An Examination of Practitioners Implementation of Communication Intervention with Students with Complex Communication Needs

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

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2017

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Abstract

This dissertation investigates ways of training adults to teach students with communication impairments to use augmentative and alternative communication (AAC) systems across a variety of environments. In addition to three stand-alone papers, it will start with an introduction and conclude with a discussion. Chapter 1 will provide the reader with information relating to the background and purpose for the dissertation. Chapter 2 functions as a systematic literature review on the pyramidal training approach used by practitioners who support individuals with disabilities. Chapter 3 is a research study that evaluated a pyramidal approach to training on the rate and fidelity of paraeducator implementation of a communication intervention for school-age children who use AAC. Chapter 4 is a paper written for practitioners that highlights strategies to support the generalization of manding behaviors among students who use AAC. Finally, Chapter 5 provides the reader with future directions and questions that remain after the culmination of this dissertation.
Dedication

To my mother for providing me with a lifetime of unwavering love and support. And to my husband, Aaron, who for the past three years straightened himself up as much as he could for me to have a place to sit and rest.
Acknowledgments

I owe a tremendous amount of thanks to the teachers and paraeducators who participated in my dissertation study. Thank you for the tireless dedication you provide to your students each and every day. I also want to thank Dr. Helen Malone for being a mentor and a leader. I would not be where I am today if it wasn’t for the immense amount of support you have provided me over the past three years. Thanks to Dr. Nancy Neef for unofficially adopting me as a mentee and guiding me through research, classes, and learning experiences. Thank you also to Dr. Matthew Brock as the lessons I have learned from you will be career lasting. Finally, I want to thank Allison Tittiger for spending what felt like hundreds of hours with me during the data collection phase of this dissertation.
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Publications

Brock, M. E., Cannella-Malone, H. I., Seaman, R. L., Andzik, N. R., Schaefer, J. M.,
training studies in special education: A comprehensive review and meta-analysis.

Exceptional Children.


**Fields of Study**

Major Field: Educational Studies

Area of Emphasis: Special Education & Applied Behavior Analysis
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Chapter 1: Introduction

The following dissertation is broken into five chapters, and this first chapter serves as an introduction to the subsequent chapters. My goal with this dissertation is to better inform the special education community about an effective and efficient way of training school-based practitioners to implement a communication intervention that can affect the quality of life of students with communication disorders.

Rationale

Students with significant disabilities often have difficulty communicating with others. Augmentative and alternative communication (AAC) systems are often used to mitigate these deficits (Light & McNaughton, 2014). Yet even with these supports, students continue to encounter educational and social barriers (Romski & Sevcik, 2005). The National Longitudinal Transition Study-2 (2009) reported that approximately 45% of individuals with an intellectual disability, 39% with autism, and 28% with multiple disabilities are not communicating effectively. Students with complex communication needs are at risk for developmental delays across communication skills, speech and language development, cognitive development, literacy development, social participation, access to education, and overall quality of life (Drager, Light, & McNaughton, 2010). Beyond quantifying the prevalence of students who are not communicating, researchers have identified several effective practices that can promote positive communication outcomes across school and community settings (Snell et al., 2010). The gap between
researched practices and student outcomes may exist due to the delivery of instruction by school-based practitioners. An issue before school-based administrators and teacher preparation programs is how to best prepare teachers to work with students with communication disorders while being efficient and maintaining a budget. One may argue that the onus is on school-based speech-language pathologists to train practitioners to implement strategies with these students. The ownership of this issue rests on many individuals and until it is resolved, is it possible that school-based practitioners will remain unprepared to work with students with communication disorders.

**Barriers to Positive Communication Outcomes**

Ultimately, is the responsibility of school-based practitioners (e.g., teachers, administrators, service providers) to ensure all efforts are made to promote the communication independence of students with disabilities and to document these changes to ensure communication interventions are effective. The law mandates these efforts and was reinforced by the U.S. Departments of Justice and Education in a memo directed at all public and private schools (2014). Citing the Individuals with Disabilities Education Act of 2004, the Americans with Disabilities Act of 1990, and Section 504 of the Rehabilitation Act of 1973, the memo underlined the need for all schools to guarantee that efforts are made to ensure students with disabilities have the supports necessary to communicate with others. However, school-based practitioners report a lack of training to be one reason for their inability to adequately support these students. De Bortoli, Arthur-Kelly, Mathisen, and Balandin (2014) interviewed eight speech-language pathologists and found that not only did they feel that barriers to implementing communication interventions included teachers not getting enough training in communication, they
themselves felt underprepared to support students with multiple disabilities. Johnson, 
Inglebret Jones, and Ray (2006) found similar results when surveying nearly 300 speech-
language pathologists and found that 84% of the responses indicated that training for the 
team (including the family) was an important factor to long-term success for students 
using alternate ways of communicating.

One way of alleviating the effects of practitioners feeling underprepared to 
support student with communication disorders is ongoing training. However, staff 
training can be very time consuming and costly for districts and may contribute to the 
limited opportunities for training related to communication interventions for students 
(Kent-Walsh, Stark, & Binger, 2008). Often, the limited training teachers do receive is 
through conference attendance, on-site professional development (when an expert is hired 
to train the staff on campus), or online courses. The limiting factor with these single-
event training strategies is a lack of ongoing coaching and feedback. In a systematic 
review of the literature, Brock and Carter (2013) found that training should go beyond a 
single-event and found follow-up training to be a valuable factor in influencing ongoing 
fidelity of implementation. Without adequate training, school-based practitioners are left 
to support students with communication disorders with only a tool belt filled with 
assumptions, good intentions, and best efforts rather than evidence-based practices (Cook 
& Cook, 2013).

The field of special education is not immune to the issues surrounding the 
research-to-practice gap. Evidence-based practices published in peer-reviewed journals 
are not targeting practitioners. In addition, practitioners are not often being included in 
the intervention studies. Functional Communication Training has been documented as an
effective means of supporting communication while reducing challenging behaviors among students with disabilities (Carr & Durand, 1985). For 40 years, researchers have shown this practice to be effective, yet, in a review of the literature researchers report only 12 articles that included the classroom practitioner as the primary intervention agent (Andzik, Cannella-Malone, & Sigafous, 2016).

Researchers in special education must continue to seek better ways to involve and train practitioners to be agents of change for their students. When a study ends, the expert researchers leave the building and following, practitioners are not often consumers of this published research. Along those lines, gains in student communication can be attributed to the intervention only if data are collected. Until these gaps narrow, students with disabilities will continue to enter adulthood, the workforce, and social situations without the tools they need to be independent communicators. 

From Professional Development to Student Outcomes

Training for school-based practitioners. A specific focus on training practitioners has been a more accepted practice in the literature in the last 20 years. About 80 single-case design studies have been published in which researchers measured practitioner training on implementation of educational practices to students with disabilities (Brock, Cannella-Malone, Seaman, Andzik, Schaefer, Page, Barczak, & Dueker, in press). In a literature review evaluating the fidelity of school-based, practitioner-implemented communication interventions for students with disabilities, 91% showed a positive effect on practitioner implementation following intervention (Andzik, in preparation). Although results are generally positive, there are challenges with the way
research has been conducted on practitioner-implemented interventions, including reliance on the researcher as the primary trainer, and time/cost considerations.

Often, when a study ends, the researcher is no longer present, leaving the school teams without this resource. To overcome the challenge of researcher reliance, one study investigated teacher-delivered instruction with paraeducators as the intervention agent (Brock, Biggs, Carter, Cattey, & Raley, 2015). The benefits of this model are clear: the researchers built capacity in the school by training teachers to train their own intervention staff. When training one, or several, practitioners how to train others, researchers can address the challenges associated with a single-event training package (e.g., time and cost). This approach is termed “pyramidal training” or “train the trainer” (Andzik & Cannella-Malone, 2016).

A small subset of research has shown that pyramidal training methods are effective for training teachers to be effective change agents (see Chapter 2). Pyramidal training requires an expert trainer to be present for training a group of practitioners who are not only trained on a particular skill set, but are also taught how to train others. This method builds capacity at the school level and creates new experts who, in turn, can provide the necessary follow-up, feedback, and coaching needed by the remaining staff members. The pyramidal training approach has been effective in institutions (e.g., van den Pol, Reid, & Fuqua, 1983), group homes (e.g., Demchak & Browder, 1990), and schools (e.g., Pence, Peter, & Tetreault, 2012) to teach a wide variety of skills.

**Student Outcomes.** Researchers can demonstrate effects of training at the teacher level, but without student outcome measures, the impact of the training cannot be known. However, when assessing the social validity of an intervention study without student
outcome measures, consumers of the research are left to make assumptions about the applicability. Of the studies focusing on practitioner-implemented communication interventions included in the literature review in Chapter 2, a mere 57% of the included studies measured student outcomes, for which 74% were effective. This review provides evidence that when trained, practitioners can implement successful communication interventions with fidelity. However, with approximately half of the studies not documenting student outcomes, we cannot know if those practices would be effective when applied with students.

**New Directions and Remaining Questions**

Given the issues related to practitioner-implemented communication interventions, the concentration of this dissertation is designed to investigate efficient ways of training school staff to effectively implement communication interventions for students with communication disorders. To accomplish this goal, this manuscript is comprised of five chapters. Chapters 2, 3, and 4 are complete manuscripts, each with a different goal. The goal of Chapter 2 is to review the literature on pyramidal training methods used to train practitioners who support individuals with disabilities. Common features of this training model will be discussed and questions that still need to be answered when considering using this model in staff development will be highlighted. Chapter 3 includes a completed research paper that inspired this dissertation. Chapter 4 is a guide for practitioners designed to implement the strategies outlined in previous chapters. Chapter 5 summarizes the findings and discusses directions for future research.

School-based practitioners can be taught to implement communication interventions for students with disabilities. What we know about limitations in school
districts is that when delivering training, it needs to be cost effective and skills need to be maintained after the termination of the training. How we accomplish this with a small price tag while maintaining positive outcomes for the staff and students is currently unclear. Several unanswered question that this dissertation will attempt to answer include:

1. What are the effects of a training package on the fidelity of the training of paraeducators by in-service special education teachers?
2. Once trained by their teachers, will paraeducators implement opportunities to initiate and least to most prompting with fidelity at a higher rate?
3. What are the communication outcomes among students with disabilities following a teacher-trained, paraeducator-implemented communication intervention?
Chapter 2: Literature Review

The following chapter contains a review of the literature focusing on the use of pyramidal training methods to support interventions for individuals with disabilities.


Abstract

Pyramidal training has been used for many years to expedite training for those who work with individuals with disabilities and utilizes an expert who provides training to a practitioner, who then trains another practitioner, who then implements with clients. Fourteen articles were analyzed to investigate the viability of this training approach for practitioners of all types who support individuals with disabilities. Research does support the effectiveness of pyramidal training within the parameters with which it has been evaluated in this review. All tier-1 participants made improvement, 83% of tier-2 participants, and 43% individuals with disabilities also showed improvement. Future researchers are encouraged to analyze not only the fidelity of the implementation of these practices, but also the changes among the individuals with disabilities. To that end, progress monitoring is necessary to determine whether or not the implementation was the cause for the meaningful gains for the population being served.
A Review of The Pyramidal Training Approach for Practitioners Working With Individuals With Disabilities

About 40 years ago, the medical field moved to using only the most high-quality, research-validated practices with patients to improve patient outcomes (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). Several decades later, this standard of practice influenced education lawmakers and was written into law (ESSA, 2015; IDEA, 2004). As a result, highly qualified special education practitioners are required to provide students with disabilities instruction using evidence-based practices (EBPs). Special education practitioners, however, may find implementing these practices daunting and may resort to using teaching strategies, that may not have an evidence-base, that they have experience with or have been provided a model of before (Alexander, Ayres, & Smith, 2015).

Direct training on teaching methods (e.g., applied behavior analysis, medical care, vocational training) would be beneficial to ensure all people with disabilities are receiving instruction supported by EBPs to meet their needs. When training practitioners, a one-size-fits-all model (e.g., grade level curriculum training) does not always work for individuals with disabilities. However, when practitioners are provided with specific, individualized instruction (e.g., communication interventions for students using AAC), fidelity of implementation can increase. When provided with teacher-delivered training, four paraeducators were able to deliver services to students with disabilities with increased fidelity (Brock et al., 2015). EBPs are proven methods that improve outcomes for individuals with disabilities, only when implemented with fidelity. (Cook & Odom, 2013; Vaughn & Dammann, 2001).
The fidelity of implementation is critical to the positive outcomes for individuals with disabilities before evaluating the intervention, however, the research design must be sound and meet the standards set out by The Council for Exceptional Children (CEC). CEC developed a rigorous set of quality indicators to evaluate critical elements of research that support the ability to replicate the research protocol in applied settings (4.0, Description of Practice) (CEC, 2014). Not only must the intervention be actively applied, documentation of the fidelity of the implementation is critical (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005). When adequately describing procedures that support replication and when taking measures to ensure proper implementation, researchers are promoting sound, valid, and reliable research. Unfortunately, regardless of the methodical soundness of a study, a large research-to-practice gap exists in education. This may be due to the unavailability and readability of the research published, the perceived irrelevance of research by practitioners and administrators, the lack of transferability of research to applied settings, and a lack of professional development provided to practitioners (Greenwood & Abbott, 2001).

Simply providing practitioners access to research articles is not enough to meaningfully increase the fidelity of the implementation of an EBP (Graff & Karsten, 2012; Rosales, Gongola, & Homlitas, 2015; Roscoe & Fisher, 2008). The National Center on Teacher Quality evaluated over 100 teacher preparation programs regarding factors such as training and practice opportunities when implementing EBPs, and it was reported that less than 22% of the programs met more than a 50% rating on these factors (Greenberg, McKee, & Walsh, 2013). Providing professional development to practitioners is one method of translating research and making it accessible. Various
professional development packages have been evaluated for effectiveness and common elements (e.g., modeling and performance feedback) produce desirable outcomes for practitioners (Brock & Carter, 2013). For example, Behavioral Skills Training (BST) includes modeling, role-play, and feedback and research has found this package to be effective when training practitioners (Parsons, Rollyson, & Reid, 2012).

In addition, ongoing measurement of fidelity (Wilder, Atwell, & Wine, 2006) and delivery of immediate coaching and feedback to the practitioner (Scheeler, Ruhl, & McAfee, 2004) are critical features of successful professional development. Practitioners exiting teacher preparation programs are possibly not ready to implement EBPs and then are not being provided with systematic professional development. This unpreparedness is likely to be one factor influencing the attrition rates of special educators from the field within 5 years (Goldring, Taie, & Riddles, 2014).

Stempien and Loeb (2002) surveyed special education teachers about the satisfaction they have in their jobs and found that providing ongoing support and professional development to teachers might be one possible way of increasing the retention rates while preparing them to work with the diverse populations of students in their classrooms. Providing professional development can be expensive for school districts (Stempien & Loeb, 2002). Depending on the context, a curriculum expert may charge a modest $100 per hour to provide training to a building with six special education teachers. A model training is likely 8-hours with 1-hour follow-up trainings provided bi-weekly for each teacher for a total of 2 months. That would bring the total cost for one school building to $3,200. When districts multiply that across the many buildings in a district and across however many skills needing to be trained, cost becomes a hurdle and
teachers are left without needed training. Early efforts to streamline the training process for multiple practitioners began in the general education classroom where three teachers were taught by an expert trainer to implement a behavior skill package. They in turn taught three other teachers to implement the same practice in their classrooms (Jones, Fremouw, & Carples, 1977). All students, from both researcher-trained and teacher-trained groups, showed decreases in challenging behavior.

