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TEACHING THE PICTURE EXCHANGE COMMUNICATION SYSTEM PHASES I-II TO PRESCHOOL STUDENTS WITH DISABILITIES

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TEACHING THE PICTURE EXCHANGE COMMUNICATION SYSTEM PHASES I-II
TO PRESCHOOL STUDENTS WITH DISABILITIES

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in Education in the
College of Education
at the University of Kentucky

By

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Lexington, Kentucky

Director: Dr. Melinda Ault, Professor of Special Education

Lexington, Kentucky

2022

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ABSTRACT OF THESIS

TEACHING THE PICTURE EXCHANGE COMMUNICATION SYSTEM PHASES I-II TO PRESCHOOL STUDENTS WITH DISABILITIES

The purpose of the study was to evaluate the effectiveness of teaching the PECS protocol to preschool students with disabilities using the PECS Phases I-II. A multiple probe across participants design was used to conduct the study and evaluate the effectiveness of the training on the PECS Phases I-II. The results of the study demonstrated that teaching the PECS protocol using picture cards of preferred items was effective in the preschool setting to teach preschool students with moderate to severe disabilities to independently travel to a PECS book and exchange a picture request with the investigator.

KEYWORDS: Preschool, Disabilities, Language Delay, Picture Exchange Communication System, Preferred Items

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July 27, 2022

TEACHING THE PICTURE EXCHANGE COMMUNICATION SYSTEM PHASES I-
II TO PRESCHOOL STUDENTS WITH DISABILITIES

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Introduction

Preschoolers with disabilities face new experiences and learn new skills as they adjust to functioning in early childhood settings. One vital area of development is reliable communication of wants, needs, preferences, and thoughts. Students with moderate to severe disabilities, such as autism or developmental delay, often have greater difficulty communicating their wants in a conventional manner as compared to their same-aged peers with typical development (Sigafoos et al., 2004). Young students with disabilities with communication needs can become frustrated as they struggle to express their wants and needs in a way that is understandable to communication partners and acceptable in their environments. For example, nonverbal prelinguistic or minimally verbal students with disabilities may use nonconventional modes of communication to express their wants and needs using behaviors like pointing, looking, gesturing, vocalizing, or in some instances challenging behaviors (e.g., crying, scratching, biting). Therefore, communication interventions are needed in preschool classrooms to explicitly teach children with disabilities communication skills that allow them to function well across environments. This often requires that teachers and parents identify augmentative or alternative modes or forms of communication (AAC) that provide for a more conventional way (i.e., form) for children to communicate with their communication partners.

AAC is a way for individuals to communicate when oral speech is not used or when the oral speech a person uses needs to be augmented to increase understanding by the communicative partner during exchanges. According to the American Speech-Language-Hearing Association (ASHA, 2022), AAC includes all the methods that people

use to communicate besides talking. Augmentative communication is used to add to a person's speech, while alternative communication is used in place of a person's speech. People of all ages can use AAC, some need AAC for the entirety of their life, while others only need it temporarily. AAC can be low tech or high tech and unaided or aided. Examples of low tech AAC include gestures, writing, drawing, pointing to photos or using pictures. Examples of high tech AAC include a speech generating device or an iPad/tablet with vocabulary software. Unaided AAC includes modes of communication that do not require any tools or supplemental materials beyond the person's own body. Examples include body posture, facial expressions, sign language, or gestures. Aided AAC includes modes of communication that require outside tools or materials like communication books, picture exchange, or tablets used to communicate (ASHA 2022).

Once a student has an identified form or forms of communication, they will use that form to express a variety of communicative intents or functions of communication. Children with disabilities may need to be explicitly taught both how to use their AAC and how to express communicative intents. One of the first intents often taught to children with disabilities is to request preferences. Teaching young students to request their wants is a foundational skill that should be taught as early as possible, as it is one of the first skills typically developing peers learn (Carpenter et al., 1983). Requesting provides immediate reinforcement for the learner, thus helping students learn how to communicate. In addition, requesting, as all communication, should be taught within the natural environments and activities in which the child participates as well as with a variety of communicative partners with whom the child regularly interacts to facilitate generalization.

To teach requesting to students with disabilities, systematic instruction is often required (Sigafoos et al., 2004). One manualized intervention using systematic and behavioral principles that begins by teaching requesting that also is an AAC system is the Picture Exchange Communication System (PECS) (Frost & Bondy 2022). PECS is an AAC protocol that includes six phases. It involves the learner exchanging pictures with the communicative partner to convey a message. It was developed to help children who do not have functional speech to request, form sentences, ask questions, and make comments. Phase I teaches the learner to make an exchange with a picture card for a preferred item. Phase II teaches the learner to travel a distance to get the picture card and then make the exchange. Phase III involves teaching the learner to make a choice between two preferred pictures. Phases IV teaches the learner to make early sentences (i.e., I WANT ____). Phase V teaches the learner to respond to the question “What do you want?” and Phase VI expands on previously taught skills to teach students to answer questions like “What do you see?” (Frost & Bondy, 2002).

The PECS protocol has been widely researched and is an evidence-based practice for individuals with autism spectrum disorder (National Professional Development Center on Autism Spectrum Disorder, 2014). PECS has been used to teach requesting skills to 3-5-year-olds with disabilities (Ganz et al., 2008), 3-6-year-olds (Schwartz et al., 1998), and 3-12-year-olds (Charlop-Christy et al., 2013) These studies have evaluated the effectiveness of PECS on children with disabilities.

In one study, Ganz et al. (2008) taught three 3-5-year-old preschool participants with autism spectrum disorder or developmental delay, Phases I-IV of PECS. There were 1-10 PECS sessions per participant each week, with 10 trials per session. The researchers

used the procedures as outlined in the PECS manual as the intervention (Frost & Bondy, 2002). The results showed that one participant mastered all four phases quickly, one participant mastered all four phases but took longer to do so, and one participant never reached mastery without significant modification of the PECS procedures, thought to be due to difficulty of the participant to understand the image presented in the picture represented the actual item. The intervention agents in this study were the researchers.

In another study, Schwartz et al. (1998) studied 31 participants, 3-6 years of age, who were diagnosed with a disability (many were diagnosed with autism) and were taught Phases I-VI of the PECS manual. Sessions varied due to the large number of participants. All 31 participants learned to use the PECS system with adults and peers within their preschool classroom. The authors reported that on average, the participants learned Phase I within 2 months of the start of the study, Phase II within 4 months of the study, and Phase III within 5 months of the study. It took an average of 6 months for participants to learn the later PECS phases IV-VI. This study was conducted by researchers.

