Practitioner Implementation of Communication Intervention with Students with Complex Communication Needs

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Abstract

This study evaluated the effects of a pyramidal training approach that used an expert trainer who taught teachers how to train their paraeducators. Three special education teachers were taught to train four paraeducators to provide students with intellectual and developmental disabilities opportunities to initiate (OTI). A multiple baseline design across participants was used to evaluate the rate and fidelity that paraeducators provided OTI and least to most prompting strategies with students. Rates increased from 0 to an average of .58 per minute. Fidelity of implementation increased from 0% to an average of 94.5%. Maintenance data were recorded for three paraeducators. Schools should consider using this cost and time effective training model with staff.

Key Words: Paraeducator, Communication, Intervention, Pyramidal Training, Complex Communication Needs

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Students with significant intellectual and or developmental disabilities (IDD), especially those with complex communication needs, are most vulnerable to poor long-term outcomes without intervention (National Longitudinal Transition Study-2, 2009). One specific skill deficiency that has been reported among children with complex communication needs is independent initiating (Andzik, Chung, & Kranak, 2016; Chung, Carter, & Sisco, 2012). For example, Andzik, Chung, and Kranak (2016) describes initiation skill deficit among 23 elementary students with complex communication needs. Across nearly 200 hours of observation, only 9% of communication interactions documented were student initiated and 22% (n = 5) of the students were never observed initiating.

For students with complex communication needs who do not initiate interactions with others, they are often passive communication partners. In addition, without initiations, students do not possess the skills to protest, comment, joke, and may miss meaningful social interactions with others. The National Joint Committee for the Communication Needs of Persons With Severe Disabilities (NJC) developed a communication bill of rights that outlines the importance of educational team members ensuring the basic human rights of individuals who need support when communicating is recognized (1992). Along with this bill, and the work of professional groups such as TASH (2015), the legal rights of students with communication needs are being realized in school settings, though much of this work is falling to paraeducators.

Although paraeducators are often responsible for delivering instructional programming with limited training, they can be more effective when supporting students with IDD when adequately trained to deliver communication interventions (Mrachko & Kaczmarek, 2016).

Paraeducators have been found to be effective when implementing communication interventions for students with complex communication needs. One group of researchers effectively trained a paraeducator to provide communication interventions to an elementary-age student with autism, which directly influenced initiation rates including, opportunities to respond, opportunities to initiate, and least to most prompting (Wermer, Brock, & Seaman, 2017). These interventions provide critical components when increasing independent initiation among students with complex communication needs. Opportunities to initiate include sabotaging the environment to evoke a communicative response among a student (Kossyvaki, Jones, & Guldberg, 2016). Also referred to as milieu teaching (Yoder, Kaiser, & Alpert, 1991), the adult could make something inaccessible or provide a wrong item to the student. By sabotaging the environment, the adult is effectively prompting the initiation without providing an invasive cue such as, “tell me what you want.”

After providing an opportunity, practitioners need to then systematically teach the students how to respond with least to most prompting. This prompting hierarchy starts with the least intrusive prompt and progresses through more intrusive prompts based on the student’s response (Cooper, Heron, & Heward, 2007). Using this hierarchy, students who respond correctly earlier in the hierarchy would subsequently not be exposed to the more intrusive prompting.

Although paraeducators are effective change agents the majority of published research reports utilizing the researcher or classroom teacher as the intervention agent, rather than the paraeducator. However, one identified study did include the classroom teacher as the person providing training to the paraeducator (Brock et al., 2015). The researchers trained the teachers who then trained their paraeducators. This effort was effective, as paraeducators implemented a

peer-support strategy with students with IDD. With the exception of this study, classroom teachers have not been utilized when measuring the outcomes of the staff member they trained.

When utilizing the classroom teacher as the change agent, researchers and consultants are effectively building capacity in these teachers. It has been proven time and again that practitioners who engage in a practice with support (e.g., modeling and feedback) implement strategies with fidelity when compared to those who receive more traditional, didactic, professional development training (Brock & Carter, 2013). The pyramidal training approach is one way to support the dissemination of training from teacher professional development opportunities, to paraeducator implementation, to student outcomes. Pyramidal training uses specific components including an expert trainer providing training to either a single practitioner or group of tier-1 practitioners (e.g., teachers, administrators). These practitioners are consumers of the training that is being offered and are likely chosen to receive this level of training based on the classroom or school needs. For example, an expert trainer (e.g., curriculum specialist) would likely provide professional development training to a group of teachers when a district adopts a new curriculum. Another example might be when an expert trainer (e.g., outside behavioral consultant) provides training to a group of paraeducators prior to being placed into a particularly challenging classroom with children who have a variety of behavior intervention plans in place. In contrast to other professional development packages, practitioners such as teachers, paraprofessionals, direct care providers, family members (i.e., tier-2 practitioners) are also included and are comprised of one or more otherwise untrained practitioners who are trained by the tier-1 participants. Tier-3 individuals are those who are receiving an intervention and are instructed by tier-2 participants.

Pyramidal training has been used across various settings, practitioner types, and ages of clients in adult day facilities, homes, and special education classrooms. Two studies used teachers as training agents when training other teachers in school settings (Pence, Peter, & Giles, 2014; Pence, Peter, & Tetreault, 2012). In both studies, teachers were selected to receive training (i.e., functional analysis procedures and preference assessment, respectfully) and then were taught how to teach other teachers in the building that same strategy. Although teachers training other teachers is an important step when disseminating information from a conference, professional development, or in a mentor–mentee role, teachers training teachers can have its challenges given the need for classroom coverage for one teacher to leave their students to provide follow-up and feedback. Teachers training their own classroom paraeducators is possibly one way of expanding a one-time professional development to a paraeducator training which in turn has the potential for direct student outcomes.