Although previously coined within the medical profession, pyramidal training was developed as a way to alleviate some of the previously mentioned challenges associated with professional development for large groups of practitioners. Pyramidal training uses specific components including an expert trainer and either a single or group of tier-1 practitioners (e.g., teachers, administrators) who receive training from the expert. In contrast to other professional development packages, Tier-2 practitioners are also included and are comprised of one or more otherwise untrained practitioners (e.g., teachers, paraprofessionals, direct care providers, family members) who are trained by the tier-1 participants. Tier-3 individuals are those who have a disability (e.g., student, client) and are provided instruction from tier-2 participants. The pyramidal training approach has been used in institutions (e.g., van den Pol, Reid, & Fuqua, 1983), group homes (e.g., Demchak & Browder, 1990), and schools (e.g., Pence, Peter, & Tetreault, 2012) to teach a wide variety of skills including, but not limited to, daily living and communication skills (e.g., Ducharme, Williams, Cummings, Murray, & Spencer, 2001; Schlosser, Walker, & Sigafoos, 2006), behavior management procedures (e.g., Demchak, Kontos, & Neisworth, 1992), and safety protocols (e.g., Van Den Pol, Reid, & Fuqua, 1983).
The context of the training provided during pyramidal training methods can vary. BST is one effective method of training others and includes providing instruction, modeling, role-play or rehearsal, and feedback. It has been used to improve staff performance for a variety of skills such as: conducting preference assessments (e.g., Weldy, Rapp, & Capocasa, 2014), implementing discrete trial teaching (e.g., Fetherston & Sturmey, 2014), and pyramidal training (e.g., Finn & Sturmey, 2009). There are several potential benefits to using the pyramidal training approach when training staff working with individuals with disabilities. Possible benefits include cost effectiveness, ease of delivery, and efficiency in training multiple staff. This can be done by embedding more experienced staff as designated trainers within a setting to deliver the critically needed ongoing coaching and feedback to practitioners without requiring the ongoing assistance of an expert, and often expensive, trainer. In an age where inclusive practices are the expectation, the pyramidal training approach may be effective with general and special educators who support students included in general education settings (Jones, Fremouw, & Carples, 1977).

When adopting this training model, there are some disadvantages to consider. First, tier-1 trainers must be willing (and able) to train others. Training others and being available for ongoing coaching and feedback can be a significant time commitment and responsibility that some practitioners may not want to engage in. Similarly, there is a possible concern that trained tier-1 practitioners would be viewed by other practitioners as “experts” and consequently would be asked to take on more roles in their position, including working with less experienced practitioners or individuals with more significant disabilities (e.g., multiple disabilities or disabilities paired with
communication and behavioral needs). Finally, institutions adopting these training strategies need to consider to whom they provide tier-1 training. If the training were provided to a staff member who leaves the employing agency, the benefits of the training to that agency would be lost. Institutions may consider providing tier-1 training to tenured staff, administration, or seasoned staff who have a solid history of employment.

Given the possible benefits and challenges that pyramidal training provides to practitioners who work with individuals with disabilities, it is necessary to conduct a systematic review of the literature to determine what the data indicate about the effectiveness and ease of implementing this model. We sought to answer the following questions. First, where and with what type of practitioner is this training approach being put into place? Second, are fidelity measures being taken on tier-1 and tier-2 implementation to ensure these practitioners are delivering the training package with a high level of treatment integrity? Third, is the pyramidal training approach effective when used with practitioners supporting individuals with disabilities? Fourth, does this training strategy maintain effectiveness at the practitioner or student level after the researchers discontinue treatment?

**Method**

**Selection Procedure**

To be included in this review, studies had to meet two criteria. First, the study had to include pyramidal components: using a master trainer to train a tier-1 participant who, in turn, trained a tier-2 participant to support a tier-3 participant with a disability (Jones, Fremouw, & Carpes, 1977). If the study did not include tier-3 participants, it had to be explicit that tier-2 participants worked directly with individuals with disabilities and
would use the new skill set with those individuals. Second, the study had to include an experimental design (e.g., multiple baseline, multiple probe) that utilized visual or statistical analyses to determine success measures.

Studies were excluded on the basis of the following criteria: (a) the study did not include tier-2 to tier-3 training (i.e., no participant was taught how to train other participants); (b) the experimenter trained both tier-1 and tier-2 participants; (c) the study did not use an experimental design; (d) the study included pyramidal strategies not related to training staff (e.g., “teaching pyramid”); (e) the study included tier-3 participants without an identified disability; and (f) the study did not include a true pyramid (i.e., tier-1 participants were trained to only supervise others, not train others).

**Search Procedure**

An electronic search was conducted including all studies published prior to January 2017 using PsycINFO, ERIC, Social Services Abstract, and Education Research Complete Academic. The search included only studies available in English that were published in an academic peer-reviewed journal. One search string was used: ("special educat*" OR disab* OR autis* OR handicap* OR retard* OR “cerebral palsy” OR syndrome OR “hearing impair*” OR “visual impair*” OR blind* OR deaf* OR “emotional disturb*” OR “orthopedic impair*” OR “traumatic brain injur*” OR “health impair*” OR “speech impair*” OR “language impair*” OR “speech disord*”) AND (“Pyramid*” OR “train-the-trainer”). Forward (citation searches) and backward (reference harvesting) searches were conducted using the Web of Science database.
Database search returned: 1023 articles

Duplicates removed: 49 articles
Excluded after title and abstract review: 946 articles

28 articles screened in

Forward search found: 6 articles
Backward search found: 3 articles

37 articles screened in after initial title and abstract review

Excluded after article review:
1. No tier-2 to tier-3 training (9)
2. The experimenter trained both tier-1 and tier-2 participants (3)
3. No experimental design utilized (3)
4. A different use for word “Pyramid” (2)
5. No tier-3 participant with a disability (2)
6. Not a true pyramid (4)

14 articles included for the literature review

Figure 1. Flow chart of search procedures.
We evaluated the references found in the “cited by” sections as well the reference sections for each identified article. Fourteen articles were included for review. See Figure 1 for a detailed description of the search, inclusion, and exclusion processes.

**Data Extraction**

For each article, we coded variables related to the demographics, training components, study parameters, and success measures.

**Demographic variables.** For each study, we coded five demographic variables: (a) a description of the training and implementation setting, (b) a description of the tier-1 trainer, (c) a description and number of tier-1, tier-2, and tier-3 participants—including disability label, (d) ages of tier-3 participants, and (e) length of training conducted for tier-1 and tier-2 participants.

**Training components.** We created a comprehensive list of all training elements used across all studies. We then coded for author descriptions of the following 10 training components: (a) practice description; (b) rationale or justification why the skill is important to use; (c) fidelity checklist including all critical steps when implementing the strategy; (d) written instructions or other reading material provided as a supplemental support; (e) modeling either in person or with use of video; (f) role play, including providing an opportunity for the practitioner to practice the skill in a separate setting; (g) skill rehearsal, including practicing the new skill with an individual with a disability prior to assessment of performance; (h) performance feedback including communicating supportive or corrective statements about the practitioners’ performance including changes they need to make in the future; (i) planning for specific clients, including
making a specific plan for individuals practitioners work with; and (j) data collection training, including providing training with data collection sheets.

**Study parameters.** We coded for the following study parameters: (a) descriptions of skill taught, (b) reported outcomes for individuals with disabilities, (c) reported generalization and maintenance measures, (d) reported fidelity of training and implementation measures across tiers, (e) reported interobserver agreement measures, and (f) reports of social validity measures.

**Success measures.** Two different measures of success were employed for experimental designs. Given the lack of valid and reliable effect size estimates for single-case designs (Wolery, Busick, Reichow, & Barton, 2010), we used visual analysis, replication logic, changes in level, trend, and stability across all data in each study to determine if a planned experimental effect was present or absent (Gast & Ledford, 2014). All included studies used a variation of the multiple baseline design and an opportunity to demonstrate an experimental effect occurred at the phase change from baseline to intervention for each individual or dyad. When studies included effects for multiple participants, for example, each participant’s data produced an opportunity to replicate the measure and demonstrate success.

Once each study had been evaluated for success across participants/behaviors, success estimates were calculated for each study (Reichow & Volkmar, 2010) by creating a ratio of successful implementations of the independent variable to the total implementation attempts. Given the possibility of multiple treatments of the independent variable to one participant, the denominator of the ratio may not always equal the number of participants in the study. The foundation of single-case research lies with the
replication of independent variable exposure and, thus, a success estimate takes these measures into consideration when creating the ratio. Maintenance and generalization measures were also considered an opportunity to show an effect after the removal of the intervention.

A success estimate was calculated in a different way for the one study utilizing a group design (Haberlin, Beauchamp, Agnew, & O'Brien, 2012) by evaluating the reported difference between the groups receiving different treatments (effect size) as well as the interaction effects between the two groups.

**Inter-coder Agreement**

Inter-coder agreement was calculated for the extraction of study variables for 35.7% \((n = 5)\) of the studies. Additionally, agreement was calculated for 100% of studies for success measures. Trial-by-trial agreement was calculated between two independent coders when evaluating the same studies (Cooper, Heron, & Heward, 2007). For combined variables and success measures, an agreement was scored for each item if coders recorded the same outcome, and a disagreement was scored if coders did not code the same outcome. Overall agreement for each study was calculated by dividing the number of agreements by the total number of items to be coded and multiplying by 100. Average agreement was calculated for the extraction of study variables to be 95% (range: 91–97%) and for success estimates to be 96% (range: 77–100%). Researchers came to a consensus if there was a disagreement.

**Results**

Fourteen studies met the inclusion criteria for this review and details for these articles are presented in Table 1.
Table 1

Summary of Studies Included in the Literature Review Presented in Chronological Order

<table>
<thead>
<tr>
<th>Author</th>
<th>Setting</th>
<th>Tier-1</th>
<th>Tier-2</th>
<th>Ratio of Tier 1:2</th>
<th>Disability Tier 3</th>
<th>Maint.</th>
<th>Skill Taught to Tier-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>van den Pol, Reid, &amp; Fuqua, 1983</td>
<td>Institution</td>
<td>Staff</td>
<td>Staff</td>
<td>4:4</td>
<td>ID</td>
<td>N/A</td>
<td>Fire protocol, managing aggression, and seizure response</td>
</tr>
<tr>
<td>Demchak &amp; Browder, 1990</td>
<td>Group home</td>
<td>Supervisor</td>
<td>Staff</td>
<td>3:3</td>
<td>ID</td>
<td>N/A</td>
<td>Functional skills</td>
</tr>
<tr>
<td>Demchak, Kontos, &amp; Neisworth, 1992</td>
<td>Child care center</td>
<td>Staff</td>
<td>Staff</td>
<td>3:6</td>
<td>DD</td>
<td>2.5 weeks</td>
<td>Behavior reduction</td>
</tr>
<tr>
<td>Shore, Iwata, Vollmer, Lerman, &amp; Zarcone, 1995</td>
<td>Institution</td>
<td>Supervisor</td>
<td>Staff</td>
<td>2:8</td>
<td>ID</td>
<td>N/A</td>
<td>Antecedent and consequence behaviors</td>
</tr>
<tr>
<td>Ducharme, Williams, Cummings, Murray, &amp; Spencer, 2001</td>
<td>Group home</td>
<td>Supervisor</td>
<td>Staff</td>
<td>3:9</td>
<td>ID</td>
<td>N/A</td>
<td>Teaching skills</td>
</tr>
<tr>
<td>Kuhn, Lerman, &amp; Vorndran, 2003</td>
<td>Home</td>
<td>Parent</td>
<td>Family member</td>
<td>2:4</td>
<td>ID</td>
<td>N/A</td>
<td>Behavior reduction and replacement behavior instruction</td>
</tr>
<tr>
<td>Schlosser, Walker, &amp; Sigafoos, 2006</td>
<td>Group home Adult habilitation program</td>
<td>Staff</td>
<td>Staff</td>
<td>3:4</td>
<td>ID &amp; autism</td>
<td>N/A</td>
<td>Requesting behavior</td>
</tr>
<tr>
<td>Finn &amp; Sturmey, 2009</td>
<td>Staff</td>
<td>Staff</td>
<td></td>
<td>4:3</td>
<td>ID</td>
<td>N/A</td>
<td>Positive feedback and interactions</td>
</tr>
</tbody>
</table>

Continued on next page
<table>
<thead>
<tr>
<th>Author</th>
<th>Setting</th>
<th>Tier-1</th>
<th>Tier-2</th>
<th>Ratio of Tier 1: 2</th>
<th>Disability Tier 3</th>
<th>Maint.</th>
<th>Skill Taught to Tier-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haberlin, Beauchamp, Agnew, &amp; O'Brien, 2012</td>
<td>Day program</td>
<td>Supervisor</td>
<td>Staff</td>
<td>4:44</td>
<td>DD</td>
<td>3 months</td>
<td>Community skills</td>
</tr>
<tr>
<td>Pence, Peter, &amp; Tetreault, 2012</td>
<td>School</td>
<td>Teacher</td>
<td>Teacher</td>
<td>3:6</td>
<td>DD</td>
<td>N/A</td>
<td>Preference assessment</td>
</tr>
<tr>
<td>Loughrey, Contreras, Majdalany, Finn &amp; Sturmy Rudy, Sinn, Teague … &amp; Harvey, 2014</td>
<td>Autism center</td>
<td>Parent</td>
<td>Parent</td>
<td>2:1</td>
<td>Autism</td>
<td>4 weeks</td>
<td>Manding behavior</td>
</tr>
<tr>
<td>Pence, Peter, &amp; Giles, 2014</td>
<td>School</td>
<td>Teacher</td>
<td>Teacher</td>
<td>6:6</td>
<td>Students with an IEP</td>
<td>N/A</td>
<td>Functional analysis</td>
</tr>
<tr>
<td>Suhrheinrich, 2014</td>
<td>School</td>
<td>Staff</td>
<td>Teacher</td>
<td>3:9</td>
<td>Autism</td>
<td>3 months</td>
<td>Pivotal response training</td>
</tr>
</tbody>
</table>

*Note.* DD = developmental disability, ID = intellectual disability. IEP = individualized education plan, Maint: maintenance. N/A = not assessed.
Demographic Variables

Setting. The trainings took place in several different settings. Three studies took place in a group home, school, and an adult day program, respectively. Two studies took place in an institution. One study each took place in a child-care center, autism center, and home. Generalization of skills was measured in two locations, in the home and teacher’s classroom.

Expert trainer. Researchers provided training to tier-1 staff across 86% (n = 12) of the studies. One study included a school psychology graduate student who previously showed mastery of the skills as the expert trainer, and in a second study, an experienced behavior analyst provided the training.

Tier-1 and tier-2 participants. Between two and nine tier-1 participants (M = 3.6) were included across all studies. Five studies used staff as tier-1 trainers, four used supervisors, two used parents, and three used teachers. One study employed teachers, assistants, and staff as tier-1 participants. Between 1 and 45 tier-2 participants participated (M = 8.3). Nine studies used staff as tier-2 participants, three used teachers, and two used family members.

Tier-3 participants. Five studies described tier-3 participants as having disabilities, but did not specifically identify the number of individuals, if any, who received intervention. Nine studies reported the number of included individuals with disabilities, ranging from 1 to 21 (M = 8.1). Twelve studies provided ages of tier-3 participants: eight included children, four included adults, and one study included individuals between the ages of 8 and 23. Five studies included intervention for participants with an intellectual disability and three included individuals with
developmental disabilities, three included individuals with autism, one described including students with IEPs, and two studies included individuals with both autism and intellectual disability.

**Practitioner Training Components**

**Tier-1 training.** The specific descriptions of training elements provided to tier-1 trainers varied considerably (see Table 2). Every study included a description of the practice and 28% ($n = 4$) also included a rationale for the use of the practice with individuals with disabilities. Two studies (14%) provided fidelity checklists to the participants, and seven studies (50%) provided additional reading materials. Twelve studies (86%) modeled the practice for the participants, 10 studies (71%) included an opportunity for skill rehearsal, and 8 studies (57%) included role-play within the training practices. Thirteen studies (93%) included coaching and feedback. Three studies (21%) included client planning, and three studies (21%) included data collection training.