Finally, Charlop-Christy et al. (2013) studied the effects of the PECS protocol with three children with autism who were 3, 5, and 12-years-old. The purpose of the study was to analyze the effects of PECS on the acquisition of speech and social communicative behavior, and problem behavior. PECS Phases I-VI were taught to the participants. Two sessions were conducted each week, with each participant. All three participants from this study mastered PECS in a relatively short amount of time. These findings indicated that participants mastered all six phases in an average of 246 trials. Another finding was that the participants' social communicative behaviors increased after

learning to use PECS, and a decrease occurred in the participants' problem behavior after mastering PECS. This study was conducted by a therapist.

The purpose of the current study was to evaluate the effectiveness of the PECS protocol (Frost & Bondy, 2002) on the requesting behavior of 3–5-year-old children with disabilities (i.e., autism and developmental delay). Specifically, children were taught Phases I and II of the protocol in which they were taught to exchange a picture symbol card in return for a preferred item (Phase I) and subsequently to travel a distance to get the picture card and make the exchange with their teacher (Phase II). Both phases required a communication partner and a helper (physical prompter) to make the exchange. This study adds to the literature as it is a replication of the effect of the manualized PECS Phase I and II protocol with young children with disabilities. This study is different from the previous studies mentioned as it uses the participant's classroom teacher as the research investigator as well.

Research Question

Is the use of the picture exchange system (PECS Phases I-II) effective in increasing the requesting of preferred items of preschool students with disabilities in the preschool classroom?

Methods

Participants

Children

The inclusion criteria to participate in this study were that participants were 3-5 years of age; were enrolled in a state-funded preschool; were nonverbal, minimally verbal, or unable to appropriately communicate their wants as they did not have a reliable method for communicating currently in place; and had not been previously exposed to PECS as an AAC system. Participants also needed to have a diagnosed disability. This study required participants to have fine motor skills so that they were able to pick up a PECS card and hand it to the communication partner and the ability to tolerate a physical prompt. The exclusion criteria were that students could verbally and appropriately request for preferred items, did not have a disability, or were under the age of 3 and or above the age of 5. To appropriately request, the students requested for preferences in a way that was both developmentally appropriate and understood by others, without problem behavior. Observational data were used to assess these inclusion criteria.

Three preschool students with identified disabilities (i.e., autism, developmental delay, and communication disorders) who were nonverbal, minimally verbal, or unable to appropriately verbally request their wants, qualified for this study. All participants had a severe language impairment. All participants were enrolled in state funded preschool and were between 3 and 5 years of age. Prior to the intervention, all participants exhibited behaviors such as grunting, swatting, pointing, dropping to the ground, crying, or hiding when they wished to communicate that they wanted an item in the classroom.

Bobby was a 3-year-old boy with autism. He had a medical diagnosis from his pediatrician. He was in the process of getting an educational diagnosis as well (as he was only 3 and this was his first year in school), but at the time of the study did not have any assessment scores to be reported. He received special education services from the preschool teacher in the classroom, as well as speech therapy weekly and occupational therapy bi-monthly. Bobby was unable to engage in cooperative play, however he did engage in onlooker and parallel play occasionally. He could sustain interest in a preferred task for around 2 minutes. Bobby preferred sensory toys that vibrated or lit up, chocolate milk, and the iPad. Areas of growth included expressive and receptive communication as well as appropriately expressing wants. Bobby was completely nonverbal. When he wanted an item, he began reaching for it or crying that quickly escalated to aggressive behaviors like scratching, biting or hair pulling. Bobby had IEP with goals under the domains of communication, general intelligence, motor, and social emotional/adaptive.

Eli was a 4-year-old boy with autism. He had both a medical and an educational diagnosis. The Adaptive Behavior Assessment System-Third Edition (ABAS-III, Harrison & Oakland, 2015) was completed with Eli's mother, and preschool teacher. The ABAS-III provides a comprehensive, norm-referenced assessment of adaptive skills for individuals birth to 89 years of age. Adaptive behavior was assessed across several domains including communication, community use, functional academics, home living, health and safety, leisure, self-care, self-direction, and social skills. All items in all administered skill areas were completed by the respondent and there were no items reported as guessed by the respondent in any administered skill area. The results of this administration of the ABAS-III appeared to be a valid assessment of Eli's adaptive

behavior. His scores were in the 10th percentile. Eli also participated in the administration of the Autism Diagnostic Observation Schedule, Second Edition, Module 1 (ADOS 2, Lord, C., 2012). The ADOS-2 is an instrument designed to assess social and communicative behaviors that are associated with autism spectrum disorder (ASD). Eli's ADOS-2 classification was autism with behaviors during the ADOS-2 reflecting a high level of autism spectrum-related behaviors as compared to other children who had a diagnosis of autism spectrum disorders of the same chronological age and language level. These assessments were administered by the school psychologist.

Eli received special education services from the preschool teacher in the classroom, as well as speech therapy weekly and occupational therapy bi-monthly. Eli's strengths included engaging in onlooker and parallel play occasionally. He was unable to engage in cooperative play. He could sustain interest in a preferred task for around 4 minutes. Eli preferred the iPad, a marble game, and Play Doh. Areas of growth included expressive and receptive communication as well as appropriately expressing wants. Eli was completely nonverbal. When he wanted an item, he began reaching for it, hand flapping, vocalizing loudly, or running away. Eli had an IEP with goals under the domains of communication, general intelligence, motor, and social/adaptive.

Fisher was a 3-year-old boy with developmental delay and a severe language delay. This was a diagnosis given by his pediatrician and speech language pathologist, respectively. He was in the referral process of getting an educational diagnosis and at the time of the study and did not have any assessment scores to be reported. He received special education services from the preschool teacher in the classroom, as well as speech therapy weekly. Strengths for Fisher included engaging in cooperative play with other peers. He

was interested in what other peers were doing in the classroom and often tried to involve himself in their play. He could sustain interest in a preferred task for 5-10 minutes.

Fisher preferred the iPad, skittles, and light up toys. Areas of growth included expressive and receptive communication as well as appropriately expressing wants. Fisher was minimally nonverbal. Though he made many utterances of attempted words, none of his words could be understood by others. When he wanted an item, he began reaching for it, crying, whining, or falling to the ground. Fisher had an IEP with goals under the communication domain.

Research Personnel

The students' preschool teacher served as the research investigator. She held a bachelor's degree in interdisciplinary early childhood education. She had 3 years of teaching experience and was currently enrolled in a master's program in interdisciplinary early childhood education. She had limited experience with the PECS protocol. Other individuals that were involved in the study included the paraprofessional employed in the children's classroom. She held a bachelor's degree in interdisciplinary early childhood education and had 1 year of experience working in a classroom as a paraprofessional. She had limited experience with the PECS procedures. During the study, she served as the helper/physical prompter. A graduate student working toward a master's degree in applied behavior analysis served as the reliability data collector. She held a bachelor's degree in psychology and had limited experience with the PECS protocol.