Benefits of pyramidal training include being cost and time efficient (Andzik & Cannella-Malone, 2017). The expert trainer is needed only once to provide training, and then the teacher provides training, follow-up, and feedback to remaining staff. In addition, the training can be efficient in regards to the time it takes to train multiple practitioners. Also, pyramidal training promotes growth at the teacher level; teachers are left with a new skill set (e.g., communication intervention to use with their students) and with the skills to train their current or future paraeducators.

Pyramidal training is an approach that promotes training from one person to another to benefit the student, yet there are significant gaps in the literature related to how these training methods can benefit school teams. It is important to note that the training components included at each level are equally important. Quality training components include modeling, role-play, and

feedback, and these components are the tenants of Behavior Skills Training (BST) (Sarokoff, & Sturmey, 2004). BST has been linked with a greater fidelity of implementation among practitioner (Brock et al., 2017) Immediate feedback (Scheeler, Ruhl, & McAfee, 2004) and follow-up (Brock & Carter, 2013) were found to be essential components for effective staff training. When teachers conduct training with staff, they can be the ones to provide that feedback and follow-up whereas an expert trainer cannot if she is hired to come in only once (e.g., as is common with professional development). Pyramidal training with BST components is an ideal combination when training staff and has been shown to be effective in training individuals who work with people with significant disabilities (Andzik & Cannella-Malone, 2016; Parsons, Rollyson, & Reid, 2012).

A variety of studies have made claim that teachers can be effective trainers, and that when trained, paraeducators can be effective change agents for students with IDD. But these studies are few and thus are limited when generalizing to other populations (e.g., ages, disability types, across settings). The present study assessed the effects of teacher-led BST on a paraeducator's rate and fidelity of implementation of opportunities to initiate (OTI) and least to most prompting (LTM) strategies with students with complex communication needs. Student outcome data were collected to assess the effectiveness of the treatment. Specifically, this study sought to answer three questions. First, what are the effects of a training package for special education teachers when training paraeducators? Second, once trained by their teachers, will paraeducators implement OTI and LTM with fidelity at a higher rate than baseline? Third, what are the communication outcomes among students with complex communication needs following a teacher-trained, paraeducator-implemented communication intervention?

Method

Special Educators, Paraeducators, and Students With Significant Disabilities

After receiving approval from the district and university Institutional Review Board, four triads were recruited, comprised of one special education teacher, one paraeducator, and one student with a disability. Teachers helped select potential student participants who (a) received special education services and had an active Individualized Education Program (IEP), (b) were eligible for the State's alternate assessment, (c) used a high tech AAC device, (d) were supported by a paraeducator, and (e) were not consistently initiating communication based on classroom observations and staff report of the students' communication. The classroom special education teacher also identified one paraeducator per student who consistently (i.e., at least one period per day) worked with the target student.

Classroom A

Tier 1, teacher. Suzie was a 30-year old Caucasian female who was a licensed special education teacher with a bachelor's degree and 5 years of teaching experience. Suzie had worked with John for two years and with Judah for one school year, and she also supervised two paraeducators, Sarah and Madison. On a survey prior to the start of the study, Suzie expressed she was "quite comfortable" (4 out of 5) when training her staff. However, she rated previous training she had had to teach new strategies as being "not very effective" (2 out of 4). She provided training to paraeducators two times per year on topics including daily needs of students, use of communication devices, and data tracking.

Tier 2, paraeducators. Sarah was a 27-year-old Caucasian female who was a paraeducator with a bachelor's degree. She had been working as a special education paraeducator for 2.5 years and had been working with John for 1.5 years. She expressed that she usually received 1 hour per month of in-service training conducted by the school staff. Sarah indicated

that she felt she was “somewhat effective” (3 out of 4) when implementing OTI and LTM procedures. Madison was a Caucasian 40-year-old female with a bachelor’s degree. She had been working as a special education paraeducator for 4 months and was assigned to work with Judah. Madison received 4 hours per year of “miscellaneous” in-service training. She expressed that she was “not very effective” (2 out of 4) when implementing OTI and LTM procedures.

Tier 3, students. John was a 14-year-old male student with autism in the seventh grade and identified as Caucasian, Hispanic, and Asian. He received the majority of his educational services in a multiple disabilities classroom and attended art class with students without disabilities for one period per day. John demonstrated significant delays in expressive and receptive language. He used an AAC device (i.e., ProloQuo2Go communication application on his personal iPad), gestures, and a few words (or word approximations) to communicate. John had been using this AAC device for 2 years prior to the start of this study. John’s IEP goals related to communication included following directions, labeling and requesting items, and answering questions. He received 180 min per month of small-group speech-language services.

Judah was a 12-year-old, Caucasian, male student with autism in the sixth grade. He received most of his educational services in a classroom for students with significant and multiple disabilities with the exception of an art class that included students without disabilities. Judah received 180 min per month of small-group speech-language services to support his IEP goals, which included answering questions and making requests. Previous IEPs noted that it had been “very difficult to assess” Judah’s communication skills. It was noted anecdotally in his IEP that he was not consistently using vocalizations to communicate, and during class time, he would recite songs or phrases from videos, but did not verbally initiate communication or consistently use words to respond to questions/communication presented to him. Judah had been using an

iPad application, ProloQuo2Go for the past 2 years to assist with communication and had been observed during structured speech sessions to use 3–4 word phrases with this device. Judah had been identified as a student with multiple disabilities.