**Tier-2 training.** Three studies (21%) did not include any description of the training provided to tier-2 participants. Four studies (29%) included a description of tier-2 training as the same training tier-1 participants received. Two studies (14%) described the training as providing feedback only, and one study (7%) described the training as providing tier-2 participants with individual consultation and practice. Four studies (29%) described the training to tier-2 participants with more detail including specific training elements.

Seven studies (50%) included a description of the practice, and one study (7%) included a rationale for the use of the practice with individuals with disabilities. One study (7%) provided fidelity checklists to the participants, and four studies (29%)
provided additional reading materials. Seven studies (50%) modeled the practice for the participants, six studies (43%) followed up with an opportunity for skill rehearsal, and four studies (29%) included role-play. Ten studies (71%) included coaching and feedback. No studies included client planning, and one study (7%) included data collection training.

**Study Parameters**

**Skills taught to practitioner.** Eleven studies (79%) displayed results for each tier-2 participants’ percentage of correctly completed steps, and three studies (21%) reported this number as an average across groups of participants. One study reported the frequency of the practitioners’ behavior only. A variety of skills were taught to tier-1 and tier-2 participants including teaching behaviors (e.g., appropriate instruction, prompts, consequences for the learner), responding to emergency situations (e.g., fire, seizure), specific consequence procedures (e.g., planned ignoring, time out), specific behavior interventions given (e.g., mand training, pivotal response training, providing opportunities to initiate), assessment procedures (e.g., functional analysis, preference assessment, compiling a task analysis), and learner specific tasks (e.g., teaching manual signs, making jewelry).

**Outcomes for individuals with disabilities.** Five studies (36%) graphed outcomes for 21 individuals with disabilities. These outcomes included behavior reduction (e.g. spitting, off-task behavior, aggression), behavior increase (e.g., compliance, mands), community integration skills (e.g., bus training, pedestrian safety, setting, clearing the table), and learner-specific outcomes (e.g., hair brushing, hanging up coat).
Table 2

*Included Training Components for Tier-1 and Tier-2 Participants Presented in Chronological Order*

<table>
<thead>
<tr>
<th>Author</th>
<th>Description</th>
<th>Rationale</th>
<th>Fidelity checklist</th>
<th>Reading material</th>
<th>Model</th>
<th>Skill rehearsal</th>
<th>Role-play</th>
<th>Feedback coaching</th>
<th>Planning</th>
<th>Data</th>
<th>Tier 2 training description</th>
</tr>
</thead>
<tbody>
<tr>
<td>van den Pol, Reid, &amp; Fuqua, 1983</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>No description provided</td>
</tr>
<tr>
<td>Demchak &amp; Browder, 1990</td>
<td>X</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>X</td>
<td>“Repeat the tier-1 procedures,” including: role-play &amp; feedback</td>
</tr>
<tr>
<td>Demchak, Kontos, &amp; Neisworth, 1992</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>Train, provide praise, &amp; feedback</td>
</tr>
<tr>
<td>Shore, Iwata, Vollmer, Lerman, &amp; Zarcone, 1995</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>X</td>
<td>0</td>
<td>X</td>
<td>No description provided</td>
</tr>
<tr>
<td>Ducharme, Williams, Cummings, Murray, &amp; Spencer, 2001</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>“Identical to tier-1 training” (researchers supported less than 5% of the training)</td>
</tr>
<tr>
<td>Kuhn, Lerman, &amp; Vorndran, 2003</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>“Same as tier-1 training”</td>
</tr>
<tr>
<td>Schlosser, Walker, &amp; Sigafos, 2006</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>Individual consultation &amp; practice</td>
</tr>
</tbody>
</table>

*Continued on next page*
Table 2 continued

*Included Training Components for Tier-1 and Tier-2 Participants Presented in Chronological Order*

<table>
<thead>
<tr>
<th>Author</th>
<th>Description</th>
<th>Rationale</th>
<th>Fidelity checklist</th>
<th>Reading material</th>
<th>Model</th>
<th>Skill rehearsal</th>
<th>Role-play</th>
<th>Feedback coaching</th>
<th>Planning</th>
<th>Data</th>
<th>Tier 2 training description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finn &amp; Sturmey, 2009 Haberlin, Beauchamp, Agnew, &amp; O'Brien, 2012</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>Feedback</td>
</tr>
<tr>
<td>Pence, Peter, &amp; Tetreault, 2012</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>No description provided</td>
</tr>
<tr>
<td>Parsons, Rollyson, &amp; Reid, 2013</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Loughrey, Contreras, Majdalany, Finn &amp; Sturmey Rudy, Sinn, Teague … &amp; Harvey, 2014</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>“Used BST”</td>
</tr>
<tr>
<td>Pence, Peter, &amp; Giles, 2014</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>Description, Model, skill rehearsal, role-play, &amp; feedback</td>
</tr>
<tr>
<td>Suhrheinrich, 2014</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>Description, Model, skill rehearsal, role-play, &amp; feedback</td>
</tr>
</tbody>
</table>

*Note.* X = training component included, 0 = training component not included.
**Generalization and maintenance measures.** Generalization across settings and people is programmed into the design of pyramidal training. That is, role-play and skill rehearsal were most often completed with tier-1 and/or research team members in a contrived setting, and implementation of newly acquired skills was often performed with tier-2 and tier-3 participants in a different setting. Two studies assessed for generalization after treatment including one adding a generalization client and one programming untaught exemplars. One study provided the opportunity for tier-2 participants to become tier-1 participants and train new staff after completing their own role as tier-2 participants. No study measured or graphed any generalization effort, therefore we were unable to determine if the generalization efforts made by studies were effective.

Four studies (29%) programmed for and included graphed results of maintenance measures across 18 tier-2 practitioners ranging between 2.5 weeks and 8 months ($M = 7.6$ weeks). One study described the inclusion of a “maintenance condition,” but the practice was in fact generalization of skills from one trainer to a new trainee rather than discontinuing treatment while maintaining measurement procedures. Three studies showed stable reporting across nine practitioners after treatment was discontinued and the remaining study that reported maintenance measures reported zero participants maintaining the skill.

**Fidelity and interobserver agreement (IOA) measures.** No study documented researcher-implementation fidelity measures during either tier-1 or tier-2 training. Seven studies reported tier-2 implementation fidelity by way of a line graph as a dependent variable, two studies reported this information as a group average, two studies reported
behavior frequency (not treatment fidelity), and three studies did not report tier-2 implementation fidelity. Each study included measures of IOA either for tier-1 or tier-2 behavior or reported a combined IOA for both tier-1 and tier-2 behaviors. IOA ranged from 67–100% ($M = 90\%$).

**Measure of Success**

*Single-case designs.* Success was measured using visual-analysis of single-case graphs for 14 studies (see Table 3). Thirty tier-1 participants’ behavior was graphed, and all (100%) made improvement. Across these studies, 115 tier-2 participants were included, and 95 (83\%) showed improvement after treatment. Nine (43\%) out of 21 individuals with disabilities effect opportunities were successful.

*Group designs.* One study utilized a group design (Haberlin, Beauchamp, Agnew, & O'Brien, 2012) that compared consultant-led and pyramidal training groups. Researchers used a 2x3 mixed factorial analysis of variance (ANOVA) to test for differences between the three time points (i.e., baseline, post-training, follow-up) and between the two training groups. The degree of change over time was different in the two conditions. The last five data points for 26 participants were evaluated, showing that the pyramidal training group performed better than the consultant-led group during post-training and at the 3-month follow-
### Table 3

**Success Estimate Ratios for Included Studies in Chronological Order**

<table>
<thead>
<tr>
<th>Author</th>
<th>Tier-1 Success Estimates</th>
<th>Tier-1 Maintenance</th>
<th>Tier-2 Success Estimates</th>
<th>Tier-2 Maintenance</th>
<th>Student Success Estimates</th>
<th>Student Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>van den Pol, Reid, &amp; Fuqua, 1983</td>
<td>12:12</td>
<td>N/A</td>
<td>12:12</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Demchak &amp; Browder, 1990</td>
<td>6:6</td>
<td>6:6</td>
<td>2:4</td>
<td>3:3</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Demchak, Kontos, &amp; Neisworth, 1992</td>
<td>3:3</td>
<td>2:2</td>
<td>0:3</td>
<td>2:2</td>
<td>0:5</td>
<td>N/A</td>
</tr>
<tr>
<td>Shore, Iwata, Vollmer, Lerman, &amp; Zarcone, 1995</td>
<td>N/A</td>
<td>N/A</td>
<td>0:5</td>
<td>N/A</td>
<td>0:4</td>
<td>N/A</td>
</tr>
<tr>
<td>Ducharme, Williams, Cummings, Murray, &amp; Spencer, 2001</td>
<td>3:3</td>
<td>N/A</td>
<td>9:9</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Kuhn, Lerman, &amp; Vorndran, 2003</td>
<td>2:2</td>
<td>N/A</td>
<td>0:4</td>
<td>N/A</td>
<td>6:6</td>
<td>N/A</td>
</tr>
<tr>
<td>Schlosser, Walker, &amp; Sigafoos, 2006</td>
<td>N/A</td>
<td>N/A</td>
<td>3:3</td>
<td>N/A</td>
<td>3:3</td>
<td>N/A</td>
</tr>
<tr>
<td>Finn &amp; Sturmev, 2009</td>
<td>N/A</td>
<td>N/A</td>
<td>6:6</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Pence, Peter, &amp; Tetreault, 2012</td>
<td>N/A</td>
<td>N/A</td>
<td>2:3</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Parsons, Rollyson, &amp; Reid, 2013</td>
<td>N/A</td>
<td>N/A</td>
<td>3:3</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Loughrey, Contreras, Majdalany, Finn &amp; Sturmev Rudy, Sinn, Teague ... &amp; Harvey, 2014</td>
<td>4:4</td>
<td>4:4</td>
<td>4:4</td>
<td>4:4</td>
<td>0:3</td>
<td>N/A</td>
</tr>
<tr>
<td>Pence, Peter, &amp; Giles, 2014</td>
<td>N/A</td>
<td>N/A</td>
<td>6:6</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Suhrheinrich, 2014</td>
<td>N/A</td>
<td>N/A</td>
<td>4:9</td>
<td>2:6</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Haberlin, Beauchamp, Agnew, &amp; O’Brien, 2012</strong></td>
<td>NA</td>
<td>N/A</td>
<td>YES</td>
<td>YES</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

*Note. N/A = Not assessed. ** Indicates group design and the success of each row will either be a “yes” or “no”*
Discussion

Practitioners require training to meet the needs of the individuals with disabilities they support, and the pyramidal approach may be a time and cost efficient way of providing this needed training. There are, however, several limitations existing within the literature that future researchers and practitioners should consider addressing before employing pyramidal training procedures within their work. We reviewed 14 studies in which the pyramidal training approach was used, and we arrived at the following conclusions about this body of literature:

**Training details.** The pyramidal training approach has been used across various settings, practitioner types, and ages of the client. Settings included adult day facilities, homes, and special education classrooms. Practitioner types included parents, teachers, and service providers who supported individuals with autism, intellectual disability, and developmental disability ranging from pre-K through adulthood. The authors’ description of the training provided to tier-1 participants was notably more robust than that of tier-2 participants. One consistent factor across most studies (86%) was the presence of the researcher acting as the expert trainer. This might be in line with real-world practices when employing an expert trainer to conduct professional development in applied settings. The relationships between tier-1 and tier-2 participants were most commonly a supervisor/subordinate role, however studies also included staff-to-staff and parent-to-family member dyads. The ratio between tier-1 and tier-2 practitioners varied between 1:1 and 1:15.

There was a wide range of skills taught including various EBPs, facility safety procedures, and specific client needed skills (e.g., making jewelry). A variety of teaching
strategies was used to teach practitioners a range of skills and varied considerably between studies. Although research supports that feedback is a key component predicting success (e.g., Jerome, Kaplan, & Sturmey, 2014; Ward-Horner & Sturmey, 2012), the presence or absence of any one given training strategy among the studies included in this review did not predict or correlate with successful participant outcomes. For example, the two studies that did not incorporate feedback components did have positive outcomes, and others that did incorporate this training element did not. However, there were some commonalities between studies. For example, during instruction, all studies included a description of the practice, 86% of studies included coaching or feedback, and 86% included modeling.

Given the variety of elements present across studies, there is promise that the pyramidal training approach may be beneficial for any location, with any variation of practitioner, and with any skill. There is, however, a lack of evidence related to whether this approach is useful with individuals with a variety of disabilities given the narrow scope of disabilities included in these 14 studies (i.e., autism, developmental disabilities, intellectual disabilities). There is no evidence to discourage the use of this training approach with other populations, but practitioners and researchers alike should use caution when using the pyramidal approach to support individuals with different disabilities.

**Fidelity measures.** No study included researcher-implemented fidelity data when training tier-1 participants. Six studies (43%) reported a change in tier-1 performance, eight studies (57%) reported individual tier-2 implementation fidelity by way of a line graph. All participants made some improvement from baseline to treatment.
Without adequate data regarding the correct implementation of the independent variable, it is impossible to assert that the training practices described were actually those used to change the participants’ behavior. The absence of this measurement leaves the body of research lacking possible methodical soundness, and therefore should be interpreted with caution. Any and all training and implementation of new skills should be documented and measured for accuracy. Practitioners employing this training approach should evaluate the expert trainers’ behavior, the practitioners’ behavior, and the individual with disabilities’ behavior to ensure each level of implementation is the direct cause for any change in the target behavior.

Effective practice and maintenance. Overall, reports of practitioner behavior change appeared to be positive. All tier-2 practitioners made some gains, but only 83% \((n = 95)\) of tier-2 practitioners made significant improvements after treatment. Including the data for individuals with disabilities data can be complex and time consuming for researchers, but without this data, consumers of this research are left guessing if positive outcomes for individuals with disabilities would have been resulted from the practitioner training.

Only five studies measured outcomes for individuals with disabilities, and 42% \((n = 9)\) of those individuals’ data was positive. This is concerning given the end goal of any training is to provide individuals with disabilities with instruction that will result in improved outcomes. Without measures of the impact on the individual with a disability, readers cannot ascertain if the training package was effective.

Maintenance was measured across only four (29%) studies, and no maintenance measures were taken for outcomes for individuals with disabilities. Across the
maintenance data taken for tier-1 participants, all were successful at maintaining the skill, and only 73% ($n = 11$) tier-2 participants maintained skills. Although the data that were captured on the maintenance of practitioner data are promising, this lacking information across the included articles is concerning. Without follow-up information about these interventions, only assumptions can be made about the viability of the intervention and the long-term effects on the individuals with disabilities.

Researchers should be applauded when making any effort to better practitioners’ delivery of instruction to individuals with disabilities. However, as a field, researchers should make all attempts to gather data on the individuals with disabilities performance to ensure the benefit of the intervention is not only in the fidelity of the implementation, but the outcomes related to the individual with the disability. Future researchers must make the effort to measure individual outcomes and adjust their training protocol or approach accordingly.

**Limitations of Literature Review**

Limitations exist within our review process. First, we sought to review only studies that used an experimental design. Future researchers may consider including studies using any measure of effectiveness when discussing the appropriateness and effectiveness of the pyramidal training approach. Second, we did not target specific client populations, settings, or practitioners when conducting our analysis so that we could describe pyramidal training in a broad way. Future researchers who are interested in a specific population or element of this approach should consider a more focused search. Third, when evaluating the single-case design studies, we used visual analysis to determine success estimates for each participant. We believe this measure is valid and
reliable, however, future researchers may consider an alternative way (e.g., \(d\)-Hedges-Pustejovky-Shadish (DHPS; Hedges, Pustejovsky, & Shadish, 2013) of measuring the effectiveness or success of each study regarding the magnitude of the effect. This limitation is a consistent judgment call among researchers evaluating single-case designs and a more widely accepted measurement is still needed to address this issue in the field.