Instructional Setting and Arrangement

The study was conducted in a publicly funded preschool classroom that located in an elementary school serving preschool through 5th grade students in a southeastern state

in the United States. Preschool students attended Monday through Thursday, August through May, for half of the day. The preschool held two sessions for preschool students. Each session was 3 hours in length. The first session was held in the morning and had 16 students, 8 of which had a disability of some kind. The second session was held in the afternoon and had 15 students, 7 of which had a disability of some kind. Identified disabilities of the children included autism, language delays, and developmental delays. The students without a disability were considered “at risk” due to low-income levels at home. There was one teacher and one paraeducator always present in the classroom. The occupational therapist and speech therapists came in and out of the room on a regular basis to work with students. This study was conducted during the afternoon session only, as all three participants attended preschool during that session.

Probe, intervention, and maintenance sessions were held in the preschool classroom, the speech pathologist’s classroom, or the school cafeteria. The intervention was implemented in a 2:1 format with the communication partner and helper/physical prompter working with each participant one at a time. The classroom was an 8 x 8-meter room that contained seven centers (i.e., blocks, library, dramatic play, science, sensory, art, literacy, and music). The cafeteria was a 20 x 24-meter room that contained tables and a lunch line to walk through. In the classroom, sessions were conducted wherever the student was playing. The investigator began the sessions in the center the student was already in which the student was playing. Each center had a table that could be used for the sessions, though a table was not required. In the cafeteria, the sessions were conducted at the cafeteria table.

Materials/Equipment

The investigator implemented the intervention during free choice/center time in the classroom, or at mealtimes which took place in the cafeteria. Materials were the same across contexts (except for each participant's preferred items) and included PECS cards that were 5 x 7.5 centimeters size. Each card contained one colored graphic of preferred items which were an iPad, chocolate milk, bubbles, and a light up toy, with a white background. The iPad was a classroom iPad in a rubber case with many preschool educational games downloaded (e.g., color sorting, letter tracing, counting, shapes). The chocolate milk was the milk from the school cafeteria in a carton which participants drank through a straw. The bubbles were contained in a plastic bottle with a bubble wand, and the light up toy was a ball with colored lights inside that lit up and spun when a button was pushed. The cards were laminated with a Velcro dot on the back so they could stick to a communication book when necessary. The communication book was a black 1" binder with a Velcro dot on the front to place the PECS card. The investigator used paper data sheets that were printed on a standard sized piece of paper. Reinforcers included the student's preferred items that were determined prior to instruction using a reinforcer preference assessment (i.e., iPad, light up sensory toys, edibles such as candy, bubbles, chocolate milk). Data sheets used include probe, intervention (Phase I and II), and maintenance sessions with the participants name, the date, the preferred item used, and the number of sessions and trials per condition.

Measurement System

The measurement system used was event recording. Event recording was used to collect data across all conditions. Each time a trial was conducted, the implementer used

the event recording data sheet to record whether the participant gave the correct response for that phase. A plus was given for that trial if the participant gave the correct response for that phase, and a minus sign was given if they were not.

Dependent Variable

The dependent variable was the participants' independent requesting preferred items using the exchange of PECS cards. This looked different during each phase of the PECS protocol. Phase I was defined as the participant picking up the picture exchange card and handing it to the communication partner within 5 seconds of the investigator presenting the preferred item. In Phase II, this was defined as the participant walking over to the PECS book that was 3 feet away and picking up the picture exchange card and handing it to the communication partner that was an additional 3 feet away, within 5 seconds of presenting the preferred item.

Experimental Design

This study used a multiple probe design across participants (Ledford & Gast, 2018). Experimental control was demonstrated with this design by showing that data remained stable until the intervention was applied. A change in participant behavior occurred when, and only when, the intervention was applied. The multiple probe across participants design was chosen over other designs because it was appropriate for this study's nonreversible target behavior and was appropriate when asking a demonstration question.

Threats to validity were minimized using this design. First, instrumentation threats were controlled through the collection of interobserver agreement and procedural fidelity data for at least 20% of the sessions in each condition. Second, history threats

were controlled for by communicating often with the participant's parents/family and requesting they not intervene on this skill during the study, and ensuring data were stable before moving to another condition. Maturation threats were minimized by keeping the study short (1-2 months). This design type was more feasible than a multiple baseline design because continuous data are not required in probe conditions. The investigator was also serving as the classroom teacher and found probing students intermittently more efficient when simultaneously conducting research and teaching students than conducting continuous probes.

Screening Procedures

The PECS protocol was chosen as an intervention for these participants because observational data showed that these participants were unable to appropriately request for their wants. All participants were screened using a universal screener called the Speed Dial 4 (Speed Dial 4, Mardell C., & Goldenberg, D., 2011) upon entry to preschool (which included a language component) and all participants did not meet the "cut off" score to pass the language section, meaning there were significant deficits in this area. Further assessments were done by the speech language pathologist to confirm these results and to better understand the deficits each participant had. Other data such as IEP goal data and general assessment data were taken by the teacher multiple times a year. Observational data were also taken that showed the students did not have a conventional way to request preferred items, demonstrating intervention in the area of expressive communication was critical.

General Procedures

This study used the steps in the PECS protocol to implement Phases I and II of the PECS system as an intervention with three participants with disabilities. First, probe data were collected on all participants to measure how participants requested preferred items without intervention. Once data were stable across all students, intervention began for participant 1 while untrained participants received probe procedures once per week. After participant 1 neared mastery criteria for Phase I and II, defined as 3 consecutive sessions at 100% correct exchanges, participant 2 received continuous probe sessions for a minimum of 3 sessions. When criterion for Phases I and II was reached for participant 1, participant 2 began intervention. This same sequence occurred for participant 3. After participants reached mastery criteria for Phase I and II, participants received maintenance sessions.