Classroom B

Tier 1, teacher. Kelly was a 35-year-old Caucasian female who was a special education teacher with a Master's degree. She had been working as a special education teacher supporting students with moderate to intensive disabilities for 13 years. At the time of this study, Kelly had been a member of Randal's educational team for 2.5 years and was Kathy's supervisor. On a survey prior to the start of the study, Kelly expressed she was comfortable when training her staff, however when asked to rate any training she has had to help her teach new strategies, she rated this as being "not very effective." She provided training 10–12 times per year on topics including medical management, behavior support, and communication device use.

Tier 2, paraeducator. Kathy was a 47 year-old, African American female who was a paraeducator with a high school diploma. She had been working as a paraeducator for 3 years and had worked near or around Randal for 2 years. She expressed that she received 15 hours of in-service training per year and ranked herself a 4 out of 4 ("quite effective") when implementing OTI and LTM procedures. However, when training Kathy, she was asked if she knew what the two procedures were and she indicated that she was not sure.

Tier 3, student. Randal was a 17-year-old, male Bangladeshi student with autism in the tenth grade. He had been using the ProloQuo2Go communication application for 1 year at the time of this study. Randal spoke in simple sentences when naming vocabulary words and answering reading comprehension questions. IEP goals for Randal related to communication included being able to describe his daily activities (e.g., "I'm going to the bathroom"), initiate a

greeting or farewell, and answer questions about personal information. Randal received 120 min per month of small-group speech therapy. Randal had been identified as a student with multiple disabilities and was not meeting grade level expectations.

Classroom C

Tier 1, teacher. Rebecca was a 22 year-old Caucasian female who was a student teacher and had Jeremy on her caseload for the past 4 months. She was in her last year as an undergraduate majoring in special education with an emphasis on moderate to intensive disabilities and was expected to receive a Bachelor's degree within 3 months after the termination of this study. She was working full-time as a student teacher and, at the time of the study, she had no previous experience working with students with IDD. On a survey prior to the start of the study, Rebecca expressed she was "maybe" comfortable when training her staff, however, when she rated training she has had to help her teach new strategies, noted that she had never received training on how to train her staff in the past and had never trained a paraeducator.

Tier 2, paraeducator. Ashley was a 39-year old Caucasian female who was a special education paraeducator with 4 months of experience at the time of the study. She held an associates degree and had been working with Jeremy since the onset of her employment as a paraeducator. She indicated that she received one training per month conducted by her school. She rated herself 4 out of 4 ("quite effective") when implementing OTI and LTM with students.

Tier 3, student. Jeremy was a 16-year-old, male, Caucasian student with cerebral palsy in the tenth grade. Jeremy's oral motor weakness adversely affected his ability to produce clear speech. Jeremy had the communication app, SonoFlex, on his personal iPod and halfway through the study, he got an android device with the communication app, Let Me Talk. Jeremy required prompting to use both devices. Goals in his IEP focused on using oral motor exercises to

improve his overall oral strength and speech intelligibility. One objective outlined the use of an augmentative and alternative communication (AAC) device to clarify messages when his vocal speech was not understood. Jeremy had 120 min of speech-language small group support per month. Jeremy had been identified as a student with multiple disabilities and was not meeting grade level expectations.

Settings

This study was completed in two schools, one junior high school and one high school, in a rural school district in a Midwestern state. This district enrolled approximately 10,000 students, 27.9% were economically disadvantaged, 14.9% were students with disabilities, and 4.1% had limited English language proficiency. About 63% of students were Caucasian, 21.5% African American, 7.2% were comprised of two or more races, 5% Hispanic/Latino, 3.1% Asian, and .2% Native American.

Classroom A. Classroom A was located in a junior high school with students enrolled in seventh and eighth grades. In addition to the participants described above, each period had two general education peers in the room. Five students with significant disabilities were also in this classroom the majority of the day and followed the same schedule as study participants (e.g., rotating to lunch together). All intervention sessions took place in the multiple disabilities classroom during “bin work” that consisted of three bins labeled 1, 2, and 3. The bins were placed in front of the student and the paraeducators (Sarah and Madison) inserted a work task in each bin for the students to complete. Generalization probes were taken in the art class during the baseline phase but were not measured during intervention or maintenance phases given the limited to no interaction the paraeducators had with the students during this time.

Classroom B. Classroom B was set in a high school that enrolled students in ninth through twelfth grade. This classroom included one teacher (Kelly), and approximately 10 students with significant disabilities, three peer helpers, and two paraeducators. The instruction varied each day and included cooking tasks, functional-skills activities (typically matching or sorting activities), puzzles, and art activities. Although Kathy was not assigned by the district to work directly with Randal as a 1:1 paraeducator, she worked with him during all baseline, intervention, generalization, and maintenance sessions. Generalization sessions took place at a local restaurant where Randal removed chairs from the tables and wiped down tables with a clean rag. There were no customers in the restaurant during these sessions, and Kathy and a peer with a disability accompanied Randal.

Classroom C. Classroom C was located in the same high school as classroom B. This classroom included one special education teacher, one student teacher (Rebecca), one paraeducator (Ashley), one peer helper, and seven students with significant disabilities. All intervention sessions were conducted during math period when students were provided whole-group instruction on math concepts (e.g., money, measurement) and independent work time to complete assignments related to the direct instruction. All generalization sessions took place at a local library where two other students with significant disabilities accompanied Jeremy and Ashley. At the library, students shelved returned DVDs and books in alphabetical order.

