Generalized Effects of Paraeducator-Implemented Least-to-Most Prompting Procedures

THESIS

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Abstract

Although there is a body of published research examining the effects of paraeducator-implemented interventions with students with disabilities, few researchers have systematically measured the generalized effects of these interventions. In the current study, I used a multiple probe across participants design to measure the generalized effectiveness of the implementation of least-to-most (LTM) prompting with a time delay. I used behavioral skills training to train paraeducators to use least-to-most prompting with a time delay with a specific task with a specific student. Then, I asked the paraeducators to implement the same intervention with either a novel task with the same student or the same task with a novel student. Results indicate the paraeducators increased their implementation fidelity following behavior skills training. Factors to consider when training school staff to generalize tasks will be discussed.
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Chapter 1

Introduction

The Center for Disease Control and Prevention (2016) estimated that 1 in 68 individuals has a diagnosis of autism spectrum disorder (ASD). This was a dramatic increase from 2009, when the prevalence of autism was 1 in 110 individuals (Jensen & Spannagel, 2011). People with ASD share several commonalities including social deficits, difficulties communicating, and repetitive behaviors (Nicholas et al., 2008). The similarities and differences between people with ASD, from mildly to severely impacted, represent the spectrum (Jensen & Spannagel, 2011). Interventions have been put into place by researchers and educators to help people with ASD improve social, communicative, and behavior deficits and also decrease challenging behavior.

According to Stichter, Tillman, and Jimerson (2016), the number of students eligible for autism services rose from 5,413 in 1991 to 370,011 students in the 2010. Due to this increase, those who work with students with ASD are becoming even more important. Many instructional tasks are left to paraeducators, who largely outnumber special education teachers (U.S. Department of Education, 2017). Paraeducators are expected to deliver one-on-one instruction, small group instruction, attend IEP meetings, produce instructional materials, and collect data (Britton, Collins, Jones, Ault, & Bausch, 2017; Carnahan, Williamson, Clarke, & Sorensen, 2009). Despite these responsibilities, some paraeducators are not provided with the proper training needed to complete the tasks efficiently and effectively (Britton et al., 2017). Although many paraeducators have proper training and extensive knowledge of evidence-based practices, some have limited education, a lack of experience, and insufficient training (Brock & Carter, 2015; Uitto & Chopra, 2015). Without proper training, paraeducators are less likely to implement

Many researchers have highlighted the importance of paraeducator training and the role training has on strengthening the education of students with ASD (Brock & Carter, 2015; Brock & Carter, 2017; Carter, O’Rourke, Sisco, & Pelsue, 2009; Hall, Grundon, Pope, & Romero, 2010; Weinkauf et al., 2011). Carter et al. (2009) surveyed 313 paraeducators working in a variety of school settings ranging from elementary to high school. The purpose of this project was to assess how support was provided to students, determine the knowledge of paraeducators on the methods used to educate students, examine what jobs paraeducators performed most frequently along with the fidelity when implementing those jobs, and decide whether or not they needed additional training in any of these areas. The paraeducators who were surveyed reported that most of their training came from on-the-job training (48.7%), in-service training (25.5%), other unspecified training (15.3%), and conference training (10.5%). Paraeducators reported a need for additional training on delivering evidence-based practices, the legal rights of students with disabilities, how to identify indicators of abuse, and managing student behavior (Carter et al., 2009). Paraeducators also reported engaging in mostly one-on-one instruction, small group instruction, and managing student behaviors.

Although there is research demonstrating that once paraeducators are trained to implement evidence-based practices they do so effectively, there have been few studies examining which training systems are the most effective (Britton et al., 2017; Brock et al., 2017). Brock et al (2017) explored more appropriate and comprehensive training protocols using video modeling to train paraeducators to implement evidence-based practices. Although both paraeducators implemented the evidence-based practices and student outcomes improved, this
training model requires technology that not all school districts have available to them. When using video modeling, the paraeducator still required in-person feedback, which takes valuable instructional time (Brock et al., 2017). To save both time and money, behavior skills training (BST) may be more cost-effective option to train paraeducators. Not only is BST a cost effective option for training, many people can be taught to conduct BST adding to the ease of training (Fetherston & Sturmey, 2013, Himle & Wright, 2014, Hogan et al., 2014).