A preference assessment was conducted prior to the PECS procedures implementation to identify those items in the classroom that were highly reinforcing to each participant (See Appendix A). A parent survey was also sent home to each participant's family, as well as teacher observation to choose three-five items that were used in the preference assessment. When conducting the preference assessment, each of the items was presented to each participant one at a time. The investigator used the data sheet in Appendix A as provided by the PECS manual to score each item. As the item was presented, the participant received a 0 if they rejected the item or had no reaction. The participant received a 1 if they reached for the item, showed signs of pleasure, or took it again. The participant scored a 2 if they protested when the item was taken away. The PECS manual said to present the item and let the participant take it if he would. If he

did, the investigator immediately tried to take it back to observe his reaction. Did he protest when it was taken away, or did he reach for it and try to take it again? The investigator presented three-five items that she suspected would be preferred items (one at a time) to conduct one trial. One trial was conducted along with the parent reports to establish a hierarchy of reinforcers. The investigator would present an item (for example bubbles) and give that item a score based on how the participant reacted to the item (see the data sheet on Appendix A). Once that item was scored, the investigator calmly took the item away and put it out of sight. She then presented the next item and gave it a score. She did this with all items. After all items had been given a score, the trial ended. The investigator began probe procedures using the item that scored the highest and kept the other high scoring items ready for back up use if needed. This highest scoring item was the one used for probe and both Phases I and II of the PECS procedures. If a participant lost interest in the item during a session, the investigator moved on to the next most preferred item that was determined from the preference assessment.

Probe Procedures

Probe data were collected on all participants to measure how participants requested preferred items before intervention. There were at least three probe sessions conducted for each participant that continued until data were stable. Each probe session included 5 trials. If the participant had three consecutive probe sessions at 0%, the initial probe procedures stopped. Each participant received an additional weekly probe session if they were not receiving intervention, and three probe sessions directly before they began Phase 1. Mastery for Phase I was handing the communication partner a picture card in exchange for a preferred item, across 3 consecutive sessions at 100% independent

responses. Once Phase I was completed, the student received Phase II sessions. Mastery for Phase II was walking 3 feet to the communication book, picking up the PECS card, walking an additional 3 feet to the communication partner, and handing them the PECS card to make an exchange. Probe and intervention sessions occurred at any point during the preschool day. There was no limit to how many sessions could occur in one day, but typically one day involved 1-3 sessions each day.

During probe sessions, a picture card was placed on the table in front of the participant of a preferred item. The item was held out by the investigator to entice the participant. All participants started with the iPad as their preferred item as determined by the preference assessment. The investigator turned on the iPad and began to play a game within the participant's view. She turned the screen around to show the participant the game she was playing. The investigator then provided a 5 s response interval. If the participant responded correctly by picking up the PECS card, handing it to the investigator/communication partner, and released it into her hand within 5 s, the investigator said, "You want the iPad" and gave the item to the student. If the student responded incorrectly, by reaching for the item, pointing, crying, etc., the investigator still gave them the iPad. If the student did not respond by not moving their body or making any sounds, the investigator still handed them the iPad.

During probe procedures participants could be at any center in the classroom, as each center had a table the investigator could sit at with a participant, however sitting at a table was not required if the participant would not comply with this request. The investigator/communication partner was the only person needed for these sessions, as physical prompting was not needed to collect probe data. After the trial ended, the

investigator said, “My turn” and calmly took the item back. Thirty seconds occurred between each trial so the investigator could record data on the data sheet.

Independent Variable

The independent variable was the PECS protocol, Phases I and II. In Phase I, the participant was taught to take a picture card and hand it over to the communication partner to communicate a request, and in exchange they received the item they were requesting (the item that was on the card). In Phase II, the participant was taught to walk 3 feet to go get the picture card from the communication book, and then walk another 3 feet to the communication partner and hand it to them to receive the item they were requesting (the item that was on the card).

Instructional Procedures

Instructional procedures included Phases I and II in the PECS protocol as described in the independent variable section. Instructional sessions were conducted during any time of the day, including mealtimes, or anytime in which the participants were in the classroom. The sessions occurred during times when the preferred item was present, there was no limit to the number of sessions conducted in a day, however when the participant lost interest, the session ended. If the participant was still uninterested the next time a session started, the preferred item was then changed. Session times depended on when the preferred item would be present. For example, Bobby preferred chocolate milk, so many of his sessions occurred in the cafeteria. Fisher and Eli preferred the iPad, so many of their sessions occurred during free choice/center time. There were no constraints on when and where sessions needed to occur.

There were 5 trials in each session, per each participant. A criterion of successfully completing each phase was 3 consecutive sessions at 100% was needed and then the next phase was implemented. Mastery of the study was considered completing Phase II (walking 3 feet to retrieve the PECS card and another 3 feet to hand it to the communication partner in exchange for the preferred item) for 3 consecutive sessions at 100% of the trials.

The phases are described below:

Phase 1: Teaching the Physically Assisted Exchange

During the Phase I sessions, the investigator sat in the training environment across from the child and the physical prompter sat behind the child. The investigator placed the photo of the preferred item on the table or on the floor in front of the child. The investigator then held up the preferred item in front of the child's eyes or interacted with the item (e.g., held the milk carton within 1 foot of the child's face, played a game on the iPad). When the child looked toward the preferred item, the investigator provided a response interval of 5 seconds. If during that 5 second the child reached toward the preferred item, the investigator opened her hand (an open-handed prompt), and the physical prompter (from behind the child) provided only as much physical guidance as necessary to prompt the child to pick up the picture, reach it to the communicative partner, and release the picture into the open hand of the investigator. The investigator immediately handed the item to the participant and named the item as the exchange is made, saying "You want iPad." The investigator let the student play with the item for 30s. If the preferred item was a drink, the participant got to take one sip of the drink and then the investigator calmly took the item or drink away. If the participant did not reach

for the item within the 5 second response time, the investigator reconfirmed that it was a still a highly preferred item and gave the student a “free sample” of the item. This meant the participant got to play with the item/drink the liquid. If he played or consumed it, the investigator tried again until the student reached for the item.

No verbal prompts were provided during Phase I. Once the exchange steps were established, the physical prompter faded physical assistance. Once physical assistance was faded, the investigator also faded the use of the open-hand prompt. The investigator removed the open-handed prompt all together when the participant began to hand the investigator the PECS card upon seeing the preferred item independently. The physical prompter used only as much physical guidance as needed to assist the participant to make the communicative exchange, using moment-by-moment decisions on how much assistance to give. This phase continued until the participant independently made the exchange with the investigator for 3 consecutive sessions at 100%. (See Appendix B for data sheet)

Phase 2: Distance and Persistence

Phase II procedures began when Phase I criterion was met. The investigator sat in the training environment across from the participant with the physical prompter seated behind the participant. The investigator placed the photo of the preferred item which was now placed on the front of a communication binder on the table or on the floor in front of the child. The investigator then held up the preferred item in front of the child’s eyes or interacted with the item. Since Phase I had already been mastered, it was hoped that the participant would know to pick up the picture card and hand it to the investigator. If the

participant did not pick up the picture card, physical prompting was given as necessary by the physical prompter.