Materials

The first author (a doctoral level graduate student) modified the OTI and LTM implementation checklists available from the National Professional Development Center on Autism Spectrum Disorder (http://autismpdc.fpg.unc.edu/evidence-based-practices) to include discrete, measurable behaviors that were observed during implementation (see Table 1). A

checklist of teaching behaviors was modified from a study that taught instructors to use BST when teaching staff (Parsons, Rollyson, & Reid, 2013). A written summary of the practice being taught was provided to the teachers and paraeducators. These summaries included a rationale for the practice, how to use the practice, and a task analysis of each step.

Dependent Variable and Data Collection

Two dependent variables were measured and recorded during this study including fidelity and rate of paraeducator-implemented OTI and LTM. Opportunities to initiate were comprised of four steps shown in Table 1. Student level data were also reported but not considered as a dependent variable and had no influence when making phase change decisions.

A data collection sheet was devised and included notation for fidelity of the paraeducator behavior as well as the student behavior. Fidelity was then computed as the average percentage of steps completed correctly for each occurrence of OTI and LTM with the exception of scoring a “0” if the first step was not completed for OTI (i.e., setting up the environment) per session. If the paraeducator did not set up the environment first (step 1), the practice of OTI was no longer the target and the behavior became a different practice (e.g., constant time delay, mand modeling). Given the complexity of steps LTM prompting entails (i.e., the student could respond following the first or last prompt), the denominator used to calculate the fidelity of a given occurrence was related to the number of prompts the student required before a successful initiation was observed. The rate of paraeducator delivery of OTI and LTM was calculated by counting the occurrence of OTI that resulted in an unprompted student response or LTM that resulted in a prompted student response divided by the duration of time observed. Given that the included student participants did not use natural speech, researchers recorded student responses that occurred when the student used their AAC device. In one situation, when a student’s AAC

device was broken, the paraeducator cued the student to raise his hand when needing assistance.

During baseline and intervention (i.e., post-training) conditions, researchers observed students live (not video-recorded) across the same settings as described above with the paraeducators. Researchers documented the rate of unprompted and prompted initiations made by students during this time. If a student independently initiated without LTM prompting, the student response was marked as unprompted. If the paraeducator had to use any level of prompting, the student response was marked as prompted. It is important to note that "most" in the LTM prompting procedures include a full physical prompt. This means that not once would a paraeducator present an opportunity to initiate without the student responding.

Interobserver Agreement (IOA) and Procedural Fidelity

Additional data collectors (graduate students in special education) observed 44% of baseline conditions and 46% of post-training and maintenance conditions. The first author trained data collectors using a coding manual and practice videos taken from the Internet. All data collectors were provided with a coding manual and met a criterion of 95% agreement with the first author on video examples for rate, fidelity, and student behavior before starting. IOA for all recorded data were calculated using a point-by-point comparison, by dividing the number of agreements by the total number of agreements plus disagreements for the observed behavior (Gast & Ledford, 2014). Agreements were scored when both observers recorded an occurrence or non-occurrence of each paraeducator and student behavior. Agreement on these behaviors was 100% across all observations.

Researcher procedural fidelity was assessed for 66% of the trainings provided to the special education teachers. Identical checklists that were used when teaching BST procedures with tier-1 participants were used when evaluating the fidelity of researcher implementation.

Procedural fidelity was calculated using a point-by-point comparison on the items on the checklist, by dividing the number of agreements by the total of agreements plus disagreements for the observed behavior (Gast & Ledford, 2014). The fidelity of researcher-delivered training to the teacher was 100% across all training sessions.

Teacher to paraeducator training was also assessed for fidelity. The same methods described above for researcher procedural fidelity during training was used. The fidelity of the teacher-delivered training was 100% across all training sessions. On one occasion, the teacher looked to the researcher to confirm the statement she just made was correct, and the researcher nodded in confirmation that what she had just done was in fact correct. There was no other interaction between the researcher and the teacher or paraeducator during these training sessions.

Experimental Design

To assess the effectiveness of the teacher-led intervention on paraeducator implementation, researchers used a multiple probe design across paraeducators (Gast & Ledford, 2014). In addition, student outcome data were collected to assess the effectiveness of the treatment as a secondary, non-experimental measure. Visual analysis of the graphed paraeducator data (i.e., rate and fidelity), not student data, was used when determining when to move a participant from baseline to intervention and when to begin intervention with the next participant. Researchers looked for a stable or deescalating trend in baseline prior to starting intervention. Likewise, researchers moved participants from intervention to maintenance phases after all paraeducators demonstrated stable data (i.e., at mastery criterion of 90%) for a minimum of five consecutive trials.

Procedures

Teacher Training. The individual training sessions with each teacher were conducted using BST teaching components and ranged from 17 to 26 min *(M* = 22 min) in the classroom where they would typically deliver instruction. The duration of these trainings best replicates a block of time that in-service teachers are typically afforded alone with their paraeducators and without their students. A printed handout was provided and reviewed, and it included a rationale about why the practice is important, a step-by-step explanation of each step in the practice, a summary of the procedures, and a task analysis of the practice. To begin, the first author provided a rationale for the practice being used and why this skill was appropriate to use with students with communication disabilities. Researchers described OTI and LTM as evidence-based practices that targeted a common weakness observed in students with communication impairments—a lack of initiating. Then, each step in the task analysis was described and simultaneously modeled. For example, when describing setting up the environment for the student to elicit a request for help, the researcher provided one teacher with a juice box without a straw and explained that a student would not be able to access the juice without the straw. The researchers indicated that if the student did not initiate, they would move to LTM prompting.

