	Yes
Ganz et al. (2009)	Reinforcement Assessment and PECS	Data were variable
Radstaake et al. (2012)	FBA and PECS with Prompt Fading	Yes

Results from Table 7 demonstrate that PECS paired with a variety of strategies is generally effective in reducing challenging behavior among individuals with ID. Evidence from these studies shows that PECS is just as effective in reducing challenging behavior in comparison to a higher tech device such as a speech generating device (SGD).

Recommendations for Future Practice

The authors of the Chapter II studies made recommendations for future research. Specifically, they recommended that longer exposure to FCT would be beneficial and that more participants are needed for future studies. They also recommended that replication studies be conducted in more natural settings. It would then be a logical step to conduct studies that examine generalization across settings. The success of the functional analysis prior to PECS indicates the need for more studies to investigate its use.

My personal recommendations for future research are that participants should have the opportunity to trial more than one AT device in order to make a comparison. It would also be helpful if more studies were conducted with children who have similar disabilities in order to determine if functioning level is related to acquisition.

Implications for Current Practice

This research has implications for teachers, paraprofessionals, and other related service staff working in the field of special education. It is essential that teachers and paraprofessionals receive training in AAC and behavior strategies. As a third-year

teacher, prior to conducting this literature review, I had very little knowledge in the area of using AAC in conjunction with behavior strategies to decrease challenging behavior. This literature review taught me about the benefits of AAC in conjunction with behavior strategies.

In addition to training, school districts need to provide more time for the IEP team to collaborate in order to develop a detailed FBA and AAC intervention. Results from most of the research studies demonstrated the importance of conducting a FBA and functional analysis prior to implementing AAC. Before AAC is implemented, it is essential that (a) IEP team members have an in-depth understanding of why the behavior is occurring and (b) use the SETT framework to select AAC that will allow the student a means of communicating appropriately.

Special education teachers and school psychologists need to learn about the benefits of FBAs for students with ID. There have been times when special education staff made comments about the functioning level of students with ID and that an FBA probably would not change things. The majority of the studies in Chapter II demonstrated the importance of fully understanding the behavior. Students would receive higher quality services if FBAs and functional analyses were completed prior to implementing AAC. It is crucial that behavioral strategies such as FCT, natural aided language, or PECS are used in order to teach the individual with ID how to communicate appropriately.

After conducting this review of the literature, I wanted to learn more about AT selection, implementation, and the use of FBAs in conjunction with AAC for students

with ID in my school district. To that end, I sent a list of questions via email to my school district's AT Specialist, Mary Peterson. The questions and her verbatim responses follow.

1. Can you describe the process the School District uses for selecting an AT device for students?

> There is a referral form that teachers complete. Once that is completed I set up a time to visit the classroom, talk to the teacher, and observe the student. We then discuss a plan to trial a tool that might be appropriate. I use the SETT process in determining what the student needs to complete/have access to the curriculum. S: is the student and knowing what their strengths and weaknesses are. E: is the environment and knowing where they are in the classroom, seating, the setting (regular education or special education). T: tasks, what do they need to do in order to be successful in school and participate with their peers to access the curriculum. T: tools, what tool will help them be successful and have access.

2. What is the process for a re-evaluation?

> For re-evaluation I usually am contacted by a teacher who has concerns about a student who is using or needs AT.

3. What IEP team members assist in the selection of an AT device for students in special education?

> I try to talk to the speech clinician, my AT paraprofessional, the classroom teacher, parents, and if possible the student.

4. Does the School District typically complete an FBA prior to implementing a communication device for students that displays challenging behavior?

> No

(M. Peterson, personal communication, March 11, 2014)

After interviewing Mary Peterson, I am pleased to hear that the school district I work for uses the SETT framework to select AAC. On the other hand, it concerns me

that FBA's are not typically used prior to implementing a communication device for students that display challenging behavior. Now that I am aware of the research on this topic, I plan on sharing my findings with our AT specialist, speech language pathologist, school psychologist, and my special education supervisor.