As training progressed, the investigator moved one foot at a time away from the participant so that the participant had to move that distance to hand the picture card to the investigator. For example, in session 1 of Phase II there were 5 trials. In Trial 1 the investigator moved 1 foot away from the participant. If the participant made the exchange correctly, the investigator then moved 2 feet away from the participant for trial 2. If the participant made the exchange correctly, the investigator then moved 3 feet away from the participant for trial 3.

Once the participant mastered picking up the picture card, traveling 3 feet, and handing it to the investigator, the investigator then moved not only herself but also the communication book (the binder with the picture card on the front) by 1 foot each trial so that the participant had to move to access the picture card from it. For example, during this part of Phase II the investigator started trial 1 by moving the communication book one foot away from the participant. The investigator stood 3 feet away (as mastery for this skill had already been established). If the participant did this independently, for trial 2, the investigator moved the communication book 2 feet away and stood 3 feet away from the participant. For trial 3 the investigator moved the communication book 3 feet away from the participant and stood 3 feet away from the participant. The investigator immediately handed the item to the participant and named it as the exchange was made, saying “You want the iPad” No verbal prompts were provided throughout Phase II. (See Appendix C for data sheet). In all trials in Phase II, the physical prompter/helper provided as much physical prompting as necessary to assist the participant in traveling to the book

and then to make the exchange with the communicative partner as necessary. (See Appendix C).

Maintenance

After a participant met criteria for Phase II, maintenance sessions were conducted at least once per week after instruction. All maintenance sessions were done weekly, and each session included 5 trials. The trials were conducted identically to probe sessions.

Interobserver-agreement

Interobserver agreement (IOA) was collected in at least 20% of the sessions during each condition across all participants. The point-by-point method was used to calculate IOA using the formula: $\text{number of agreements} / (\text{number of agreements} + \text{disagreements})$ multiplied by 100 (Gast & Ledford, 2018). The percentage of agreement had to be 80% or higher to be considered acceptable. If the percentage fell below acceptable levels, the reliability observer was retrained. The IOA observer was trained using role playing prior to the study so any questions could be answered. She had to reach a criterion of agreement of 80%. She was trained on the responses possible in each phase of the PECS procedures. (See Appendix D).

Procedural Fidelity

Procedural fidelity was collected simultaneously with IOA and was collected for at least 20% of the sessions during each condition by a University of Kentucky graduate student who was working in the classroom weekly. The formula used to collect procedural fidelity was $\text{\# of observed investigator behaviors} / \text{\# of planned investigator behaviors} \times 100$. The percentage of accuracy had to be 80% or higher to be considered accepted. If the percentage fell below acceptable levels the communication

partner and helper were retrained. Investigator behaviors that were assessed included: implementing each step from the PECS protocol to see if she implemented them exactly as the steps called for, as well as in the correct order. Specific investigator behaviors that were assessed depended on the steps according to the protocol as listed in the procedures section. Procedural fidelity was taken to see how accurately the researcher implemented the PECS procedures. (See Appendix E).

In Phase I, procedural fidelity was collected on the steps for Phase I which were that the investigator arranged the training environment, enticed the participant with the reinforcer, reinforced the participant immediately after the exchange, and took back the item to begin a new trial. Procedural fidelity was also collected on the physical prompter to ensure that she waited for the participant to reach, physically prompted the participant to make the exchange by helping them to pick up the card, reach it to the investigator, and put the card in the investigator's hand.

For Phase II, procedural fidelity was taken on the investigator to ensure she arranged the training environment, enticed the participant with the reinforcer, gradually increased the distance between the participant and herself by 1 foot, gradually increased the distance between the participant and the communication book/picture card by 1 foot, reinforced the participant immediately after the exchange by giving them the item. Procedural fidelity was also collected on the physical prompter to ensure that she waited for the participant to reach, physically prompted the participant to make the exchange by helping them to pick up the card, reach it to the investigator, and put the card in the investigator's hand if necessary, and physically guided the participant to the investigator of communication book if necessary.

Results

The student performance data are shown in Figure 1. A visual analysis of the graphed results was conducted. Trend, level, overlap, stability, consistency of effect and immediacy of effect were all visually analyzed to see if the PECS procedures, Phases I and II were effective. According to the data, the PECS procedures were effective in teaching all three participants to exchange a picture of a preferred picture to mastery in both phases.

Participant 1 received three probe sessions, all of which were at 0%. At this point the data were stable and probe sessions stopped for participant 1. Participants 2, and 3 received the initial three probe sessions (which were all also at 0%) and then one probe session per week until they began intervention.

Eli

Before beginning the study, Eli had no communication system in place. He was at that time, unable to sign, use picture cards, or any form of symbolic communication to appropriately communicate his wants in the classroom. Throughout probe sessions, this remained the same. The PECS picture card was placed in front of him on the table, but he did not acknowledge the card in any way. All sessions were scored at 0% as he was unable to give the correct response (i.e., handing the communication partner/teacher the picture card in exchange for the item on the card). Probe sessions took place until Eli scored three 0% for three consecutive sessions, which took place during the first three sessions. At this point the data were stable and probe sessions for EL were concluded.

During Phase I, Eli was taught to make the picture exchange for his preferred item (the iPad) using the PECS procedures. When the intervention was introduced, he had an immediately change in level and trend and reached mastery of Phase 1 in four sessions. Mastery was considered three consecutive sessions at 100% (i.e., independently handing the communication partner/teacher the picture card in exchange for his preferred item). After mastery of Phase I, Eli then entered Phase II. During Phase II, Eli was immediately at criterion levels and reached criterion on Phase II in six sessions.

After mastering both Phase I and II, maintenance data were taken 5 times (at least weekly) which remained at 100% throughout the study for Eli. The iPad was used for all probe and training sessions for Eli.

Fisher

Before beginning the study, Fisher had no communication system in place. He was at that time, unable to sign, use picture cards, or any form of symbolic communication to appropriately communicate his wants in the classroom. Throughout probe sessions, this remained the same. The PECS picture card was placed in front of him on the table, and though he did acknowledge the card by looking at it or poking it, he was not able to hand it to the communication partner/investigator to make the exchange. All probe sessions were scored at 0% as he was unable to give the correct response (i.e., handing the communication partner/teacher the picture card in exchange for the item on the card). Probe sessions took place until Fisher scored three 0% in a row, which took place during the first three sessions. At this point the data were stable, however probe sessions were still conducted to be sure Fisher was still at 0% before entering phase 1.

The investigator began to collect three consecutive data points as required before Fisher could begin Phase I, which occurred at sessions 11, 12, 13.

During Phase I, Fisher had an immediate change in level and trend and reached mastery of Phase I in four sessions. Mastery was considered three consecutive sessions at 100% (i.e., independently handing the communication partner/teacher the picture card in exchange for his preferred item). After mastery of Phase I, Fisher then entered Phase II. During phase II, Fisher maintained high levels of responding and met criterion in seven sessions.