After all questions had been answered, the researcher modeled all of the steps with the teacher acting as the paraeducator. Again participants were asked if they had any questions. Next, teachers were offered opportunities to ask questions and to role-play the skill with the researcher in the role of the paraeducator. During role-play, the researcher followed a script that included producing errors and asking follow-up questions. Teachers had to follow the steps of BST when responding to errors on the part of the "role-play paraeducator" and were required to answer all questions presented to them. The researcher documented the presence or absence of each step of BST and provided feedback after each role-play and offered suggestions to improve.

This may have included feedback related to providing a rationale such as, “you told your staff what OTI and LTM were but did not say why you were teaching it to them today.” After each participant reached 100% mastery of the teaching skill in a role-play situation, the session ended.

Paraeducator Training

Baseline. Paraeducators were observed for an average of 16.8 min per session (range: 3–37 min) and across various settings (i.e., special education classroom, mainstream classroom, student job sites) with the target student. The duration of baseline sessions ranged so considerably due to the unique academic demands presented to each student. A session was defined as a discrete task with an obvious beginning and end. For example, when students were assigned 1:1 work to do with the paraeducator (e.g., “bin work”), the student started and completed an assigned task (e.g., complete 3 bins before taking a break). For John and Judah, the completion of three bins was marked as one session. When students were observed in a whole-group setting (i.e., Randal and Jeremy), the session was defined in the same way. For these tasks, the whole class engaged in an activity, and when the target student completed the task and moved on to another, the session was terminated. Researchers documented fidelity of OTI and LTM procedures used with the target student. Each paraeducator was observed until steady baseline or descending baseline trends in data were observed. For OTI procedures, a paraeducator had to set up the environment to evoke the communication behavior for the event to have been scored. Without environmental manipulation, participants would be teaching a different strategy altogether (e.g., prompting).

Training. Training occurred for participant 1 after 7 sessions of stable baseline observations. Participants 2–4 received training at staggered points in the study (i.e., after baseline sessions 8, 12, 13). Teachers used BST strategies to teach OTI and LTM to

paraeducators. Individual trainings lasted between 13 and 27 min (M = 18.75 min) and were conducted 1:1 in the classroom where everyday instruction took place. If the teacher made an error when training, researchers were available to provide immediate corrective feedback, though this was not needed. Only once during teacher to paraeducator training did a teacher (Kelly) ask the researcher if what she was doing was correct and the researcher nodded in approval. Teachers followed the same format of instruction as was provided to them, including providing a rationale regarding the importance of using OTI and LTM, a vocal summary of the steps, modeling the skill, answering all questions, role-playing with the paraeducator, and providing supportive and constructive feedback. Role-plays continued until paraeducators reached 100% skill mastery when role-playing.

Post-Training. Paraeducators were observed for an average of 13.9 min per session (range: 3–24 min) and across various settings (i.e., special education classroom, mainstream classroom, student job sites) with their target student. Similar to the baseline condition, if the paraeducator did not set up the environment to evoke the communication behavior, an event was not scored. Each paraeducator provided OTI in a variety of ways. An example of some ways paraeducators evoked an initiation included, withholding materials needed to complete a task, providing a student with work that was too difficult, with holding needed items, providing the wrong materials that were not needed to complete a task, standing or sitting in the way of the student, and providing a student with an inaccessible item (e.g., bin with a lid that the student could not open). No feedback was given to the paraeducator during the post-training phase. However, researchers were present during each session and collected live data on paraeducator performance. If errors in paraeducator performance were observed, an additional feedback phase was added

Post-Training Feedback. The researcher provided feedback to the classroom teacher only once regarding the decline in opportunities to initiate recorded for Madison. No other errors were noted by the researcher and reported to the classroom teacher. Following this singular report, the teacher suggested that since Sarah, who was also in the room and a participant in the current study, provide a brief follow-up training with Madison. This training was informal and included Sarah answering questions Madison had about the procedures and Sarah also providing more examples of ways Madison could provide opportunities to initiate with Judah. The researcher noticed this interaction was relatively normal practice in this classroom as Sarah was a much more experienced paraeducator and would often support Madison if she was struggling with other concepts (e.g., academic instruction, social supports).

Maintenance. Once all participants achieved five consecutive sessions at 90% fidelity or higher, researchers returned to observe the paraeducators interacting with the target students in the intervention and generalization settings. The difference between this condition and the intervention condition was the absence of researchers reporting to the teacher if errors occurred, thus no feedback was provided to the paraeducators during this phase. Rate and fidelity of OTI and LTM procedures were documented to assess the effects of the training across students and time. Maintenance data were collected for students between 6 and 12 weeks following intervention. Maintenance data were collected for three of the four paraeducator/student dyads. Following the winter break, Madison was no longer assigned to work with Judah. Therefore, it was not possible to collect maintenance data with this dyad.

Generalization. Generalization data were collected for Randal and Jeremy. Generalization data were collected for them throughout baseline, post-intervention, and maintenance conditions to assess the generalized behaviors of the paraeducators. Generalization

data were not taken for John and Josh because Sarah and Madison were not assigned to them in the generalization setting (i.e., art period).