**Conclusions**

Researchers should consider taking more comprehensive outcome measures to ensure pyramidal training is being implemented with fidelity, and that individuals with disabilities are in fact benefiting from the training. Although a promising practice to develop practitioners’ ability to implement new instructional strategies, without proper measurement, it is unclear if the pyramidal training approach is effective at changing practitioner behavior to directly benefit individuals with disabilities.
Chapter 3: Research Paper

In this chapter, I present a stand-alone research paper. This paper includes an introduction with a brief literature review, a detailed description of the methods, a description of the results, and the discussion of the findings.

Abstract

Special education teachers and paraeducators work together as a team to support students with disabilities. 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 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. Paraeducator rates increased from 0 at baseline to an average of .58 per minute after intervention. Paraeducator fidelity of implementation increased from 0% during baseline to an average of 94.5% after intervention. Maintenance data were recorded for three paraeducators. Schools supporting students with disabilities should consider using this cost and time effective training model with staff.
A Pyramidal Training Approach For Training Paraeducators

Students with severe disabilities are most vulnerable to poor long-term outcomes without intervention including those with complex communication needs (National Longitudinal Transition Study-2, 2009). These individuals, without the support from trained staff and accommodations such as augmentative and alternative communication (AAC), often experience social barriers, fewer friendships, poorer academic outcomes, and poor communication outcomes (Drager, Light, & McNaughton, 2010). One skill that seems to be missing among younger children with complex communication needs and severe disabilities is independent initiating (Andzik, Chung, Kranak, 2016). A descriptive study that documented the interactions between 23 elementary students with complex communication needs reported that only 9% of communication interactions were student initiated (Andzik, Chung, Kranak, 2016). In addition, 22% of the students were never observed initiating. Given this skill deficit, one would hypothesize that the school staff were actively teaching these children how to communicate, yet, across the 117 hours of observation, no adult was observed providing opportunities to initiate (OTI) for their students.

Paraeducators are critical members of the educational team, and when provided training, can be effective intervention agents for students with severe disabilities (Mrachko & Kaczmarek, 2016). For example, paraeducators have been found to be effective at implementing communication interventions for students with complex communication needs (Douglas, Light, & McNaughton, 2013). One group of researchers effectively trained one paraeducator to provide opportunities to respond, opportunities to
initiate, and least to most prompting to an elementary-age student with autism (Wermer, 2016). With the exception of this study, the majority of research has utilized the researcher or classroom teacher as the intervention agent. However, one identified study did include the classroom teacher as the individual providing training to the paraeducator (Brock et al., 2015). Although the trained paraeducators effectively implemented a peer-support strategy with students with disabilities, the classroom teacher has not been utilized in other studies when measuring the outcomes of the staff member they trained.

Given the major role paraeducators have as intervention agents in the classroom and the lack of availability of training for these individuals, the teacher is often tasked with providing training. Teachers are naturally the most logical trainer of paraprofessionals given the sustainability and feasibility of their relationship in the classroom. In addition, federal law requires students to be exposed to only evidence based practices. When utilizing school-based practitioners such as paraeducators and teachers when conducting research, researchers are building capacity at the school level by preparing teachers to not only be experts on the given strategy, but leaving them with the skills to provide training to paraeducators. This approach reflects the current professional development model in schools, where teachers receive professional training and are then expected to return to the school and deliver that training to their staff. 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). In contrast to other professional development packages, tier-2 practitioners are also included and are comprised of one or more otherwise untrained practitioners (e.g., teachers, paraprofessionals, direct care providers, family members) 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). One study used teachers to train paraeducators (Brock et al., 2015).

Benefits of pyramidal training include being cost and time efficient. 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. However, 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 correlated with positive outcomes among practitioner implementation fidelity (Brock, Cannella-Malone, Seaman, Andzik, Schaefer, Page, Barczak, & Dueker, in press). 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 disabilities (Andzik & Cannella-Malone, 2016; Parsons, Rollyson, & Reid, 2012).

The current study sought to teach students how to initiate by providing students with OTI using least to most prompting (LTM) (Kossyvaki, Jones & Guldberg, 2012). This is important because students with complex communication needs, including those diagnosed with autism, display significantly less spontaneous communication compared to their peers (Forde, Holloway, Healy, & Brosnan, 2011). This study specifically extends the literature by first using in-service teachers to train their paraeducators. Only one identified study used teachers when training paraeducators (Brock et al., in-press) and only two identified studies used teachers as training agents to teach other teachers (Pence, Peter, & Giles, 2014; Pence, Peter, & Tetreault, 2012).

The present study assessed the effects of teacher-led BST on a paraeducator’s rate and fidelity of implementation of OTI and LTM strategies with students with disabilities. 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 disabilities following a teacher-trained, paraeducator-implemented communication intervention?

Method

Special Educators, Paraeducators, and Students With 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. First, a district representative provided researchers with a list of teachers who had students using AAC in their designated special education classrooms. Then, teachers helped select potential student participants who (a) received special education services and had an active Individualized Education Plan (IEP), (b) were eligible for the State’s alternate assessment, (c) used a high tech AAC device, (d) was supported by a paraeducator, and (e) was not consistently initiating communication with others. 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. The final inclusion criterion was based on classroom observations and staff report of the students’ communication. Initiation was defined to include the students’ use of their AAC system to independently initiate comments, questions, or to make statements.

Classroom A

Tier 1, teacher. Suzie was a 30-year old White licensed special education teacher with a bachelor’s degree and five years of teaching experience. She had previously taught students with mild to moderate disabilities and students who were deaf. 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. On a 4-point likert-type scale, she rated her skills related to delivering OTI at a 3 and her LTM prompting effectiveness at a 2 (see Appendix H).

**Tier 2, paraeducators.** Sarah was a 27-year-old White 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 White 40-year-old female with a bachelor’s degree and had been working as a special education paraeducator for 4 months while 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, student.** John was a 14-year-old male student with autism in the seventh grade and identified as White, 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. Due to John’s communication limitations, a direct assessment of cognitive ability had not been attempted since receiving a diagnosis of autism at the age of 2. 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 most recent IEP reflected that he had hit others to gain access to attention and to terminate a non-preferred activity. 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. John had been identified as a student with multiple disabilities and was not meeting grade level expectations and thus qualified for the state’s alternative assessment for students with cognitive disabilities.

Judah was a 12-year-old, White, male student with autism in the sixth grade. He received most of his educational services in a classroom for students with 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 and was not meeting grade level
expectations and thus qualified for the state’s alternative assessment for students with cognitive disabilities.

**Classroom B**

**Tier 1, teacher.** Kelly was a 35-year-old White 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. When given a 4-point likert-type scale, she rated her skills related to delivering OTI at a 3 and her LTM prompting effectiveness at a 2.

**Tier 2, paraeducator.** Kathy was a 47 year-old, Black paraeducator with a high school diploma. She had been working as a paraeducator for 3 years and had worked with 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 on his personal iPad for 1 year at the time of this study. Randal produced 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 therapy from the speech-language pathologist. Randal had been identified as a student with multiple disabilities and was not meeting grade level expectations and thus qualified for the state’s alternative assessment for students with cognitive disabilities.

Classroom C

**Tier 1, teacher.** Rebecca was a 22 year-old White student teacher and had Jeremy on her caseload for the past four 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 Bachelors 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 disabilities. 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. When provided with a 4-point likert-type scale, she rated her skills related to delivering OTI at a 3 and her LTM prompting effectiveness at a 3.

**Tier 2, paraeducator.** Ashley was a 39-year old White 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, White student with cerebral palsy in the tenth grade. Jeremy’s oral motor weakness adversely affected his ability to produce clear speech. At the start of the study, Jeremy had the communication app, “SonoFlex” on his personal iPod but required cueing from the speech-language pathologist to use the device. When Jeremy got an android device, his communication app changed to “Let Me Talk.” His speech-language goals in his IEP focused on strengthening use of oral motor exercises to improve his overall oral strength and speech intelligibility. One objective listed in his IEP outlined the use of the AAC device to clarify his message when 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 and thus qualified for the state’s alternative assessment for students with cognitive disabilities.

**Settings**

This study was completed across two schools, one junior high school and one high school, located in a rural school district in a midwestern state. This school district enrolled approximately 10,000 students per year, 27.9% who were labeled as economically disadvantaged, 14.9% were students with disabilities, and 4.1% had limited English language proficiency. About 63% of students who attended this district were White, 21.5% Black, 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. Both John and Judah spent the majority of their day in a multiple disabilities classroom. One special education teacher, Suzie, led the classroom with support from two additional full-time paraeducators, Sarah and Madison. Also, each period had two general education peers in the room to help with instruction. Madison was assigned to Judah all day and John had a rotating paraeducator schedule throughout the day. Five students with disabilities were also in this classroom the majority of the day and followed the same schedule together (e.g., rotating to lunch together). Six additional students with disabilities from a different multiple disabilities classroom also attended the same art class each day. Each student with a disability was paired with a general education peer helper. After art class, this larger group of students transitioned to adapted physical education class together.

All intervention sessions took place in the multiple disabilities classroom during 1:1 instruction or “bin work” that consisted of three bins labeled 1, 2, and 3. These bins were placed in front of the student and the paraeducators (Sarah and Madison) placed a work item in each bin, and the students were expected to complete each bin item prior to moving to the next. Generalization probes were taken in the art class during the baseline phase but were not measured during intervention or maintenance phases given the limited 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 disabilities, three peer helpers, and two paraeducators. The instruction varied each day including cooking tasks, functional-skills activities
(typically matching or sorting activities), puzzles, and art activities. Although Kathy was not assigned to work with Randal, she worked directly with him during all baseline, intervention, generalization, and maintenance sessions. Generalization sessions took place at a local restaurant where Randal was expected to remove the chairs from the tables and wipe down tables with a clean rag. There were no customers in the store during these sessions, and Kathy and a peer with a disability accompanied Randal.

**Classroom C.** Classroom C was set in the same high school as classroom B where students in ninth through twelfth grade were enrolled. This classroom included one special education teacher, one student teacher (Rebecca), one paraeducator (Ashley), one peer helper, and seven students with disabilities. All intervention sessions were conducted during math period where 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 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 Appendix C). A checklist of teaching behaviors was modified from a study that taught instructors to use BST when teaching staff to include 14 steps (Parsons, Rollyson, & Reid, 2013). The components included were providing a rationale, vocally describing the
steps of the practice, providing a task analysis of necessary steps, and providing multiple opportunities for questions, modeling, role-playing, and feedback (see Appendix D). Teachers were provided with a BST task analysis to use when training the paraeducator (see Appendix E). A written summary of the practice being taught was provided to participants (see Appendix F). 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 (see Appendix G). Opportunities to initiate were comprised of four steps, (a) set up the environment to encourage learner to request assistance or materials, (b) gain learner’s attention, (c) establish appropriate proximity, and (d) wait for initiation (minimum 5 s but not more than 10 s). Least to most prompting was comprised of 8 possible steps: (a) Wait 5 to 10 s after OTI. (b) Following a correct response, provide praise and access to requested item or support. Following an incorrect response, immediately deliver next prompt. (c) If no response occurs from previous prompt, wait 3 to 5 s and deliver gestural prompt. (d) Following a correct response, provide praise and access to requested item or support. Following an incorrect response, immediately deliver next prompt. (e) If no response from previous prompting hierarchy, wait 3 to 5 s and deliver model prompt. (f) Following a correct response, provide praise and access to requested item or support. Following an incorrect response, immediately deliver next prompt. (g) If no response from previous prompting hierarchy, wait 3 to 5 s and deliver physical prompt. (h) Praise, specifically state what the child did, and provide access to the item.
Fidelity of paraeducator behavior was 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. 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 amount of time observed. Given that the included student participants did not use natural speech, researchers recorded student responses that occurred when the student used the 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. This method of responding was only counted when the AAC device was broken and otherwise students were prompted to use the AAC device.

During baseline and intervention conditions, researchers observed students 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.

**Interobserver Agreement (IOA) and Procedural Fidelity**

A second data collector (a graduate student in special education) observed 44% of baseline conditions and 46% of treatment conditions. The first author trained data collectors with the use of a coding manual (see Appendix A) 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 before starting. IOA was 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. Agreement on paraeducator and student behavior was 100% across all observations.

Researcher procedural fidelity was assessed for 66% of the trainings provided to the special education teachers (see Appendix B). 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, 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.

**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. Visual analysis of the graphed paraeducator 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 generalization phases after all paraeducators had 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, without children, with their paraeducators. 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. Each of the steps were vocally described and modeled and all questions posed by the teachers were answered.

After all questions had been answered, the researcher engaged in a role-play, with the teacher acting as the student. Then, the researcher modeled all of the steps, and again participants were asked if they had any questions. Then the researcher asked the teacher to role-play with the researcher and gave immediate corrective feedback (when
appropriate). After the teacher had the opportunity to act as the paraeducator delivering OTI and LTM in a role-play situation, she was asked if they had further questions. Researchers recorded each teacher’s performance when engaged in role-play and then asked specifically what steps the teacher felt they completed correctly. Each teacher continued to role-play the skill until she delivered BST training with 100% fidelity and then the training session ended.

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. 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 competition 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. mand modeling, prompting).

Pre-intervention. 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 provided immediate corrective feedback. This feedback occurred an average of 2 times per training. Teachers followed the same format of instruction as was provided to them in the previous phase of this experiment, 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 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. Examples of OTI that were observed during this phase included withholding materials needed to complete an academic task, providing a student with work that was too difficult, and providing a student with an inaccessible item (e.g., bin with a lid that the student could not open). 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.

**Generalization and 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. 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 data were collected for the two boys in the high school (Randal and Jeremy). Generalization data were not taken for John and Josh because the times of day when
Sarah and Madison were assigned to them outside of the intervention setting (i.e., work bins) was during the art period. During art, all students with disabilities were paired with students without disabilities, thus leaving the paraeducators in a passive role. Kathy and Randal as well as Ashley and Jeremy were observed at off-campus work sites.

Social Validity

Researchers inquired about the social significance of the intervention goals, social appropriateness of the intervention procedures, and social importance of the intervention effects (Wolf, 1978) across the student, paraeducator, and teacher (see Appendix H, I, J, and K). Given the complex nature of the disabilities of the students, obtaining their verbal reports was unreliable. Researchers used visual analysis of the student data to make determinations about the efficacy of the intervention. Researchers assessed the verbal reports of the teachers and paraeducators about their opinions via survey. The surveys included standard 4- and 5-point likert-type scales 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 (i.e., paraeducators in the building and one parent of one participant).

Results

A functional relationship was established following a pyramidal training approach using BST with paraeducators. Following a teacher-led training, four paraeducators’ data showed positive effects. It is also important to note that student communication outcomes (i.e., rate of initiating) improved following intervention. Paraeducator fidelity data are
described in the results section, and student rate of communication and paraeducator rate of OTI and LTM are displayed in Figure 2.

**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 teacher-led training, all four paraeducators made substantial improvement. Kathy and Ashley’s fidelity increased to 100%, Sarah to 99.45% (range: 94–100%) and Melissa to 98.7% (range: 93–100%) across intervention sessions. During the maintenance phase, the three paraeducators maintained on average 99.72% (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 student was observed initiating during baseline conditions. Following paraeducator training, each student made gains when initiating.
John’s prompted rate of initiation was an average of .402 (range: .125–.7) per min, independent initiation rate was an average of .067 (range: 0–.22) per min, and his overall initiation rate (prompted and unprompted) was .469 (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 .428 (range: .2–.8) per min, independent rate of initiation was .178 (range: 0–.9) per min, and his overall initiation rate (prompted and unprompted) was .60 (range: .2–1.42) per min.

Randal’s rate of prompted initiation was an average of .173 (range: 0–.45) per min, independent rate of initiation was 1.11 (range: .5–1.8) 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. While in the generalization setting, Randall’s overall rate of initiation was .46 (range: .44–.5) per min.