An important thing I learned from this literature review is that there was not a significant difference in the effectiveness of low tech communication modes (e.g., pictures) vs. higher tech devices (e.g., speech-generating devices). Both low tech and high tech modes were generally effective. If the sole purpose of implementing AAC is to provide a means for basic communication that meets the function of a behavior, in most situations low tech modes such as PECS would meet the student's AAC needs.

When selecting AAC for students who display challenging behavior, several steps need to be completed. First, the function of the behavior must be established and second, the SETT framework should be completed in order to select the most appropriate AAC for the student. If special education staff complete an FBA and the SETT process, the outcomes for decreasing challenging behavior would be more effective.

Summary

Research suggests that AAC in conjunction with behavior strategies decreases challenging behavior for most youth with ID. AAC not only assists in decreasing challenging behavior, it also provides individuals with a means to communicate. Rather than reacting to challenging behavior, teachers and parents can learn to be

proactive by teaching children how to communicate their feelings, wants, and needs

by using AAC in conjunction with behavioral strategies.

REFERENCES

American Psychiatric Association. (2000). *Diagnostic and statistical manual-IV-text revision*. Washington, DC: Author.

Anderson, A., & Moore, D. W. (2007). Functional communication and other concomitant behavior change following PECS training: A case study. *Behaviour Change, 24*, 173-181.

Aspy, R., & Grossman, B. G. (2008). *The Ziggurat model*. Shawnee Mission, KS: Autism Asperger's Publishing Co.

Batshaw, M. L., Pellingro, L. P., & Roizen, N. J. (2007). *Children with disabilities* (6th ed.). Baltimore, MD: Paul H. Brookes Publishing Co.

Beirne-Smith, M. L., Ittenbach, R. F., & Patton, J. R. (2002). *Mental retardation* (6th ed.). Upper Saddle River, NJ: Pearson Education.

Cafiero, J. M. (2001). The effect of an augmentative communication intervention on the communication, behavior, and academic program of an adolescent with autism. *Focus on Autism and Other Developmental Disabilities, 16*, 179-189.

Charlop-Christy, M. H., Carpenter, M., Le, L., LeBlanc, L. A., & Kellet, K. (2002). Using the picture exchange communication system (PECS) with children with autism: Assessment of PECS acquisition, speech, social-communicative behavior, and problem behavior. *Journal of Applied Behavior Analysis, 35*, 213-231.

Cornelia de Lange Syndrome Foundation. (2010). *Characteristics of CdLS*. Retrieved from http://www.cdlsusa.org/what-is-cdls/characteristics-of-cdls.htm.

Crissey, P. (2009). *Teaching communication skills to children with autism*. Verona, WI: Attainment.

Durand, V. M. (1999). Functional communication training using assistive devices: Recruiting natural communities of reinforcement. *Journal of Applied Behavior Analysis, 32*, 247-267.

REFERENCES

American Psychiatric Association. (2000). *Diagnostic and statistical manual-IV-text revision*. Washington, DC: Author.

Anderson, A., & Moore, D. W. (2007). Functional communication and other concomitant behavior change following PECS training: A case study. *Behavior Change, 24,* 173-181.

Aspy, R., & Grossman, B. G. (2008). *The Ziggurat model.* Shawnee Mission, KS: Autism Asperger's Publishing Co.

Batshaw, M. L., Pellingro, L. P., & Roizen, N. J. (2007). *Children with disabilities* (6th ed.). Baltimore, MD: Paul H. Brooks Publishing Co.

Beirne-Smith, M. L., Ittenbach, R. F., & Patton, J. R. (2002). *Mental retardation* (6th ed). Upper Saddle River, NJ: Pearson Education.

Cafiero, J. M. (2001). The effect of an augmentative communication intervention on the communication, behavior, and academic program of an adolescent with autism. *Focus on Autism and Other Developmental Disabilities, 16,* 179-189.

Charlop-Christy, M. H., Carpenter, M., Le, L., LeBlanc, L. A., & Kellet, K. (2002). Using the picture exchange communication system (PECS) with children with autism: Assessment of PECS acquisition, speech, social-communicative behavior, and problem behavior. *Journal of Applied Behavior Analysis, 35,* 213-231.