Social Validity

Researchers created a survey including questions related to the adult participants' opinions about the study and provided it to the teachers and paraeducators. The surveys included standard 4- and 5-point likert-type scale and open-ended questions. These surveys were provided to the teachers and paraeducators before and after the study and included questions about the proposed intervention and satisfaction with the outcomes. Researchers also assessed behavior changes among the paraeducators by observing the interactions they had with other consumers (e.g., a parent of one participant).

Results

A functional relationship between the training teachers provided to the paraeducators and the rate and fidelity of the paraeducators' behavior was established. Increases in level and trend in paraeducator performance data were observed following a teacher-led training. It is also important to note that student communication data increased in trend and level following intervention. Data for the dependent measures and student-level data are displayed in Figure 1.

Rate and Fidelity of Paraeducator OTI and LTM

During baseline sessions, no paraeducators were observed providing opportunities to initiate nor were there any instances of LTM prompting observed. Following a teacher-led training, an increase in fidelity and rate of LTM prompting and OTI were observed across all paraeducators. Kathy and Ashley's fidelity increased to 100%, Sarah's to 99.5% (range: 94–100%) and Melissa to 98.7% (range: 93–100%) across intervention sessions. During the maintenance phase, three paraeducators' data were steady at an average of 99.7% (range: 95–

100%) fidelity of implementation. Kathy and Ashley's fidelity went from 0 during baseline to 100% fidelity across generalization settings, and Sarah's fidelity dropped to 95% during one session.

The rate of offering students an OTI and subsequent LTM when necessary for all paraeducators increased on average from a baseline rate of 0 to .60 per min (range: .22–. 97). Sarah's rate increased to .77 per min, Madison's increased to .44, Kathy's increased to .97, and Ashley's increased to .22 per min. All three paraeducators maintained higher rates of OTI and LTM during the maintenance phase. Sarah maintained her rate at .47 per min, Kathy at .90 per min, and Ashley at .18 per min. Kathy and Ashley also maintained a rate of OTI and LTM in generalization settings at a rate of .46 and .19, respectfully.

Student Communication

No instances of independent initiations were observed during the baseline phase and thus are absent from the baseline graph in Figure 1. It is also important to note that no student was observed initiating without the paraeducator contriving the setting to evoke a response. This would explain the parallel rates of student initiations and paraeducator rates of OTI seen in Figure 1. Increases in the level of initiations for all students were observed following paraeducator training (see Table 2). John's prompted rate of initiation was an average of .40 (range: .13–.70) per min, independent initiation rate was an average of .07 (range: 0–.22) per min, and his overall initiation rate (prompted and unprompted) was .47 (range: .16–.77) per min. During the maintenance phase, John's overall (prompted and unprompted) rate of initiation maintained at .47 (range: .36–.55) per min.

Judah's rate of prompted initiation was an average of .43 (range: .20–.80) per min, independent rate of initiation was .18 (range: 0–.90) per min, and his overall initiation rate (prompted and unprompted) was .60 (range: .20–1.42) per min.

Randal's rate of prompted initiation was an average of .17 (range: 0–.45) per min, independent rate of initiation was 1.11 (range: .50–1.80) per min, and his overall initiation rate (prompted and unprompted) was 1.28 (range: .56–2.27) per min. Randal's overall rate of initiation maintained at .90 (range: .44–1.63) per min. In the generalization setting, Randall's overall rate of initiation was .46 (range: .44–.50) per min.

Jeremy's rate of prompted initiation was an average of .17 (0–.285) per min, independent rate of initiation was .09 (range: .03–.16) per min, and his overall initiation rate (prompted and unprompted) was .27 (range: .14–.43) per min. Jeremy's overall rate of initiation maintained at .18 (range: .03–.53) per min. While in the generalization setting, Jeremy's overall rate of initiation was .19 (range: .05–.53) per min.

Social Validity

To measure the social validity of the procedures, researchers surveyed the teacher and paraeducator (see Table 3). Each student participant had IEP goals related to communication and had corresponding speech-language services to address these goals. In addition, each student had a personal AAC device and the students' parents expressed wanting their child to communicate more. Baseline measures indicated that each student was not initiating. Anecdotally, the duration of the training was designed in such a way that practitioners would not have to work beyond their assigned work hours and was brief enough to accommodate a time when both the teacher and paraeducator could be relieved of their teaching duties. When asked if there was any part of the training that they did not like, all of the participants said, "no." When asked what they did

like about the training, participants expressed that they liked the hands-on (e.g., modeling, role-play) components.

When evaluating the student-level data, initiation rates across students increased after intervention. Students did not display any independent or prompted initiations prior to intervention. These behaviors increased to an average rate of .61 (range: .14–2.2) per min following intervention. Although the rate of initiating was low, students with IDD, particularly those with autism, initiate at a lower rate than their peers without disabilities (Winder, Wozniak, Parladé, & Iverson, 2013) and an increased rate can be considered a socially appropriate outcome for students with IDD and communication needs.

To measure the social validity of the intervention effects at the practitioner level, researchers noted behaviors of the practitioners outside of the training elements. One paraeducator, Sarah, asked if she could train the parent of her student, Jacob. In addition, other paraeducators in the building asked to be trained in the same way as their peers when the study had ended, and the first author encouraged the paraeducators and teachers to provide this training.