After mastering both Phase I and II, maintenance data were taken weekly which remained at 100% throughout the study for Fisher. The iPad was used for all probe and training sessions for Fisher.

Bobby

Before beginning the study, Bobby had no communication system in place. He was unable to sign, use picture cards, or any form of symbolic communication to appropriately communicate his wants in the classroom. Throughout probe sessions, this remained the same. The PECS picture card was placed in front of him on the table, but he did not acknowledge the card in any way. All sessions were scored at 0% as he was unable to give the correct response (i.e., handing the communication partner/teacher the picture card in exchange for the item on the card). Probe sessions took place until Bobby scored three 0% in a row, which took place during the first three sessions. At this point the data were stable, however probe sessions were still conducted to be sure Bobby was still at 0% before entering Phase 1. The investigator collected weekly probe sessions

which occurred at session 9 and 17. The investigator also collected three consecutive data points as required before Bobby could begin Phase I, which occurred at sessions 22, 23, 24.

During Phase I, Bobby was taught to make the picture exchange for his preferred item (the iPad) using the PECS procedures. When Phase I was implemented, Bobby maintained 0 levels of responding for 9 sessions. On the 10th day of intervention in Phase I, he had a change in level, but then had variable responding through session 41. On session 42 (17th day of intervention), Bobby had an increasing trend and reached mastery of Phase I after 20 sessions. After mastery of Phase I, Bobby then entered Phase II. During Phase II, Bobby had high levels of responding and mastered Phase II in seven sessions.

A modification was made to the procedures for Bobby where instead of using the iPad that was used in probe sessions, chocolate milk was used when Bobby reached mastery. This is a “modification” to the procedures because there is no probe data on chocolate milk to say for sure that BR did not have the skill of requesting chocolate milk prior to intervention.

Maintenance data were not collected for Bobby as the school year had ended promptly after Bobby mastered both Phase I and II. Bobby was also the only participant that became quickly disinterested in his preferred items, so he did attempt using a few different PECS picture cards. He started using an iPad as his preferred item (most preferred as determined by the preference assessment), next he used bubbles, a light up toy, and finally chocolate milk, which was not originally included in the preference

assessment but ended up working the best and eventually he was able to reach mastery using chocolate milk as the preferred item.

Reliability

IOA and procedural fidelity were taken 20% of the time across all probe and training sessions, for each participant. The mean IOA was 100% for probe sessions and 95% (range, 90-100%) for training sessions. The mean procedural fidelity for probe sessions was 100% for all investigator and physical prompter behaviors. For training sessions, the mean procedural fidelity was 90% for all investigator and physical prompter behaviors (range, 85-100%). Neither IOA nor procedural fidelity data dropped below 80% so no training sessions were needed

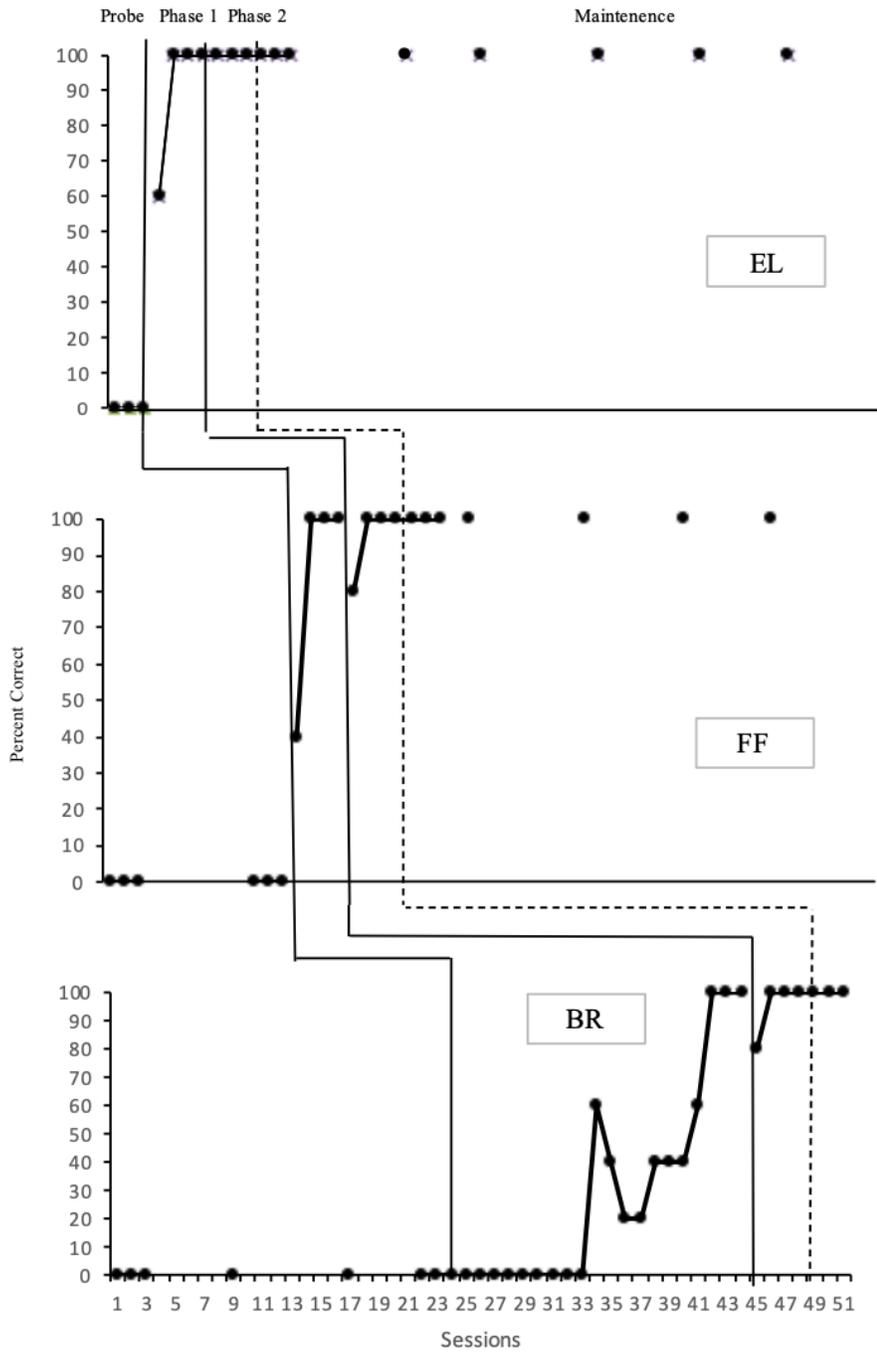


Figure 1: Graph of Results.