Jeremy’s rate of prompted initiation was an average of .171 (0-.285) per min, independent rate of initiation was .089 (range: .033–.16) per min, and his overall initiation rate (prompted and unprompted) was .269 (range: .142–.428) 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.
Figure 2. Rate of paraeducator implementation of OTI and LTM procedures are displayed via line graph. Student initiation data are displayed via stacked bar graph. The white portions of the bar indicate rates of independent initiation and dark portions indicate prompted initiation. The stars indicate when data were taken in a generalization setting. Maintenance data were taken between 6 and 12 weeks after intervention.
Social Validity

To measure the social validity of the procedures, researchers surveyed the teacher and paraeducator (see Tables 4 and 5). 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.

Table 4

Social Validity Response Items Rated Across Teachers

<table>
<thead>
<tr>
<th>5-point likert-type questions</th>
<th>Mean response</th>
<th>Range of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>To what degree do you feel that the initial training and role-play for each strategy was effective in helping you to train your paraeducators?</td>
<td>4.66</td>
<td>4–5</td>
</tr>
<tr>
<td>To what degree do you feel that using BST was effective when training your paraeducator?</td>
<td>4.66</td>
<td>4–5</td>
</tr>
<tr>
<td>How likely would you be to use these same training strategies with the same or different paraeducator in the future?</td>
<td>4.66</td>
<td>4–5</td>
</tr>
<tr>
<td>How effective do you believe the training package was for increasing the paraeducator’s use of OTI and LTM prompting?</td>
<td>4.33</td>
<td>3–5</td>
</tr>
<tr>
<td>What is the likelihood that you would recommend this kind of training for your paraeducator to a colleague?</td>
<td>4.33</td>
<td>3–5</td>
</tr>
</tbody>
</table>

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 .611 (range: .14–2.2) per min following intervention. Although the rate of initiating was low, students with disabilities, 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 significant 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 can 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 99.53% during intervention. On average, student initiations went from 0 at baseline to .65 per min following intervention.

Although paraeducators are increasing in their role of 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.
Table 5

*Social Validity Response Items Rated Across Paraeducators*

<table>
<thead>
<tr>
<th>5-point likert-type questions</th>
<th>Mean response</th>
<th>Range of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>To what degree do you feel that the initial training you received was effective in helping you to implement new strategies?</td>
<td>4.66</td>
<td>4–5</td>
</tr>
<tr>
<td>To what degree do you feel that creating opportunities for the student to initiate was effective?</td>
<td>3.75</td>
<td>3–4</td>
</tr>
<tr>
<td>To what degree do you feel that the systematic prompting hierarchy was effective (least to most prompting)?</td>
<td>3.75</td>
<td>3–4</td>
</tr>
<tr>
<td>How likely would you be to use these same strategies with the same student or a different student in the future?</td>
<td>4.5</td>
<td>4–5</td>
</tr>
<tr>
<td>How effective do you believe the training was for increasing the student’s use of AAC device?</td>
<td>3.5</td>
<td>3–4</td>
</tr>
<tr>
<td>What is the likelihood that you would participate in a similar professional development opportunity in the future?</td>
<td>4.25</td>
<td>3–5</td>
</tr>
<tr>
<td>What is the likelihood that you would recommend this kind of professional development opportunity to a colleague?</td>
<td>4.5</td>
<td>3–5</td>
</tr>
</tbody>
</table>

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 (2016),
in lieu of a longer, multi-hour training like previous researchers (Brock et al., in-press). Researchers 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 duration.

Second, paraprofessionals, given brief BST from teachers, can implement simple strategies (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 effectiveness 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, students made great progress. Researchers documented positive staff and student outcomes across settings and time. Two of the 4 students were observed at work sites and 3 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 a work setting.
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 vocabulary and programming new vocabulary. One student (Jeremy) got a new device halfway 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.

There were two limitations to the actual implementation. 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.

**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 cannot 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 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 at promoting effective professional development options to help narrow the gap between research and practice.
Chapter 4: Practitioner Paper

The following chapter is a practical guide directed towards paraeducators and combines the findings from chapters 2 and 3.

Abstract

Manding refers to the verbal operant of requesting. A significant challenge for practitioners working with students who use augmentative and alternative communication (AAC) methods is programming for generalization of communication across people, stimuli, and settings. This paper outlines five strategies that practitioners can use to help students with complex communication needs generalize mands. These strategies are presented as a menu of options from which practitioners can pick and choose, including: (a) introducing natural contingencies, (b) training sufficient exemplars and teaching loosely, (c) using indiscriminable contingencies, (d) programming common stimuli, and (e) contriving a mediating stimulus (Stokes & Baer, 1977). When practitioners plan for generalization of manding, they can select one or more strategies from the menu to encourage their students’ successful generalization of mands.
Five Strategies for Generalizing Mands

Practitioners working with individuals with disabilities often have to decipher what their student wants. “What do you want?,” “Do you want juice?,” “Do you want milk?” are common phrases overheard during snack time when communicating with students with communication difficulties. Students with a variety of disabilities, including autism spectrum disorder, cerebral palsy, Down syndrome, multiple disabilities, and acquired disabilities (e.g., traumatic brain injury) may have complex communication needs. Their speech abilities may range from little to no intelligible speech to some speech, but they are generally unable to rely on vocal speech as a primary means of communication (Drager, Light, & McNaughton, 2010). Oftentimes students with complex communication needs have a narrow mand (i.e., requesting) repertoire ranging from pointing and gesturing to crying or engaging in self-injurious behaviors. Skinner (1975) first defined mands as a verbal operant in which the response is reinforced by a characteristic consequence. Often controlled by motivating operations, manding behavior typically develops in children at a young age. Children may cry when they are hungry or tired, but around 1 to 1.5 years old, children begin to use words to label and request (e.g., “Milk,” or “Mama!”) (Heward, Alber-Morgan, & Konrad, 2016).

For some students with disabilities, practitioners reinforce their use of maladaptive mands (e.g., crying) and naturally, these inappropriate mands increase and may in turn reduce the student’s use of appropriate mands, such as, “Can I have a turn with that toy?” To advance beyond simple one-word requests or maladaptive communication, practitioners must systematically teach new communicative behaviors that are more socially appropriate and more easily understood by unfamiliar listeners.
Inadvertent reinforcement of non-functional communication is particularly concerning for students who use augmentative or alternative communication (AAC) systems. The spontaneous generalization of the inappropriate communicative acts (e.g., self-injury seen across environments) often precedes attempts to encourage the generalization of learned mands. This is perhaps because the response effort to engage in maladaptive mands not only has a rich reinforcement history, but also has a lower response effort than engaging with a possibly new and complex AAC system. For example, if a student with a disability is provided with an icon to use when requesting juice at snack time, this student may continue to point at the juice box rather than using the new icon. Practitioners must carefully arrange the environment so that learners are more likely to use newly taught skills and abandon previously maladaptive mands.

A student’s limited mand repertoire may not always be due to the complexity of their disability, but rather to constraints such as AAC system failure (Light & McNaughton, 2012). The challenge when programming for these students may lie in the complexity of their AAC system, and may range from high technology to no technology. See Figure 3 for a sample of common AAC systems used by students with complex communication needs.

**Terminology and Concepts**

This manuscript will focus specifically on the generalization of mands. Simply defined, generalization is when behavior occurs under different conditions including people, stimuli, settings, as well as over time without the presence of teaching supports in those other conditions.
Generalization of behavior change does not naturally occur on its own; it requires intentional planning on the part of the practitioner (Stokes & Baer, 1977). Mands include any verbal response that results in a predictable consequence. An individual can mand for just about anything, including actions, activities, smells, sights, food, toys, and so on.

A Brief History of Generalization

In 1977, Stokes and Baer challenged what researchers at the time believed to be fact: generalization is a passive process that was a natural outcome of any behavior change process. Discrimination was believed to be the active process by which individuals learned to generalize and when absent, it was thought that the teaching was too tight, too controlled, and did not support any variation of behavior. We now know that in order to expect the successful generalization of a behavior change in most individuals, explicit teaching across settings, people, behaviors, and time are critical. In defiance of this previous assumption about generalization, Stokes and Baer suggested
practitioners consider several different generalization programming techniques to support generalization among individuals with disabilities.

This paper will highlight five strategies to consider when programming for generalization as well as a section dedicated to progress monitoring. This is not meant to be a step-by-step checklist, rather it is intended to provide a menu of strategies that practitioners can select from that will match the needs of their students who use AAC. Each strategy will outline supporting literature and a description of the practice as well as suggestions for implementation.

**Mand Training**

Individuals who possess a labeling repertoire (i.e., tacting) (e.g., “That is a doll”) do not necessarily have that same vocabulary within their mand repertoire (e.g., “I want that doll”) (Skinner, 1957). Knowing the meaning of a word does not always translate directly to the independent use of that same word. Prior to conducting mand training, practitioners should consider what vocabulary students already know or need to be taught prior to expecting independent manding. Although individuals do not necessarily need to know the meaning of a word prior to starting, mand training should extend past, “What do you want” and can include a variety of strategies including incidental teaching.

Individuals may need explicit teaching when labeling the items they want, but this training can be embedded in mand training and does not need to be a stand-alone training. outlines possible communication partners and mand combinations commonly seen across settings.
Table 6

*Communication Combinations*

<table>
<thead>
<tr>
<th>Setting</th>
<th>Communication partners</th>
<th>Possible mands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom</td>
<td>Paraeducators, classmates, parent volunteers</td>
<td>Request to share, request for information or materials (e.g., toys, books, school supplies)</td>
</tr>
<tr>
<td>Office</td>
<td>Principal, office staff</td>
<td>“Can I have more paper for my teacher, please”</td>
</tr>
<tr>
<td>Cafeteria</td>
<td>Cafeteria staff, peers from other classrooms, cafeteria supervision</td>
<td>Request for eating utensil, food choice, more or less of an item, help with carrying</td>
</tr>
<tr>
<td>PE</td>
<td>Gym teacher, peers</td>
<td>Request for a team, help, break</td>
</tr>
<tr>
<td>Extra curricular</td>
<td>Art teacher, computer lab tech, drama teacher</td>
<td>Request for materials, colors, clarification</td>
</tr>
<tr>
<td>Home</td>
<td>Parents, family members, siblings</td>
<td>Request for information, access to items,</td>
</tr>
<tr>
<td>Community</td>
<td>Bus driver, cashier</td>
<td>Directions, change</td>
</tr>
</tbody>
</table>

**Strategy 1: Using Natural Maintaining Contingencies**

This strategy involves introducing the individual to the reinforcing qualities in the natural environment that already exist but are not currently being accessed. For example, by teaching a child to initiate an interaction with a sibling, the natural reinforcement gained from the interaction is hopefully enough to promote the maintenance and generalization of this socialization behavior. These outcomes assume the siblings are able to provide reinforcement by way of returning a communicative interaction. The goal is to transfer the reinforcing qualities of the parent to the sibling, also known as transfer of...
stimulus control. Similarly, a student may display work refusal behaviors but when taught to mand, “help,” they can access support from an adult in the room, effectively allowing them to escape the aversive nature of the difficult work. Unless programmed, an individual may attach this reinforcing relationship to whatever variable is currently maintaining the behavior, likely the adult. Unfortunately, when a behavior consultant enters a classroom, teaches a student a new skill, provides reinforcement for that new skill, and then neglects to transfer that reinforcement to the naturally available reinforcers, such as the teacher or other adults/peers in the classroom, it is unlikely generalization will occur (Freeland & Noell, 2002).

Practitioners should survey the environment for possible communication partners who can act as either direct reinforcement or as a bridge to a reinforcing item. Reinforcement is available beyond the four walls of a classroom or behavior clinic. Peers, siblings, family members, and adults around campus and in the community are all likely agents of reinforcement. They must assess what is already happening between the adults and peers who are successfully manding in the environment. For example, if an individual was taught to mand for lunch in the lunch line, the cafeteria staff could deliver the reinforcement (i.e., food). This would provide the student the opportunity to practice appropriate daily living skills as well as access reinforcement from adults other than their teacher or paraprofessional. Other areas of possible reinforcement for manding might be the recess yard when interacting with peers by asking, “Can I have a turn,” or a sibling in the living room, “Can we change the channel to Disney?”

**Teaching communication partners.** Once communication partners have been identified, practitioners should train these partners to alter the way they react to those
learning to mand by reinforcing the individual. The existing contingencies do not always offer reinforcement for emerging communicators. Pellecchia and Hineline (2007) found while teaching three children with autism to request for items that were visible but out of reach using incidental teaching strategies (i.e., blocking reaching for bubbles and providing a prompt to mand, “Bubbles”), the children spontaneously generalized this skill to their parents but not to their siblings or peers. Following role-play, coaching, and prompting to the new communication partners, the children generalized manding behaviors to parents, siblings, and peers. Siblings and peers required more direct cueing from the instructors when appropriately responding to these children. This is why it is important to teach new communication partners how to provide reinforcement.

**Behavior momentum.** Practitioners can manipulate the environment by contriving ways for students to request highly preferred items at first before moving to other less preferred items. The Picture Exchange Communication System (PECS) is designed to work in precisely this way (Bondy & Frost, 1994). Practitioners begin initial mand training with items that are particularly reinforcing the to individual. After an initial mand repertoire is established, practitioners can then generalize responses across items, space, and communication partners.

A similar concept is called a “behavior trap.” This phenomenon occurs when a newly acquired manding skill opens the door to enticing reinforcement. Very little effort is required to enter the trap and once inside, the reinforcement provided is so rich that often satiation is not observed (Alber & Heward, 1996). A common behavior trap is often seen among children who are taught to say, “more.” After a small bite of food, a parent may withhold the next bite until the child omits the phrase, “more.” The reinforcing
nature of food is so powerful, that children find themselves “trapped” in the reinforcing nature of the experience and will continue to request “more” when being fed. Prior to mand training, an individual may have relied on the offering of that item by another person. Once their newly acquired manding behavior is established, they become “trapped” by the ability to request that item at any time and will likely display this new manding behavior in the future.

Practitioners should take advantage of this by beginning mand training with the most highly reinforcing items. By conducting a preference assessment (e.g., Paired Stimulus, Multiple Stimulus Without Replacement), practitioners can get an accurate picture of what a student finds to be most reinforcing. Although preference assessments are useful for many individuals with disabilities, identifying preferences for those with significant intellectual, developmental, and physical disabilities, and those who have limited communication can present a challenge. Practitioners should assess a student’s preferences so that these preferences can be used as motivational factors throughout the learning process (Cannella-Malone, Sabielny, Jimenez, & Miller, 2013). A student might be less likely to be “trapped” by manding for a pencil to complete an academic task, whereas the student would easily become “trapped” by the reinforcing nature of asking for snacks, a break, or a favorite toy. Similarly, practitioners can set up “traps” in different environments. For example, students can mand for pudding in the cafeteria instead of manding for a napkin (Alber & Heward, 1996).

**Strategy 2: Train Sufficient Exemplars and Teach Loosely**

Stokes and Baer (1977) characterize this strategy as one of the most critical when programming for generalization. When training sufficient exemplars, the practitioner
considers the stimulus and the response. Sufficient stimulus-exemplars might include
who is teaching the individual (e.g., parent, teacher, paraeducator), varying the stimulus
used (e.g., a variety of toy when teaching attributes) or including multiple teaching
settings during initial instruction (e.g., group table, carpet time, recess). Sufficient
response exemplars include teaching a variety of responses within one response class
(e.g., “Hi,” “Hello,” “Hey!”). Although staying within one response class might be the
simple choice, using sufficient stimulus exemplars works best when stimulus and
response class variation are employed. To summarize, if the behavior is going to
generalize across people, places, and time, the behavior needs to be taught across these
variations and diverse responding with each of these changes needs to be taken into
consideration.