Finally, when one paraeducator was not providing the same rate of opportunities to initiate to her student, it was suggested that Sarah provide the booster training. These examples of interaction beyond the scope of the study indicate a level of buy-in not captured by a 5-point likert-type scale survey. Immediate and extended members of the community (e.g., parents, district administrators) were informed of the results of the study. However, multiple practitioners commented on their frustration with the AAC device being too complicated and expressed a desire for further device training.

Discussion

Students with significant communication needs have poor social, academic, and behavioral outcomes, and paraeducators are often tasked with providing evidence-based practices to mitigate the effects of these disorders (Mrachko & Kaczmarek, 2016). Training is limited among school-based practitioners, leaving teachers and paraeducators unprepared to work with students who use AAC when communicating (Bailey, Stoner, Parette Jr, & Angell, 2006). The aim of this study was to evaluate pyramidal training with BST as an efficient way of training four special education paraeducators. Following teacher-led training, all four paraeducators made significant gains in their rate and fidelity when providing students with opportunities to initiate and when needed, least to most prompting. On average, paraeducator fidelity of OTI and LTM went from 0 at baseline to 99.5% during post-training (i.e, intervention). On average, student initiations went from 0 at baseline to .65 per min following intervention.

Although paraeducators are increasing in their role as intervention agents in experimental studies (Mrachko & Kaczmarek, 2016), the research is limited with respect to including the classroom teacher as the trainer for the paraeducator. This critical component to a research study truly builds capacity at the school level and leaves multiple practitioners prepared to implement an intervention and a teacher prepared to provide ongoing feedback to the intervention agent, the paraeducator. This study sought to extend the literature on teacher-delivered, paraeducator-implemented interventions in a variety of ways.

First, researchers found that special education teachers can deliver BST accurately and effectively. We chose to implement a brief training, similar to that of Wermer et al. (2017), in lieu of a longer, multi-hour training that is more inline with district professional developments. Researchers in the current study wanted to validate the effectiveness of a brief training that

would likely fit into the busy schedules of school-based staff. This brief training was effective at preparing staff to (a) train others and (b) implement with fidelity over time and across settings. Future researchers should take into consideration the complexity of the task when training practitioners. Understandably, a more complex task would require a longer training.

Second, paraprofessionals, given brief BST from teachers, can implement strategies (i.e., OTI and LTM) to promote communication with fidelity and at a higher rate when compared to baseline. The current study used a multiple baseline design across paraeducators rather than with one paraeducator's multiple behaviors. In addition, the paraeducators and students included in the current study were diverse (e.g., age, race, education). With a diverse population across participants, researchers were able to evaluate the effectiveness of the training package across variables that cannot be captured with one participant. For example, all participants demonstrated improvements in behavior regardless of previous exposure to training, exposure to ongoing training from their teacher or school, previous experience as a paraeducator, and time spent with their current student.

Third, changes in paraeducator behavior were associated with changes in child behavior. Specifically, increases in paraeducator fidelity and rate of LTM prompting and OTI were associated with increases in student prompted and unprompted initiations. Given that these students were rarely observed initiating (prompted or unprompted) in the decade they had each been in school, any level of growth, prompted or otherwise, is important to note. Researchers documented positive staff and student outcomes across settings and time. Two of the four students were observed at work sites and three students were observed over time. This extension opens up an opportunity for discussion in the field regarding the support of communication outcomes for older students preparing to leave the K-12 setting for work.

Limitations and Future Research

Although the present study extended findings of previous research, and paraeducator and student level data were positive, there are limitations to consider. First, paraeducators struggled when navigating the complexity of high-tech AAC devices. Each team expressed a concern about being able to find and program new vocabulary. One student (Jeremy) got a new device half way through the study and was unable to operate the system. Future researchers should consider doing specific device training with classroom staff prior to starting a study with students who use AAC devices. This can be arranged with a speech-language pathologist or device manufacturers. Although this additional training might be difficult to schedule and will impact the ease of a brief training, the skills these practitioners will gain by learning the nuance of these devices could be long lasting. Second, the students in this study were between 12 and 16 years old. It is possible that when exposed to AAC systems at an earlier age, students would acquire skills more quickly and could have better long-term outcomes (Romski, Sevcik, Barton-Hulsey, & Whitmore, 2015). Future researchers should consider investigating AAC device use among younger children to compare acquisition and maintenance rates.

Teachers would not often take daily data on the performance of their paraeducators and would then not notice a deviation in the plan until a scheduled observation occurred. Given the nature of these classrooms and the rapid pace of data collection during the intervention phase, because the teacher and paraeducator were often in different settings, the researcher told the teacher of any errors the paraeducator made, including if the rate of OTI decreased from the previous observation. This allowed for the teacher to give corrective feedback to the paraeducator without a significant delay between performance and feedback. Although the

fidelity of the paraeducator's behavior was never a reported issue, on one occasion, the rate of one paraeducator's behavior was noted and reported back to the teacher.

There were three limitations to the actual implementation of the intervention by the paraeducators. First, the practitioners may have been reactive to the presence of the researcher. A researcher was present for data collection for every session and the behavior of the paraeducator may have increased given this presence. To control for this possible confound, future researchers should consider video recording or training the special education teacher to take data when the researcher is not present. Second, the students included in this study were school age and the intervention was done in a school setting. Although two students generalized this new skill to a work setting, future researchers should consider training other practitioners (e.g., job coaches) to support students when using their AAC devices so that the newly learned communication skills generalize beyond the K-12 setting.