Cornelia de Lange Syndrome Foundation. (2010). *Characteristics of CdLS.* Retrieved from http://www.cdlsusa.org/what-is-cdls/characteristics-of-cdls.htm.

Crissey, P. (2009). *Teaching communication skills to children with autism*. Verona, WI: Attainment.

Durand, V. M. (1999). Functional communication training using assistive devices: Recruiting natural communities of reinforcement. *Journal of Applied Behavior Analysis, 32,* 247-267.

Durand, V. M., & Crimmins, D. B. (1992). *The motivation assessment scale (MAS) administration guide.* Topeka, KS: Monaco & Associates.

Flexer, R. W., Baer, R. M., Luft, P., & Simmons, T. J. (2008). *Transition planning for secondary students with disabilities* (3rd ed.). Upper Saddle River, NJ: Pearson Education.

Ganz, J. B., Parker, R., & Benson, J. (2009). Impact of picture communication system: Effects on communication and collateral effects on maladaptive behaviors. *Augmentative and Alternative Communication, 25,* 250-261.

Graziano, A. M. (2002). *Developmental disabilities.* Boston: Pearson Education.

Hagopian, L. P., Contrucci, K., Long, E. S., & Karena, R. S. (2005). Schedule thinning following communication training: Using competing stimuli to enhance tolerance to decrements in reinforcer density. *Journal of Applied Behavior Analysis, 38,* 177-193.

Kelley, M. E., Lerman, D. C., & Van Camp, C. M. (2002). The effects of competing reinforcement schedules on the acquisition of functional communication. *Journal of Applied Behavior Analysis, 35,* 59-63.

Maag, J. W. (2004). *Behavior management from theoretical applications to practical applications* (2nd ed.). Belmont, CA: Wadsworth/Thomson Learning.

Minnesota Department of Education. (2013). *Developmental cognitive disabilities.* Retrieved from http://education.state.mn.us/mde/edexc/specedclass/disabcateg/developcogdisab/index.html.

National Dissemination Center for Children with Disabilities. (2012). *Categories of disability under IDEA.* Retrieved from http://nichcy.org/disability/categories#id

Overcash, M., Horton, C., & Bondy, A. (2010). The picture exchange communication system: Helping individuals gain functional communication. *Autism Advocate, 3, 21-24.*

Pacer Center. (2014). *Simon technology center overview.* Retrieved from http://www.pacer.org/stc/.

Radstaake, M., Didden, R., Oliver, C., Allen, D., & Curfs, L. (2012). Functional analysis and functional communication training in individuals with Angelman syndrome. *Developmental Neurorehabilitation, 15,* 91-104.

Schmit, J., Alper, S., Raschke, D., & Ryndak, D. (2000). Effects of using a photographic cueing package during routine school transitions with a child who has autism. *Mental Retardation, 38,* 131-137.

Smith, T. E., Polloway, E. A., Patton, J. R., & Dowdy, C. A. (2008). *Teaching students with special needs in inclusive settings* (5th ed.). Upper Saddle River, NJ: Pearson Education.

Snell, M., & Brown, F. (2011). *Instruction of students with severe disabilities* (7th ed.). Upper Saddle River, NJ: Pearson Education.

The Bridge School. (2010). *Eye gaze boards*. Retrieved from http://bridgeschool.org/transition/multimodal/eye_gaze_boards.php.

Trottier, N., Kamp, L., & Mirenda, P. (2011). Effects of peer-mediated instruction to teach use of speech-generating devices to students with autism in social game routines. *Augmentative and Alternative Communication, 27,* 26-39.

Westling, D. L., & Fox, L., (2009). *Teaching students with severe disabilities* (4th ed.). Upper Saddle River, NJ: Pearson Education.

Zabala, J. (2005). *Using the set framework to level the learning field for students with disabilities.* Retrieved from http://www.joyzabala.com/uploads/Zabala_SETT_Leveling_the_Learning_Field.pdf.

Zabala, J. (2010). *The SETT framework: Straight from the horse's mouth.* [Presentation Slides]. Retrieved from http://www.joyzabala.com/Handouts_for_ Download.html.