When using multiple exemplar training, Marzullo-Kerth, Reeve, and Reeve
(2011) taught four children with autism to share using art materials, snack items, toys,
and gym materials across a variety of activities using video modeling. The children
watched a video of a child playing, and when a second child enters the area, the first child
gave a verbal offer to share. These same strategies used to teach preschool children to
offer to share can be used to teach a child to mand, “Can I play with you,” “Can I have
that toy,” or “Can I have a turn?” When programming for this type of generalization from
the onset of instruction, students are more likely to generalize this skill to untrained
settings/situations (Marzullo-Kerth et al., 2011). Refer to Figure 4 for a flow chart of the
variables to consider and identify when working to identify exemplars.
By teaching students a range of requesting responses, practitioners are expanding the student’s probability of accessing reinforcement. For example, to effectively recruit attention, a student could say “hi,” “hey,” or “what’s up?” Being able to request attention in different ways will more likely keep the peer’s interest and result in a desirable response in return. There are several AAC systems that practitioners can use when promoting the diverse responses of students. ProloQuo2Go includes folders in which a variety of related responses can be programmed. For example, a greeting folder can include options such as “Good morning!” and “How are you?” The Step-by-Step Communicator with Levels is a simple, single-switch system that can be programmed to omit a different message after each activation. For example, a practitioner can program this device to support students when recruiting peers to play with during recess. The student can activate the switch to say “Do you want to play with me?” and when activating it a second time, it may omit, “Do you want to play chase?” or “Do you want to play on the jungle gym with me?”

**Figure 4. Define range of exemplars**

1. Identify **what** you want your student to request.
2. Identify all of the **options** for these times.
3. Identify the **when** and **where** when your student will need to request the item throughout the day.
4. Identify the **modifiers** that could go with those items.
5. Identify **non-examples** you actually have access to but students would not want to request at the moment.
Although it is essential to teach sufficient exemplars, practitioners should introduce new exemplars slowly and one at a time. Introducing too much all at once can backfire and may limit skill acquisition. This is an example of when teaching loosely can be beneficial. Loose teaching encourages a relaxed nature of teaching, disregarding the control over the stimulus and response class, rather promoting variation in a more relaxed way. This includes varying the aspects of the instructional setting that are not directly related to the specific items such as the teaching strategy, physical setting, and instructional staff (Campbell & Stremel-Campbell, 1982). Practitioners should use caution when setting up these supports to vary stimuli slightly to ensure students do not become reliant on arbitrary characteristics. It is particularly important to plan from the very beginning to avoid dependence on a specific communication partner, especially for those students used to working 1:1 with a particular adult. Practitioners should observe for faulty stimulus control. This occurs when a student responds in a certain way because of an environmental condition (Heward, 2003). For example, if the same practitioner at the same table always withholds the pencil, the student may require more glue but will mand, “Can I have a pencil?” given the previous reinforcement history in that context. Although this strategy is called loose, practitioners should not teach in a literally loose way. On the contrary, loose teaching is a systematic process that practitioners use to systematically set up supports.

The nature of research tends to require specific control over independent and dependent variables; therefore, there is limited research on this teaching strategy. However, the intention of purposefully varying and letting go of precision and control has shown to promote the generalization of behaviors successfully. Manipulating the
environment by limiting access to desired items is one way of teaching loosely. By limiting access to preferred or needed items, the child will have to mand for items throughout the day with different communication partners, at different times of the day, and across different parts of the classroom. When using this strategy to teach the generalization of mands, one variable that should stay consistent and unvaried is the communication method or mode the individual is using. This will be discussed further in Strategy Five: Mediating Generalization.

**Strategy 3: Use Indiscriminable Contingencies**

Ideally, practitioners should program their reinforcement to mirror reinforcement that is available in the naturally occurring environment as soon as possible. One method of doing this is to simply provide reinforcement only when a new or different behavior is observed. This includes withholding reinforcement from previously demonstrated skills and only providing reinforcement to new skills. Stokes and Baer (1977) criticize this technique claiming, “generalization [is] an outcome of behavioral change, rather than as a behavior itself” (pp. 363). Practitioners should consider initially providing immediate and dense schedules of reinforcement to establish a strong manding repertoire. When promoting generalization, reinforcement should shift to variable rates and then reinforcement schedules that match the generalized environment where the mands are likely to take place (Cooper, Heron, & Heward, 2007).

**Immediate reinforcement.** At first, when possible, practitioners should immediately reinforce every instance of a newly learned mand. Use caution when employing “end of the day” or “end of the hour” reinforcement strategies. When programming for generalization, at least at the onset, reinforcement needs to be paired
with the desired response in order to increase response rates. When using this reinforcement rate (i.e., FR1), the practitioner should consider limiting the vocabulary to include only what is available to the individual. As the individual makes the connection between the mand and the immediate and consistent reinforcement, the practitioner can consider a variable reinforcement rate (see below) and open up vocabulary access that may not always be available.

**Dense schedule of reinforcement.** Always consider how, when, and how much reinforcement will be provided to the student when he or she is learning new skills. A good rule when teaching manding is to start with a *dense schedule* of reinforcement and gradually move to a more natural schedule (Cooper et al., 2007). Begin by reinforcing the request by providing the requested item immediately. Although practitioners cannot indefinitely give students unlimited access to anything they request, the fastest and most predictable way to establish a quick response is to initially provide reinforcement for each instance of its occurrence (Cooper et al., 2007). Once the individual has been exposed to consistent and dense reinforcement for a mand, delays between the response and the reinforcement can be inserted and the schedule can be adjusted so that not every occurrence of the response is reinforced. Without the initial dense schedule, the mand may never be established and the practitioner will not see progress. Similarly, practitioners may need to resume a dense schedule of reinforcement for the target response when it is to occur in a new setting.

**Varied schedules of reinforcement.** This strategy has proven to be more resistant to extinction than fixed schedules (Cooper et al., 2007). When using indiscriminable contingencies, practitioners do not always provide the manded item. It is
acceptable to inform the student that the requested item is not currently available. Certain foods or play items may only be available during certain parts of the day (e.g., recess equipment only available at recess) and by not always allowing access to a requested item, reinforcement is put on an intermittent schedule. Specific mands are often reinforced in specific settings and when outside of that controlled setting, reinforcement may not be available or immediately available. So, the team needs to contrive indiscriminable sets of contingences so that the individual does not know when she or he will receive reinforcement that promotes the manding behaviors across settings.

**Improvising.** Marckel, Neef, and Ferreri (2006) taught two children with autism to use a picture communication system to solve problems (i.e., improvise) by using various descriptors, such as color and shape, to request desired items when the specific pictures were unavailable. After training on improvising, requesting increased, and these new skills generalized to other items, settings, and listeners in the natural environment. Teaching improvisational skills is critical for students because of the likelihood that they will be presented with a situation where they do not have corresponding vocabulary (e.g., pictures, icons, signs). Generic phrases such as “Help me” or “I want” accompanied by a pointed finger are two options for maintain requesting behaviors when the specific vocabulary is not available to the child.

**Reinforcement schedules.** One strategy to use when encouraging response variability after the individual has learned to mand, is to use a lag schedule of reinforcement, which means a response is only reinforced if it differs from a certain number of preceding responses (Lee, Sturmey, & Fields, 2007). Practitioners can use this strategy when students are learning how to greet others. For example, when saying
“Hello” to the teacher, the student is provided with verbal reinforcement in the form of a return greeting such as, “Oh hi, how are you today?” But if the teacher wants to encourage variability, she can withhold reinforcement until the student uses a difference greeting such as, “Good morning.” Duker and Lent (1991) found that when a teacher stopped responding to high-rate spontaneous gesture requests, individuals with developmental disabilities increased their use of previously taught gesture requests.

One study combined this lag schedule of reinforcement with differential reinforcement (DR) and taught two young boys with autism to vary their responses when asked social questions (Lee, McComas, & Jawor, 2002). If the child made an inappropriate response, the therapist would respond with, “No” and turn away. When teaching students to generalize their responses, practitioners should consider DR paired with a lag reinforcement schedule. Certainly, incorrect or invalid mands by the individual (e.g., “potty”) can be redirected to an appropriate response prior to allowing access to reinforcement. However, by adding a lag schedule and only providing reinforcement to different, albeit previously taught, responses, students are likely to use more vocabulary when manding.

**Strategy 4: Program Common Stimuli**

When programming common stimuli with individuals with complex communication needs, practitioners need to make an effort to make the training environment reflect the generalization environment. This can be accomplished by bringing training stimuli to the generalization setting or by bringing items from the generalization setting into the training setting. One common strategy that employs this method is classroom-based instruction. One example of this is when Petursdottir,
McComas, McMaster, and Horner (2007) used play items in peer-tutoring activities with students with autism. Then, the same items were placed in a social environment during a free-play activity and interactions increased when those common stimuli were present.

An example of using common stimuli when teaching the generalization of mands can occur when bringing items from the generalization setting to the training setting. When students pretend to order a hamburger at McDonalds, asking a familiar adult for a picture of a hamburger in the classroom is quite different from ordering from an unfamiliar adult in the actual restaurant. Teaching students to mand for items with similar features to that of the generalization setting can help them to make requests in a variety of generalized situations. For example, Pol and colleagues (1981) taught three students with multiple disabilities to locate the item they desired on a menu, order, pay, eat, and exit a restaurant by using real-life items in the classroom. Prior to performing the skills in the natural environment (i.e., McDonalds) the students were taught to respond to actual stimuli including menus with pictured items, a counter, a cashier, food, and a line to wait behind. The researchers found that providing similar items from the natural environment in the classroom-teaching environment promoted generalization of taught skills into the natural environment.

**Strategy 5: Mediate Generalization**

An item or a person has to take on a mediation role from the instructional setting to the generalized setting (i.e., mediating stimulus). For students with complex communication needs, the presence of their communication book, switch, or card acts as a natural prompt for them to initiate requests. By providing students with a stimulus like this, practitioners can fade prompts such as “what do you want” to a simple point or a
subtle gesture towards the device. The functionality and portability of a communication system is critical and often requires some creativity to avoid damage or loss. Consider providing a fanny pack or a small purse-like device for use when traveling around campus or a wallet-like device that can be easily accessed.

Contriving a mediating stimulus may be the most important strategy to use when programming for generalization of mands. Individuals without disabilities rely primarily on vocal speech to communicate. Specifically, they speak a given language that is influenced by culture, geography, and age (Heward et al., 2016). People augment their speech with gestures and written language, but those too reflect the environment. The same holds true for students using alternate ways of communicating. A mediating stimulus can act as a cue or prompt to the individual to engage in the mand for a desired item. This can be as simple as a picture or as complex as a high-tech AAC device, and all should represent an individual’s unique language. O’Neill and Sweetland-Baker (2011) used functional communication training to teach a student to use a break card, in an attempt to decrease the student’s use of challenging behavior to escape from a task. When the same stimulus was given to the student in an untrained environment, the student generalized use of the card and the challenging behaviors continued to decrease.

It is critical that the mediating stimulus is the same across new settings, stimuli, and people (Stokes & Osnes, 1989). When a student is presented with a new listener or in a new environment, the card, book, picture, or device should remain constant and should always be available. The device itself can be the prompt for communication regardless of other environmental factors. Earlier, relevant and irrelevant aspects of the teaching environment were mentioned. A mediating stimulus is an example of a relevant stimulus
that should contain little to no variation across generalization opportunities. This is a specific way of making the generalization environment the same as the training environment.

**Progress Monitoring and Maintenance**

Promoting the generalization of manding behavior among students with disabilities occurs across various settings, partners, and stimuli. Given the variability of when and with whom these behaviors may occur, tracking communication can present practitioners with a challenge. Not to mention, individuals are likely to use a wide array of modalities when manding to serve many functions such as wanting attention, seeking a desired item, or expressing desire to escape a situation. Practitioners should consider a simple, easy-to-use data sheet to track newly learned and mastered mands to ensure the student and communication partners are both responding appropriately. See Figure 5 for a possible data sheet that can be used to track manding behaviors.

**Organizing progress monitoring.** When creating a data tracking system, practitioners should consider what the individual is manding, and with whom, where, and with what modality (e.g., no-tech, low-tech, or high-tech). When tracking regular progress of the acquisition and generalization of mands, practitioners can identify potential opportunities (e.g., communication partners under utilized) or identify problem environments (e.g., settings in which mands are not occurring). These data may be shared with members of the family or community to ensure generalization spans beyond the teaching setting (e.g., clinic, school).
Tracking Manding Behavior

<table>
<thead>
<tr>
<th>Mand:</th>
<th>Independence Level (Spontaneous or Prompted)</th>
<th>Mode</th>
<th>Communication Partner</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>I want more</td>
<td>Spontaneous</td>
<td>Single-Switch voice output</td>
<td>Paraeducator, Susan</td>
<td>Classroom, snack time</td>
</tr>
<tr>
<td>Crackers please</td>
<td>Spontaneous</td>
<td>Multi-switch voice output</td>
<td>Paraeducator, Susan</td>
<td>Classroom, snack time</td>
</tr>
<tr>
<td>Will you play with me?</td>
<td>Prompted</td>
<td>Picture icons on lanyard</td>
<td>Peer, Jerry</td>
<td>Recess</td>
</tr>
<tr>
<td>I’m all done</td>
<td>Spontaneous</td>
<td>Single-switch voice output</td>
<td>Paraeducator, Susan</td>
<td>Lunch tables</td>
</tr>
</tbody>
</table>

Figure 5. Sample data sheet for tracking manding behaviors

Conclusion

Communication is a fundamental part of academic and social independence. Students with complex communication needs often rely on the adults around them to facilitate their use of alternate ways of communicating, and their requesting responses are often limited to a handful of phrases such as “no,” “I need a break,” and “more please.” Practitioners must program for generalization of mands for these students prior to beginning mand training to ensure their efforts reach beyond the walls of the instructional setting. By using intentional strategies to promote generalization, students will be more likely to use mands with various people, when presented with various stimuli, and across various settings.
Chapter 5: Discussion

This dissertation opened with an introduction, a rationale for the project, and a roadmap for what would be presented across the chapters. Chapters 2, 3, and 4 included an overview of a viable training methodology to be used with practitioners who support students with disabilities, my own research project investigating these practices, and a practitioner guide that evolved from not only research but also practical experiences I have had as an educator. This chapter will conclude this dissertation and will include information about me, as an educator and as a researcher, how this dissertation was developed, as well as goals for future research that have evolved over the development of this dissertation process.

The Development of This Dissertation

The concept of this dissertation began in the early days of my doctoral program studies. I came to The Ohio State University as a special education classroom teacher hungry for answers about how to improve communication outcomes for students with the most significant disabilities. I began by reviewing the literature on one of the most common communication interventions for students, functional communication training (FCT). After researching this topic with focus only on research that employed the classroom practitioner as the intervention agent, I realized there are more questions than answers surrounding this topic. Following the literature search, I began seeking answers to questions regarding the phenomena I saw when I was a teacher in schools the majority
of kids with significant disabilities were not communicating. I began answering this question by conducting a nationwide survey of special educators and their experience with AAC in the classroom. Then, I engaged 14 of those respondents in a qualitative review of AAC use in the classroom.

I objectively concluded that teachers needed more training and support when using communication supports (e.g., AAC) in their classrooms. I found with additional searches of the literature that when trained, classroom practitioners can effectively use a variety of communication supports with fidelity and as a result, student communication outcomes improve. Although published studies typically included multiple-hour or multiple-day training sessions, I wanted to use a training model that would build capacity and leave teachers with not only additional knowledge about a communication intervention, but the steps in which they should take new information like this and train their paraeducators. This is how I narrowed my intervention to pyramidal training (see Chapter 2).

When deciding what intervention to use when training school-based teams, I reflected back on the descriptive study I conducted where I observed 23 students for an average of six hours each. I found that the majority of students did not independently initiate, nor did the staff members contrive learning opportunities for the students to independently engage. Coined as naturalistic intervention or incidental teaching, opportunities to initiate can be simple by arranging the environment in a way that would require someone to ask for assistance (Kossyvaki, Jones, & Guldberg, 2014). This seemingly simple intervention was absent from the approximately 160 observed hours
across four buildings of special education practitioners. This, naturally, became the focus of my intervention for this dissertation.