Third, despite the reported high levels of fidelity, there were quite varying rates of paraeducator implementation of OTI and LTM within post-training and maintenance sessions. Each student's academic day was unique and it was up to the paraeducators to find natural ways of providing OTI as they saw fit. Given that the rate of student initiation was directly linked to the rate of paraeducators' creating opportunities to initiate, the question of the extent to which the environment might dictate the rate of OTI and LTM is something future researchers should consider if attempting to study homogenous populations of students who use AAC.

Finally, student-level data was a secondary measure and was not experimentally manipulated. Although the student level data indicated an increase in prompted and unprompted initiations at the same time as the paraeducator training, to make claim that the paraeducator training had a direct impact on the student communication outcomes, future researchers would

have to extend the body of literature that has correlated paraeducator implementation to student outcomes through an independent and dependent variable relationship.

Implications for Practice

Special education teachers are tasked with not only providing quality instruction to their students, but ensuring their staff does the same. Maintaining their own skills after teacher licensure as well as training their staff provides a challenge to teachers given the limited amount of ongoing training and professional development they receive (Soto, Muller, Hunt, & Goetz, 2001). This challenge can be compounded when supporting a population of students who do not communicate or need significant supports to do so (e.g., AAC). School-based teams should work together to translate professional development opportunities to brief trainings for paraeducators to promote positive student outcomes. When using behavioral skills training as a framework when training others, special education teachers can bridge training they receive to include the paraeducator.

Improving outcomes for students should be the aim of any professional development provided to school-based practitioners. In the current study, after practitioners were trained, students were observed initiating with an AAC device across settings and over time. These findings should be promising and encouraging to practitioners. Students with significant disabilities who use AAC when communicating often are not afforded the supports they need to promote independent communication. This study provides evidence that teachers can, with fidelity, translate training that they have received into training for their paraeducators. This study also shows that when trained by their teachers, paraeducators can make positive changes in the communication outcomes for students with significant disabilities.

Conclusion

Prior to this study, pyramidal training methods had not been used with classroom teachers training paraeducators. This study brings hope that this brief and effective training method might alleviate expensive professional development options that school districts often choose. Also, this study adds additional evidence to the power of the paraeducator. When trained, this group of support staff can implement evidence-based practices with fidelity to the extent of making positive changes in students with significant disabilities. The findings from this study are incredibly promising and promote effective professional development options to help narrow the gap between research and practice.

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Table 1

Steps for Implementing OTI and LTM

OTI:		
Step 1: Set up the environment		
Step 2: Gain learner's attention		
Step 3: Stay close		
Wait 5-10 seconds, move to LTM:		
Correct response: provide praise, specifically state what the child did, and provides access to the item. (DONE)	**Incorrect response:** immediately deliver next prompt.	**No response from previous step:** Wait 3-5 seconds, deliver next prompt
Deliver ***gestural*** *prompt*		
Correct response: provide praise, specifically state what the child did, and provides access to the item. (DONE)	**Incorrect response:** immediately deliver next prompt.	**No response from previous step:** Wait 3-5 seconds, deliver next prompt
Deliver a ***model*** *prompt*		
Correct response: provide praise, specifically state what the child did, and provides access to the item. (DONE)	**Incorrect response:** immediately deliver next prompt.	**No response from previous step:** Wait 3-5 seconds, deliver next prompt
Physically guide student to respond		
Correct response: provide praise, specifically state what the child did, and provides access to the item. (DONE)	**Incorrect response:** immediately deliver next prompt.	**No response from previous step:** Wait 3-5 seconds, deliver next prompt

Table 2

Average student initiation rates per minute

Student	Baseline	Intervention	Maintenance	Generalization Setting
John	0	.469 (range: .16–.77)	.47 (range: .36–.55)	
Judah	0	.60 (range: .2–1.42)		
Randal	0	1.28 (range: .56–2.27)	.90 (range: .44–1.63)	.46 (range: .44–.50)
Jeremy	0	.269 (range: .142–.428)	.18 (range: .03–.53)	.19 (range: .05–.53)

Table 3

Social Validity Response Items Rated Across Teachers

5-point likert-type questions	Mean (Range)
Teachers	
To what degree to do you feel that the initial training and role-play for each strategy was effective in helping you to train your paraeducators?	4.66 (4–5)
To what degree do you feel that BST was effective when training your paraeducator?	4.66 (4–5)
How likely would you be to use BST with the paraeducators in the future?	4.66 (4–5)
How effective do you believe the training package was for increasing the paraeducator's use of OTI and LTM prompting?	4.33 (3–5)
What is the likelihood that you would recommend BST to a colleague?	4.33 (3–5)
Paraeducators	
To what degree to do you feel that the initial training you received was effective in helping you to implement new strategies?	4.66 (4–5)
To what degree do you feel that creating opportunities to initiate was effective?	3.75 (3–4)
To what degree do you feel that the systematic prompting hierarchy was effective?	3.75 (3–4)
How likely would you be to use these same strategies with the same student or a different student in the future?	4.5 (4–5)
How effective was the training in increasing the student's use of AAC device?	3.5 (3–4)
What is the likelihood that you would participate in a similar professional development opportunity in the future?	4.25 (3–5)
What is the likelihood that you would recommend this kind of professional development opportunity to a colleague?	4.5 (3–5)

Baseline

Intervention

Maintenace

Kathy

Randal

Ashley

Jeremy

Rate Per Minute

Fidelity Percentage

Sessions

Baseline
Intervention
Maintenace
Fidelity
Rate
Sarah
Prompted Communication
Unprompted Communication
John
Rate Per Minute
Fidelity Percentage
Follow-up Training
Madison
Judah
Sessions