Discussion

The purpose of this study was to evaluate the effects of teaching preschool aged children with disabilities how to appropriately communicate their wants for a preferred item using the PECS as an AAC device. Before this study, none of the participants had any exposure to the PECS protocol or the picture cards. Two of the participants were completely nonverbal, and one did use vocalizations and limited words, that were generally not understood by others. The results demonstrate that the PECS protocol was effective in teaching all three students to travel to exchange a picture for preferred items.

During the study, Eli and Fisher did not engage in challenging behavior, however Bobby did. Bobby threw the picture card many times, and when he got upset, he demonstrated aggressive behaviors toward the communication partner/teacher including behaviors like biting, scratching, and hair pulling were demonstrated often. Eli and Fisher were interested in the iPad and were excited to get extra time to use it (students were limited to 10 minutes per day typically). For Eli and Fisher, the iPad was used for all sessions and held their interest, therefore their preferred item did not need to be changed during the study. Bobby had the most difficult time reaching mastery. He was the youngest participant, and it took him the longest to reach mastery in phase I. He sustained interest in most preferred items for a few trials at a time. After he lost interest in an item, demonstrated by him running away or leaving the area, a new preferred item was selected from the preference assessment. In total, four items were used for Bobby: iPad, bubbles, a light up toy, and chocolate milk. The chocolate milk resulted in highest levels of responding, but even still he had difficulty mastering Phase 1. The investigator had to implement the training sessions in the cafeteria where Bobby would be expecting to get

chocolate milk. The investigator also had to make sure Bobby was in a state of deprivation making sure no chocolate milk was given to Bobby before the sessions to finally get Bobby to reach mastery. A variety of settings were used during this study (speech language pathologist's room, classroom, cafeteria) to help the participants generalize requesting behavior.

This study is not the first of its kind. There are many studies that have used the PECS protocol and proven it successful with other participants to help them communicate. This study supports previous research as it proved the effectiveness of the PECS procedures as other studies have done. Similar to studies mentioned, this study further supports that the PECS procedures in Phases I and II can be used with very young participants with disabilities and help them to successfully request preferred items to others using PECS. This study shows further effectiveness of the PECS protocol when teaching preschool students with disabilities how to request for preferred items. This study replicated the findings of Ganz et al. (2008), Schwartz et al. (1998), and Charlop-Christy et al. (2013), which also showed the PECS protocol to be effective in teaching young children to exchange picture cards for preferred items in Phases I and II.

Though there are many similar studies out there, this one is unique in the fact that it was conducted in a public school in a rural county by the preschool teacher. In the other studies referenced, the preschools were often laboratory schools and had researchers helping in the classroom to help the PECS protocol run more smoothly. In this study the investigators were also the indigenous implementers of the classroom (the teacher and paraeducator). The teacher and the paraeducator served 15-16 other children and were often the only other adults in the room during the time the study was implemented. The

results show that the intervention was able to be successfully carried out even when the classroom staff were working under the practical realities of implementing research within their ongoing classroom duties. This study was conducted not only to add to the literature, but also because the students in the researcher's class needed to be able to appropriately communicate their wants, and the PECS protocol was a tool/intervention to help them do that, and the protocol was implemented by the participants' classroom teacher, rather than a researcher.

Limitations

During this study the participants were not chosen randomly as to the order in which they began intervention. Random assignment of the order in which participants received the intervention would decrease potential bias within the context of the design. Another limitation was that there is not probe data on Bobby using chocolate milk, as at the time, the iPad was the most reinforcing item determined by the preference assessment. As Phase I progressed, it was evident the iPad was no longer holding his attention, and a modification was made to use chocolate milk as the reinforcing item. Although the PECS protocol then calls for the investigator to find a more reinforcing item if the item being used is no longer reinforcing. The investigator did not have baseline data on Bobby's use of PECS when chocolate milk was used as the reinforcing item.

Future Research

In future research, this study could be replicated incorporating the use of a more high-tech device instead of the PECS picture cards. As the participants age, other forms of AAC mobile devices may be more efficient and accessible. Many families have devices like iPads or can get access to other AAC devices through school that can help

the participants take the skills they have learned to be able to communicate without having to worry about carrying around picture cards or a picture book, however Pyramid Educational Consultants (n.d.) has developed procedures for transitioning from PECS to speech generating devices. This study could also be replicated in many other settings, including clinics, therapy sessions outside of the school, or other schools/classrooms. This study could easily be expanded by teaching the other steps in the PECS protocol (Phases IIIa-IIIb), which include making choices between a preferred and nonpreferred items and between two preferred items.

Something to consider for the future is how the use of naturalistic language interventions may compare to the PECS protocol. Because the PECS protocol calls for two people to implement the intervention at all times during Phases I and II, and in many public preschool classrooms there are only two adults present, it did produce logistical challenges. The use of naturalistic intervention strategies may have been another option for intervention that does not require two interventionists and so a comparison study would be an important consideration for future research

Implications for Practitioners

This study showed the effectiveness of using the PECS protocol even with very young participants (as young as 3 years old) who had just received an autism or developmental delay diagnosis. Early intervention has already been shown to be the best time to intervene when a child has developmental delays. Knowing these things, practitioners and teachers can implement the steps in the PECS protocol, knowing the earlier they can use this intervention with their students, the better the outcome. The Center for Disease Control (CDC) says that intervention is more probable to be effective

when it is provided earlier rather than later in life. They also discuss how early intervention can change a child's path of development to improve not only outcomes for the child themselves, but also their family and community (CDC, 2022). This study provided further evidence that acting and intervening on delays as early as possible has a positive outcome for students with moderate to severe disabilities.

Practical limitations for this study included a significant time restraint. Given that the students were enrolled in state funded preschool, the investigator only had 3 hours with each session of students. Much of this time included getting on and off transportation, packing and unpacking materials, and transitions. This made it difficult to conduct sessions at times. Another limitation to this study was the number of staff in the preschool classroom. The classroom included 15-16 students, half of whom had a disability. There were only two staff in the classroom at most times (the teacher and paraeducator) both of whom were needed to carry out the PECS procedures, as the teacher needed to be the communication partner and the paraeducator needed to be the physical prompter/helper. The investigator found it difficult to implement the PECS procedures because if both staff were needed to work 2:1 with the participant, the rest of the class was left unattended to. This required the implementer to have other staff come in and help supervise the other students which was often difficult and not feasible for a long period of time. Therefore, teachers should consider their staffing assignments prior to implementing the PECS protocol.