Throughout my time at Ohio State, I have also had the opportunity to engage in several single-case design studies measuring the effects of training on practitioner’s behavior. In each study, the research team used components of behavioral skills training (BST) (i.e., modeling, role play, feedback) (Parsons, Rollyson, & Reid, 2012). The success practitioners had after engaging in quality training encouraged me, but I worried about the applicability of this type of training when working with school-based teams.

One characteristic of the training I wanted to use in my dissertation was “brief.” I was advised by Dr. Reid, a leading researcher and arguably the developer of the concept of BST, to keep training brief and to the point (D. Reid personal communication, February 4, 2016). As a special educator, I understood the value in that advice because simply, we didn’t have time for training.

The idea of my dissertation may have started a decade ago as a teacher struggling with kids who did not communicate and a staff of individuals who did not have the skill set to fix the problem. Chapter 4 of this dissertation seemed obvious given my past as an educator. I included a practitioner guide surrounding the generalized use of the communication skill, manding (i.e., requesting). Although staff and students both made progress in my research study, generalizing the skill to other areas, with other people, or with stimuli outside of an academic setting, did not come easily for all of the practitioners in my study. This guide will help practitioners program for generalization from the onset of a communication intervention rather than as an afterthought.
Research Aims

Upon the completion of this dissertation, I found myself with three looming questions. First, what is the most effective way of preparing pre-service teachers to effectively support the communication needs of children with communication needs? What I found following the completion of my dissertation was that practitioners in the classroom did not have basic knowledge needed to implement interventions with their students who use alternate ways of communicating. To proactively address this issue before practitioners enter the K-12 classroom, I would like to manipulate a few in-class variables in the university setting to make these knowledge-level pieces more potent to practitioners. One way of doing this might be to find a way to use assessment tools (e.g., quizzes, tests) and study incentives in such a way that motivates students to dedicate quality effort to out-of-class assignments. Additionally, once students have acquired the basic knowledge on a topic, I would like to investigate ways of increasing performance in the classroom by engaging students with behavioral skills teaching (BST). I hope to make the learning experience in the university classroom more valuable and meaningful for practitioners so they maintain their skills when entering the classroom.

Second, do teaching methods need to change when in-service teachers are seeking a higher degree, or, if students are online vs. in-person? Several university programs offer master-level degrees for in-service teachers. Professors have an opportunity when teachers return to increase their knowledge on evidence-based practices as well as correct any misconceptions teachers have developed as a result of a lack of regular, in-service training. For example, some participants from my dissertation were unaware of their role in the student’s communication throughout the day. There are some misperceptions about
the speech-language pathologist as the “only” IEP team member who has to work with students and their AAC devices. I would like to investigate what adjustments to quality, university teaching needs to be made when students are seeking a higher degree. Along those same lines, I would like to investigate what best practice teaching strategies can be used when engaging students in online learning. BST is not always a viable option when there are large classes or online content, so I would like to investigate ways of making this work.

Third, when training practitioners in K-12 classrooms, how can I ensure my training will maintain after the termination of my presence as a researcher/consultant? During data collection of my dissertation, I was able to deduce that staff were reacting to my presence and their students were not regularly being exposed to the intervention when I was not there. Although the practitioner rate and fidelity of implementation remained high after the termination of the feedback phase, I would like to adjust my training and follow-up procedures to ensure students continue to benefit upon the termination of a researcher’s presence. I would like to investigate and develop a cost effective and efficient way of training school-based staff to implement interventions for students with disabilities by addressing concerns around the maintained and generalized use of the newly learned behavior among staff. As AAC is being more widely accepted as an evidence-based practice, and the most effective accommodation for students with communication disorders, there are a growing number of students and school teams that need training, intervention, and ongoing support.
Career Goals

My experiences as a classroom-teacher, a graduate student, and most recently as a professor of pre-service teachers, have helped me realize that the problems we face as educators do not exist because a lack of passion or drive. Problems exist because of a lack of time, lack of training and support, and a lack of connection from published research to the day-to-day special education classrooms. My goal as an educator, as I complete this doctoral degree and dissertation, is to always provide effective classroom instruction, ensure that my students are exposed to quality fieldwork experiences, and provide support through service to my students. My goal as a researcher will be to continue to seek the best way to prepare pre-service and in-service teachers to meet all of the needs of students with significant disabilities. Until all students with disabilities have access to adequate means of communication, I will keep working.

Conclusion

I have always been a passionate advocate for children with significant disabilities. As an educator, it is my responsibility to ensure that every child’s right to communicate is realized. I have worked with parents, school teams, and administrators for over a decade to promote teaching strategies and supports that promote independence, social relationships, academic access, and overall positive outcomes for students. Since entering my doctoral program, my drive has not slowed, it has simply changed to include advocacy through teacher-prep and research. My goal is to be a successful faculty member at a university that promotes learning, scholarly activity, and most importantly, service to the field. I look forward to the future as I continue to advocate and contribute to the body of knowledge about communication access for students with disabilities.
References

References marked with an asterisk (*) indicate studies included in the analysis in Chapter 2.


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Drager, K., Light, J., & McNaughton, D. (2010). Effects of AAC interventions on communication and language for young children with complex communication


Every Student Succeeds Act of 2015, P.L. 114-95


doi:10.1177/001440290507100203


doi:10.1080/07434610500483588


doi:10.3109/07434618.2014.885080


Appendix A: Coding Manual
Communication Partner

Adult:
1. Classroom teacher (special education or general education)
2. Adult holding role of teacher in the room (art teacher, computer lab teacher, for example)
3. Adult staff member assigned to work with student
4. Support staff assigned to a give area (recess/lunch setting)
5. Administrator or school staff member not directly related to supporting student present in the area of the student

Peer: Student
*Note if peer has a disability

Student Behavior

Student initiation: Any use of spontaneous natural speech, gesture, or AAC device supported directed toward a person.

- Each student’s data sheet will be different based on an interview with the teacher. The three most commonly used communication modes will be listed on each sheet for each student.
- If the student attempts to communicate with more than one modality, check the modality that was used first and also mode used during subsequent attempts.
- If student repeats the same phrase/word more than once within 5 seconds, count response as 1.

1. Natural speech
   a. Student uses natural, vocal speech to initiate
   b. Examples may include a verbal, “I want cookie” or “cookie”

2. Use of designated AAC device
   a. Aided or unaided devices may include speech generating devices (SGD) or low-tech devices including pictures without a speech-generating component.
   b. Examples may include student activating device to produce an audible response, “I want cookie” or a student pointing to/or handing over a picture to the intended audience “cookie”

Non-Examples of student initiation:

- Any communicative attempt that is clearly not directed towards someone else (repeated word “beach, beach”)
- Laughing
- Student responds to a question such as “what color are you wearing?”

**Recording any time the student initiates with a timestamp of when the behavior occurred; rate data will be taken calculating the number of attempts for the duration of the session
- Record each initiation as one unless the same behavior occurs within 5-seconds.
• All initiation attempts are recorded (e.g., physically prompted), but are noted as being prompted with a “P.”

Adult Behavior

Opportunities to Initiate: Violating the child’s expectations to provoke the student’s need for communication, or withholding materials so that a child must initiate a request. This means the behavior of the communication partner clearly deviates from what would be anticipated in an activity or routine including providing incorrect or partial materials, withholding access to materials required for an activity, not initiating an expected routine, or not following a schedule. Withholding materials involves communication partner holding, positioning, or hiding desired or required materials in a way that child must initiate a request to obtain materials.

Eight possible examples:
1. Offering choices (e.g., The adult gave a choice of activity or food without any verbal prompt; the adult might have held out two objects for the child to choose or provided the child with a photo choice board)
2. Stopping part-way (e.g., The adult stopped part-way through a child’s favorite activity, when it was in its peak)
3. Giving small portions of food or drink (e.g., The adult gave the child small portions of food or drink so that the child could ask for more)
4. Making items inaccessible (e.g., The adult put items in sight but out of reach so that the child needed to ask for them)
5. Giving the child materials they will need help with (e.g., The adult gave the child materials they could not make them work without the adult’s help. For example, wind-up toys, toys in containers, etc.)
6. Sabotaging the child’s expectations (e.g., The adult did something out of routine or unexpected)
7. Giving the child non-preferred items (e.g., The adult gave the child items they were not interested in to elicit protest or comment)
8. ‘Forgetting’ something vital (e.g., The adult set up a situation where they did not do something of vital importance; this could be to give the child paper without crayons in coloring time or putting on child only one shoe)

Possible Non-Examples:
1. Asking the student a question
2. Making a general statement about the child’s clothing, mood, snack, etc.
3. Asking what do you want? (While withholding a desired item)

Systematic Prompting: Following an opportunity to initiate, a systematic prompting hierarchy should be followed. A least-to-most hierarchy of assistance that consists of an initial 5-second delay, where no assistance is given. Any communicative attempts are to be reinforced with specific praise. If no response is made after the allotted time, then a progressive system of assistance is to be used (e.g., gestural verbal, model, physical). The
first level should not be full physical and the next two levels are more intensive than the last. The highest level of assistance should ensure that the learner responds correctly. When the adult engages the behaviors below in the order specified, throughout the time interval, a check mark with a timestamp will represent correct implementation of the skill. If a step is not followed, then no subsequent steps can be coded unless the adult professional moves on to targeting a different response and the correct sequence is followed.

1. **Initial response interval.** After providing an opportunity to initiate (see eight definitions above), the adult pauses no less than 5 seconds and no more than 10 seconds to allow the child time response.
   a. **Reinforcement.** After a correct child response adult professional praises child and specifically states what the child did and provides access to the item.
      i. If the child responds before 5 seconds, and the adult provides immediate reinforcement, then the adult correctly followed this step.
      ii. If the child provides no response then the adult provides a prompt between 5 - 10 seconds, then the adult followed this step correctly.
      iii. If the child provides an incorrect response then the adult can immediately deliver a prompt.

2. **Gestural Prompt.** After a response interval in which the child does not provide a correct response, then adult provides a gestural prompt to help child provide a correct response. For example: The adult professional points towards the specific icon that the student needs to activate on a device.
   a. **Specific praise.** After a correct child response adult professional praises child and specifically states what the child did and provides access to the item. Any communicative attempt/response is praised no matter if it is correct or incorrect.
   b. **Subsequent response interval.** After a gestural prompt the adult professional pauses up to 3-5 seconds to allow for a child response. If the child responds before 3-5 seconds, then the adult professional correctly followed this step. If the child provides no response then the adult professional provides a prompt after 3 seconds but before 5 seconds, then the adult professional followed this step correctly. If the child provides an incorrect response then the adult professional can immediately deliver a prompt.

3. **Model Prompt.** After a gestural prompt and response interval and an incorrect response, then adult provides a model prompt to help child provide a correct response. For example: The adult professional models on the AAC system exactly how the student needs to completely initiate with the device.
   a. **Specific praise.** After a correct child response adult professional praises child and specifically states what the child did and provides access to the item. Any communicative attempt/response is praised no matter if it is correct or incorrect.
b. **Subsequent response interval.** After a model prompt the adult professional pauses up to 3-5 seconds to allow for a child response. If the child responds before 3-5 seconds, then the adult professional correctly followed this step. If the child provides no response then the adult professional provides a prompt after 3 seconds but before 5 seconds, then the adult professional followed this step correctly.

c. If the child provides an incorrect response then the adult professional can immediately deliver a prompt.

4. **Full Physical Prompt.** After a model prompt and response interval and an incorrect response, then adult professional provides a hand over hand prompt to help child provide a correct response. The adult professional physically guides the child’s hand towards the device.

   a. **Specific praise.** After a correct child response adult professional praises child and specifically states what the child did and provides access to the item.

**Examples:**

   1. Adult withheld a fork and hands the child their lunch. The adult waits for the allotted time, student says fork, and adult says, “Fork! You want a fork” and then immediately provides the fork to the student.

   2. Adult waits allotted time, no student response, adult verbally prompts student to correct response, student still does not respond correctly, adult provides a gestural prompt towards the button on the device, student provides correct response, adult uses verbal descriptive praise and provides immediate reinforcement with access to item.

**Non-Examples:**

   1. Adult uses hand over hand prompting to guide student’s hand a response on the device initially

   2. Adult provides prompt before allotted time

   3. Adult provides a less intrusive prompt after a more intrusive prompt (e.g., physical then verbal)

   4. Adult provides verbal and gestural prompt at the same time
Appendix B: Researcher Fidelity Checklist When Observing Paraeducator Training
<table>
<thead>
<tr>
<th>Step</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1: Researcher provides all needed materials</td>
<td></td>
</tr>
<tr>
<td>Step 2: Researcher observes the training session</td>
<td></td>
</tr>
<tr>
<td>Step 3: Researcher corrects teacher if teacher makes errors</td>
<td></td>
</tr>
<tr>
<td>Step 4: Researcher does not provide additional support</td>
<td></td>
</tr>
</tbody>
</table>
Appendix C: Steps for Implementing OTI and LTM
OTI:

<table>
<thead>
<tr>
<th>Step 1:</th>
<th>Set up the environment (see options listed above)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 2:</td>
<td>Gain learner’s attention (with verbal or non-verbal means)</td>
</tr>
<tr>
<td>Step 3:</td>
<td>Stay close (within a few feet of the student)</td>
</tr>
</tbody>
</table>

Wait 5-10 seconds, move to LTM:

<table>
<thead>
<tr>
<th>Correct response:</th>
<th>Incorrect response:</th>
<th>No response from previous step:</th>
</tr>
</thead>
<tbody>
<tr>
<td>provide praise, specifically state what the child did, and provides access to the item.</td>
<td>immediately deliver next prompt.</td>
<td>Wait 3-5 seconds, deliver next prompt</td>
</tr>
</tbody>
</table>

Deliver **gestural prompt**

<table>
<thead>
<tr>
<th>Correct response:</th>
<th>Incorrect response:</th>
<th>No response from previous step:</th>
</tr>
</thead>
<tbody>
<tr>
<td>provide praise, specifically state what the child did, and provides access to the item.</td>
<td>immediately deliver next prompt.</td>
<td>Wait 3-5 seconds, deliver next prompt</td>
</tr>
</tbody>
</table>

Deliver a **model prompt**

<table>
<thead>
<tr>
<th>Correct response:</th>
<th>Incorrect response:</th>
<th>No response from previous step:</th>
</tr>
</thead>
<tbody>
<tr>
<td>provide praise, specifically state what the child did, and provides access to the item.</td>
<td>immediately deliver next prompt.</td>
<td>Wait 3-5 seconds, deliver next prompt</td>
</tr>
</tbody>
</table>

**Physically guide** student to respond

<table>
<thead>
<tr>
<th>Correct response:</th>
<th>Incorrect response:</th>
<th>No response from previous step:</th>
</tr>
</thead>
<tbody>
<tr>
<td>provide praise, specifically state what the child did, and provides access to the item.</td>
<td>immediately deliver next prompt.</td>
<td>Wait 3-5 seconds, deliver next prompt</td>
</tr>
</tbody>
</table>
Appendix D: Researcher/Teacher Treatment Integrity Checklists:

Using BST to Teach Educators OTI/LTM
### Steps for Implementing OTI

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Provide rationale for OTI/LTM</td>
</tr>
<tr>
<td>2</td>
<td>Provide trainee with written summary of OTI / LTM steps</td>
</tr>
<tr>
<td>3</td>
<td>Vocally describe steps of OTI / LTM</td>
</tr>
<tr>
<td>4</td>
<td>Demonstrate or Model OTI /LTM</td>
</tr>
<tr>
<td>5</td>
<td>Have trainee practice performing OTI / LTM (Provides participant with all needed materials)</td>
</tr>
<tr>
<td>6</td>
<td>Monitor participant during practice</td>
</tr>
<tr>
<td>7</td>
<td>Provide supportive and corrective feedback (the latter if applicable).</td>
</tr>
<tr>
<td>8</td>
<td>Ask participant to list 2 possible settings/opportunities to present an OTI / LTM with a student</td>
</tr>
<tr>
<td>9</td>
<td>Repeat Steps 5, 6, and 7 until trainee can perform the skill with 100% accuracy</td>
</tr>
<tr>
<td>10</td>
<td>Provide opportunity to ask questions and answer any questions asked.</td>
</tr>
</tbody>
</table>

Repeat steps if necessary:

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Have trainee practice performing OTI / LTM (Provides participant with all needed materials)</td>
</tr>
<tr>
<td>6</td>
<td>Monitor participant during practice</td>
</tr>
<tr>
<td>7</td>
<td>Provide supportive and corrective feedback (the latter if applicable).</td>
</tr>
</tbody>
</table>
Appendix E: Task Analysis for Paraeducator Training by Teacher
<table>
<thead>
<tr>
<th>Steps for Implementing OTI</th>
<th>Check box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1: Provide <strong>rationale</strong> for OTI/LTM</td>
<td></td>
</tr>
<tr>
<td>Step 2: Provide para with <strong>written summary</strong> of OTI / LTM steps</td>
<td></td>
</tr>
<tr>
<td>Step 3: Vocally <strong>describe</strong> steps of OTI / LTM</td>
<td></td>
</tr>
<tr>
<td>Step 4: <strong>Demonstrate</strong> or Model OTI /LTM</td>
<td></td>
</tr>
<tr>
<td>Step 5: Have Paraeducator <strong>practice</strong> performing OTI / LTM (Provides participant with all needed materials)</td>
<td></td>
</tr>
<tr>
<td>Step 6: <strong>Monitor</strong> participant during practice</td>
<td></td>
</tr>
<tr>
<td>Step 7: Provide <strong>feedback</strong> supportive and corrective (the latter if applicable).</td>
<td></td>
</tr>
<tr>
<td>Step 8: Ask paraeducator to list <strong>2 possible settings</strong>/opportunities to present an OTI / LTM with the student</td>
<td></td>
</tr>
<tr>
<td>Step 9: <strong>Repeat</strong> Steps 5, 6, and 7 until trainee can perform the skill with 100% accuracy</td>
<td></td>
</tr>
<tr>
<td>Step 10: Provide opportunity to ask <strong>questions</strong> and answer any questions asked.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix F: Training Handout for Teacher and Paraprofessional
Opportunities to Initiate:

An essential component of communication is initiating a communicative response. As children learn language skills, they learn that initiating communication towards others will likely produce a response. Initiation is used to express opinions, wants, and needs; skills necessary for one to self-advocate. Since many students with disabilities struggle to initiate a communicative response, alternative forms of communication that is less desirable, are likely to occur (e.g., crying, aggression). Therefore, teaching students how to appropriately initiate will help decrease their problem behaviors, increase their self-advocacy, and increase their quality of life.

How to use it

- Teachers can set up the environment in ways to increase student’s initiation of communication. One can “violate the child’s expectations” by withholding materials, providing incorrect or partial materials, denying access to materials, not initiating an expected routine, or not following a schedule.

What this might look like in the classroom

- Withholding a desired item (out of reach or in one's hands)
- Presenting a container that they will need help opening
- Handing the child a fake cookie instead of their real one
- Giving the student only a few goldfish crackers and wait for them to ask for more

<table>
<thead>
<tr>
<th>Steps for Implementing OTI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
</tr>
<tr>
<td></td>
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<tr>
<td><strong>Step 2</strong></td>
</tr>
<tr>
<td><strong>Step 3</strong></td>
</tr>
<tr>
<td><strong>Step 5</strong></td>
</tr>
</tbody>
</table>
Least to Most Prompting

A prompting hierarchy can be used to increase the success of a target behavior(s). Research has shown that using a systematic approach to teaching can increase skill acquisition. Specifically related to communication, using a prompting hierarchy will increase successful responses by reinforcing (e.g., praise) appropriate communication, increase independence by allowing time for independent responses, and provide systematic corrective feedback to teach the student how to emit and appropriate response.

How to use it

● Use a least-to-most hierarchy of assistance that consists of an initial 5-10 second delay, where no assistance is given.
● Any communicative attempts are to be reinforced with specific praise and then directed to use AAC device.
● If no response is made after the allotted time, then a progressive system of assistance is to be used (e.g., gestural, model, physical).
● The highest level of assistance should ensure that the learner responds correctly.

What this might look like in the classroom

● Teacher waits for the allotted time, student says “hello”, and adult says, “Hi! Thank you for saying hello to me.”
● Teacher holds up a choice between two different snack items (without words), waits the allotted time, student does not respond, so the teacher gestures to the device. If the student does not respond after 3-5 seconds the teacher will model “I want cracker” on the student’s device. If the student still does not respond, teacher physically prompts them to make a selection “I want cracker” and then praises them for answering. “I like how you made a choice. Here are the crackers.
<table>
<thead>
<tr>
<th>LTM: (you have waited 5-10 seconds)</th>
<th>Correct response: provide praise, specifically state what the child did, and provides access to the item. (DONE)</th>
<th>Incorrect response: immediately deliver next prompt.</th>
<th>No response from previous step: Wait 3-5 seconds, deliver next prompt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deliver gestural prompt</td>
<td>Correct response: provide praise, specifically state what the child did, and provides access to the item. (DONE)</td>
<td>Incorrect response: immediately deliver next prompt.</td>
<td>No response from previous step: Wait 3-5 seconds, deliver next prompt</td>
</tr>
<tr>
<td>Deliver a model prompt</td>
<td>Correct response: provide praise, specifically state what the child did, and provides access to the item. (DONE)</td>
<td>Incorrect response: immediately deliver next prompt.</td>
<td>No response from previous step: Wait 3-5 seconds, deliver next prompt</td>
</tr>
<tr>
<td>Physically guide student to respond</td>
<td>Correct response: provide praise, specifically state what the child did, and provides access to the item. (DONE)</td>
<td>Incorrect response: immediately deliver next prompt.</td>
<td>No response from previous step: Wait 3-5 seconds, deliver next prompt</td>
</tr>
</tbody>
</table>

**Complete Steps**

<table>
<thead>
<tr>
<th>OTI:</th>
<th></th>
</tr>
</thead>
</table>
| **Step 1** | Set up the environment to encourage learners to request assistance or materials using one or more (Pick one):  
Offer choices  
Stopping part way  
Give small amount of food/drink  
Making items inaccessible  
Giving the child materials they will need help with  
Sabotaging the child’s expectations  
Giving the child non-preferred items  
Forgetting something vital |
<p>| <strong>Step 2</strong> | Gain learner’s attention (with verbal or non-verbal means) |
| <strong>Step 3</strong> | Establish appropriate proximity (less than one yard, can touch) |
| <strong>Step 5</strong> | Wait for initiation (wait minimum 5 seconds but no more than 10 seconds) |</p>
<table>
<thead>
<tr>
<th>LTM: (you have waited 5-10 seconds)</th>
<th>Correct response: provide praise, specifically state what the child did, and provides access to the item. (DONE)</th>
<th>Incorrect response: immediately deliver next prompt.</th>
<th>No response from previous step: Wait 3-5 seconds, deliver next prompt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deliver <em>gestural prompt</em></td>
<td>Correct response: provide praise, specifically state what the child did, and provides access to the item. (DONE)</td>
<td>Incorrect response: immediately deliver next prompt.</td>
<td>No response from previous step: Wait 3-5 seconds, deliver next prompt</td>
</tr>
<tr>
<td>Deliver a <em>model prompt</em></td>
<td>Correct response: provide praise, specifically state what the child did, and provides access to the item. (DONE)</td>
<td>Incorrect response: immediately deliver next prompt.</td>
<td>No response from previous step: Wait 3-5 seconds, deliver next prompt</td>
</tr>
<tr>
<td><em>Physically guide</em> student to respond</td>
<td>Correct response: provide praise, specifically state what the child did, and provides access to the item. (DONE)</td>
<td>Incorrect response: immediately deliver next prompt.</td>
<td>No response from previous step: Wait 3-5 seconds, deliver next prompt</td>
</tr>
</tbody>
</table>
Appendix G: Data Sheet
Date/Time: Data Collector: Page ___ of ____

<table>
<thead>
<tr>
<th>Student:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Para Educator:</td>
<td></td>
</tr>
<tr>
<td>Partner</td>
<td>Adult</td>
</tr>
<tr>
<td>Setting</td>
<td>SPED</td>
</tr>
<tr>
<td>Arms reach?</td>
<td>Yes</td>
</tr>
<tr>
<td>Mode</td>
<td>AAC Device</td>
</tr>
<tr>
<td>Student Response:</td>
<td></td>
</tr>
</tbody>
</table>

Steps for Implementing OTI

<table>
<thead>
<tr>
<th>Step</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Set up the environment to encourage learners to request assistance or materials using one or more</td>
</tr>
<tr>
<td>Step 2</td>
<td>Gain learner’s attention (with verbal or non-verbal means)</td>
</tr>
<tr>
<td>Step 3</td>
<td>Establish appropriate proximity (less than one yard, can touch)</td>
</tr>
<tr>
<td>Step 4</td>
<td>Wait for initiation (wait minimum 5 seconds but no more than 10 seconds)</td>
</tr>
</tbody>
</table>

Steps for Implementing LTM

<table>
<thead>
<tr>
<th>Step</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>After providing an OTI, the adult pauses no less than 5 to 10 seconds.</td>
</tr>
</tbody>
</table>
| Step 2 | **Correct response:** provide praises, specifically state what the child did, and provides access to the item.  
**Incorrect response:** then the adult immediately delivers a prompt. |
| Step 3 | **No response from previous step:** adult waits between 3-5 seconds then delivers gestural model. |
| Step 4 | **Correct response:** provide praises, specifically state what the child did, and provides access to the item.  
**Incorrect response:** then the adult immediately delivers a prompt. |
| Step 5 | **No response from previous step:** adult waits 3-5 seconds then delivers a model prompt. |
| Step 6 | **Correct response:** provide praises, specifically state what the child did, and provides access to the item.  
**Incorrect response:** then the adult immediately delivers a prompt. |
| Step 7 | **No response from previous step:** adult waits 3-5 seconds then physically guides the child’s hand towards the device. |

Step 8 | Adult provide praises, specifically state what the child did, and provides access to the item |

Totals

119
Appendix H: Social Validity Interview: Before Intervention, Teacher
1. To what degree do you feel comfortable providing training to the paraeducator(s) in your classroom?
   1 = Not Comfortable at All
   2 = Not Very Comfortable
   3 = Somewhat Comfortable
   4 = Quite Comfortable
   5 = Very Comfortable

   And what training do you provide to your paraeducators?

2. To what degree do you feel that the training you received in the past was effective in helping you to teach new strategies to your paraeducators? (circle a choice below)
   1 = Not Effective at All
   2 = Not Very Effective
   3 = Somewhat Effective
   4 = Quite Effective

3. How effective are you at providing students opportunities to initiate?
   1 = Not Effective at All
   2 = Not Very Effective
   3 = Somewhat Effective
   4 = Quite Effective

4. How effective are you at prompting students using least to most prompting?
   1 = Not Effective at All
   2 = Not Very Effective
   3 = Somewhat Effective
   4 = Quite Effective

5. How often do you train your paraeducators now?
   a. _________ times per year

6. Do you feel prepared to provide training to your paraeducators?
Appendix I: Social Validity Interview: Before Intervention, Paraeducator
1. How often do you receive training from your school or teacher?
   a. __________ times per Week / Month / Year (Circle one)
2. How much training do you receive per year? __________
   a. Who provides that training?
3. How effective are you at providing students opportunities to initiate?
   1 = Not Effective at All
   2 = Not Very Effective
   3 = Somewhat Effective
   4 = Quite Effective
4. How effective are you at prompting students using least to most prompting?
   1 = Not Effective at All
   2 = Not Very Effective
   3 = Somewhat Effective
   4 = Quite Effective
Appendix J: Social Validity Interview: After Intervention, Teacher
1. To what degree do you feel that the initial training and role play for each strategy was effective in helping you to implement the new strategy? (circle a choice below)
   1 = Not Effective at All
   2 = Not Very Effective
   3 = Somewhat Effective
   4 = Quite Effective
   5 = Very Effective

2. To what degree do you feel that the training you received was effective in helping you to implement new strategies? (circle a choice below)
   1 = Not Effective at All
   2 = Not Very Effective
   3 = Somewhat Effective
   4 = Quite Effective
   5 = Very Effective

3. Was there anything in particular that you liked about the training package?

4. Was there anything that you did not like about the training package? Or something that you think would be helpful for us to know in the future as we design trainings for other teachers?

5. To what degree do you feel that using BST was effective when training your paraeducator? (circle a choice below)
   1 = Not Effective at All
   2 = Not Very Effective
   3 = Somewhat Effective
   4 = Quite Effective
   5 = Very Effective

6. How likely would you be to use these same training strategies with the same or different paraeducator in the future?
   1 = Not at All Likely
   2 = Not Very Likely
   3 = Somewhat Likely
   4 = Quite Likely
   5 = Very Likely

7. Was there anything about the instructional strategies you used with the paraeducator that you did not like? Or something you think would be helpful for us to know in the future as we design instructional plans for other teachers?

8. How effective do you believe the training package was for increasing the paraeducator’s use of OTI and LTM prompting?
   1 = Not Effective at All
   2 = Not Very Effective
   3 = Somewhat Effective
   4 = Quite Effective

125
5 = Very Effective
9. What is the likelihood that you would recommend this kind of training for your paraeducator to a colleague? (circle a choice below)
   1 = Not at All Likely
   2 = Not Very Likely
   3 = Somewhat Likely
   4 = Quite Likely
   5 = Very Likely
Appendix K: Social Validity Interview: After Intervention, Paraeducator
1. To what degree do you feel that the initial training and role play for each strategy was effective in helping you to implement the new strategy? (circle a choice below)
   1 = Not Effective at All
   2 = Not Very Effective
   3 = Somewhat Effective
   4 = Quite Effective
   5 = Very Effective

2. To what degree do you feel that the training you received was effective in helping you to implement new strategies? (circle a choice below)
   1 = Not Effective at All
   2 = Not Very Effective
   3 = Somewhat Effective
   4 = Quite Effective
   5 = Very Effective

3. Was there anything in particular that you liked about the training package?

4. Was there anything that you did not like about the training package? Or something that you think would be helpful for us to know in the future as we design trainings for other teachers?

5. To what degree do you feel that creating opportunities for the student to initiate was effective? (circle a choice below)
   1 = Not Effective at All
   2 = Not Very Effective
   3 = Somewhat Effective
   4 = Quite Effective
   5 = Very Effective

6. To what degree do you feel that the systematic prompting hierarchy was effective? (circle a choice below)
   1 = Not Effective at All
   2 = Not Very Effective
   3 = Somewhat Effective
   4 = Quite Effective
   5 = Very Effective

7. How likely would you be to use these same strategies with the same student or a different student in the future?
   1 = Not at All Likely
   2 = Not Very Likely
   3 = Somewhat Likely
   4 = Quite Likely
   5 = Very Likely

8. Was there anything about the instructional strategies you used with the student that you did not like? Or something you think would be helpful for us to know in the future as we design instructional plans for other teachers?
9. How effective do you believe the training package was for increasing the student's use of AAC device?
   1 = Not Effective at All
   2 = Not Very Effective
   3 = Somewhat Effective
   4 = Quite Effective
   5 = Very Effective

10. What is the likelihood that you would participate in a similar professional development opportunity in the future? (circle a choice below)
    1 = Not at All Likely
    2 = Not Very Likely
    3 = Somewhat Likely
    4 = Quite Likely
    5 = Very Likely

11. What is the likelihood that you would recommend this kind of professional development opportunity to a colleague? (circle a choice below)
    1 = Not at All Likely
    2 = Not Very Likely
    3 = Somewhat Likely
    4 = Quite Likely
    5 = Very Likely