Conclusion

To conclude, the PECS protocol was effective in teaching preschool students (ages 3-5 years) with disabilities to request for preferred items using picture cards. All

participants achieved mastery of Phases I and II, though some took longer than others. The skills these participants learned will help them communicate their wants with both peers and adults and serve as starting points for the development of additional communication skills, giving them more independence and success in their classroom

**Appendix C
PECS Phase 2[©]**

Participant: _____

Staff	Date	Activity	Item	Distance in Feet to CP			+ / -		Distance to Book				+ / -	
				0-3	3-6	6-9	+	-	0-3	3-6	6-9	>9	+	-
				0-3	3-6	6-9	+	-	0-3	3-6	6-9	>9	+	-
				>9										
				0-3	3-6	6-9	+	-	0-3	3-6	6-9	>9	+	-
				>9										
				0-3	3-6	6-9	+	-	0-3	3-6	6-9	>9	+	-
				>9										
				0-3	3-6	6-9	+	-	0-3	3-6	6-9	>9	+	-
				>9										
				0-3	3-6	6-9	+	-	0-3	3-6	6-9	>9	+	-
				>9										
				0-3	3-6	6-9	+	-	0-3	3-6	6-9	>9	+	-
				>9										
				0-3	3-6	6-9	+	-	0-3	3-6	6-9	>9	+	-
				>9										
				0-3	3-6	6-9	+	-	0-3	3-6	6-9	>9	+	-
				>9										
				0-3	3-6	6-9	+	-	0-3	3-6	6-9	>9	+	-
				>9										
				0-3	3-6	6-9	+	-	0-3	3-6	6-9	>9	+	-
				>9										
				0-3	3-6	6-9	+	-	0-3	3-6	6-9	>9	+	-
				>9										
+ = moved the indicated distance independently							- = needed assistance from the physical prompter or required the Backstep error correction procedure							

Appendix D
Inter-observer Agreement Data Sheet

Phase	Skill	Target behaviors
I	Exchange	Participant reaches for the picture card and hands the picture card over to the communication partner. Only one picture card is present at a time.
II	Travel	Participant travels three feet to the picture card, picks up the picture card and travels three feet to the communication partner. The participant hands the picture card over to the communication partner. Only one picture card is present at a time.

Date:

Phase:

Trial														
Observer 1														
Observer 2														
Trial														
Observer 1														
Observer 2														
Trial														
Observer 1														
Observer 2														

Appendix E

Procedural Fidelity Data Sheet

Implementer:	
Supervisor:	
Date:	

Phase I: Communication Partner (Teacher)		
	Pass	Comments
Arranges Training environment effectively- 1 picture card available, trainers positioned appropriately, control of reinforcers		
No verbal prompting		
Entices student with reinforcer		
Uses open hand effectively- appropriate timing (after participant reaches)		
Reinforcers within .5s with reinforcer and provides praise		
Takes back item to begin new trial and records on data sheet		
Phase I: Physical Prompter (Para)		
Waits for participant to initiate by reaching for reinforcer		
Physically prompts the student to exchange the picture card by picking up, reaching, and releasing the card into CP's hand		
Fades prompts using least to most prompting		
Interrupts/prevents participant's interfering behaviors		
No social interaction with participant		
Notes:		
Phase II: Communication Partner (Teacher)		
Arranges Training environment effectively- picture card available, trainers positioned appropriately, control of reinforcers		
No verbal prompting		
Entices student with reinforcer		
Gradually increases distance between participant and communication partner by 1 ft		
Gradually increases distance between participant and communication book by 1 ft		
Reinforcers within 1 s with reinforcer and provides praise		
Eliminates subtle trainer prompts- body orientation, eye contact, expectant look, etc.		
Phase II: Physical Prompter (Para)		
Waits for participant to initiate by reaching for reinforcer		
Prompts selection of picture card if necessary		
Physically guides participant to CP or communication book if necessary		
No social interaction with participant		

References

- Bondy, A. S., & Frost, L. A. (2002). *The Picture Exchange Communication System*. Pyramid Educational Consultants.
- Carpenter, R. L., Mastergeorge, A. M., & Coggins, T. E. (1983). The acquisition of communicative intentions in infants eight to fifteen months of age. *Language and Speech, 26*(2), 101–116. doi: [10.1177/002383098302600201](https://doi.org/10.1177/002383098302600201)
- Charlop-Christy, M., Carpenter, M., Le, L., LeBlanc, L., 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*(3), 213-231. doi: [10.1901/jaba.2002.35-213](https://doi.org/10.1901/jaba.2002.35-213)
- The National Professional Development Center on Autism Spectrum Disorder (2014). *Evidence based practices*. <https://autismpdc.fpg.unc.edu/evidence-based-practices>
- Ganz, J., Simpson, R., Crobin-Newsome, J. (2008). The impact of the picture exchange communication system on requesting and speech development in preschoolers with autism spectrum disorders and similar characteristics. *Research in Autism Spectrum Disorders, 2*(1), 157-169. doi:[10.1016/j.rasd.2007.04.005](https://doi.org/10.1016/j.rasd.2007.04.005)
- Harrison, P. L., & Oakland, T. (2015). *Adaptive Behavior Assessment System 3*. Western Psychological Services.
- Centers for Disease Control and Prevention (2022, April 11). *Why act early if you're concerned about development?* <https://www.cdc.gov/ncbddd/actearly/whyActEarly.html>

Ledford, J. R., & Gast, D. L. (2018). *Single case research methodology: Applications in special education and Behavioral Sciences*. Routledge.

Lord, C. (2012). *Ados-2: Autism Diagnostic Observation Schedule: Manual*. Western Psychological Services.

Mardell, C., Goldernberg, D. (2011). *Speed Dial 4*. Pearson

Pyramid Educational Consultants (n.d.). Transitioning from PECS to SGDs.

<https://pecsusa.com/training/pecs-to-sgds/>

Sigafoos, J. (1999). Creating opportunities for augmentative and alternative communication: Strategies for involving people with developmental disabilities. *Augmentative and Alternative Communication, 15*(3), 183–190.

Sigafoos, J., Drasgow, E., Reichle, J., O'Reilly, M., Green, V., & Tait, K. (2004). Tutorial: Teaching communicative rejecting to children with severe disabilities. *Forum on Intervention Strategies for Severe Disabilities, 13*(1), 31-42.
doi: [10.1044/1058-0360\(2004/005\)](https://doi.org/10.1044/1058-0360(2004/005))

Schwartz, I., Garfinkle, A., Bauer J. (1998). The picture exchange communication system: Communicative outcomes for young children with disabilities. *Topics in Early Childhood Special Education, 18*(3), 144-159.
<https://doi.org/10.1177/027112149801800305>

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