BST is a procedure for training not only paraeducators, but also students with ASD (Fetherston & Sturmey, 2013; Gianoumis, Seiverling, & Sturmey, 2012; Himle & Wright, 2014; Hogan et al., 2014; Miller, Crosland, & Clark, 2014). BST consists of four components: direct instruction, modeling, rehearsal, and feedback (Stewart, Carr, & LeBlanc, 2007). Miller et al. (2014) explored how BST could be used to increase teachers’ skills over a period of a year. Three female teachers with 3 to 5 years of special education teaching experience participated in this study. Each participant had voluntarily completed an initial BST training about a year before the current study. In this study, the authors used BST to increase the teachers’ skill to decrease children’s challenging behavior and develop positive relationships with them (Miller et al., 2014). The participants first reviewed the elements of this program via a PowerPoint presentation, followed by modeling and role-play with the researchers. Teachers were given extra training on steps which they were unable to complete with 100% fidelity during role-play sessions. Following intervention, each of the participants’ fidelity increased to either the same or higher than their performance after the initial training 12 months prior. These skills also generalized to the classroom after the training sessions in the training room had been completed.

Gianoumis et al. (2012) also aimed to demonstrate the effectiveness of using BST when training teachers to implement natural language paradigm (NLP) and stimulus preference
assessment (SPA). The participants included three teachers and six preschool-aged children. As with Miller et al. (2014), following an initial pre-test to assess participants’ skills the authors provided instruction, rehearsal, modeling, and feedback. Before the training sessions, all participants were implementing NLP and SPA at 50% fidelity or lower. After the training, each teacher implemented NLP and SPA with 90% or higher fidelity (Gianoumis et al., 2012). Researchers conducted post-training probes as the teacher worked with the child they worked with most often. In addition, the children’s vocalizations increased, and challenging behaviors decreased. The teachers generalized to a different child when implementing NLP and SPA. Although Gianoumis et al. (2012) demonstrated BST to be affective, they did not address whether paraeducators could generalize to a novel task once trained.

Hogan et al. (2014) sought to extend the existing literature on BST by shifting the focus of their study to investigate ways to use BST to train four paraeducators to improve their implementation of behavior intervention plans (BIPs). During baseline, each of the participants were told to implement BIPs for two different students. Although some of the participant implemented aspects of the BIP with 100% accuracy, the data were inconsistent, and the researchers determined that BST could improve their performance. They provided the paraeducators with instruction regarding the specific BIPs and how to implement them. They then modeled implementation, allowed the paraeducators to practice, and provided feedback. After this training, all four of the paraeducators implemented procedures with 96% to 100% accuracy (Hogan et al., 2014). Again, this study shows that BST is an appropriate training procedure to use with paraeducators, but it does not examine whether or not their newly acquired knowledge has the potential to generalize.
Hall et al. (2010) examined the effects of BST on increasing paraeducators communication opportunities using evidence-based practices with young children with ASD (Hall et al., 2010). Five paraeducators were selected for this study. Each attended a workshop on Pivotal Response Training (PRT), discrete trial training, and incidental teaching. Before the training, all paraeducators initiated 10 or less opportunities for communication. Following the training, each paraeducator practiced the strategies in their classroom environments and one additional setting. Researchers provided feedback to the paraeducators, after 2–3 weeks, in areas where improvement was needed. After the presentation of the training model, each of the paraeducators increased the amount of communication opportunities they provided to the target students. Generalization data were not collected until direct feedback was given in both their classroom environment and one additional setting. Researchers also collected data on the students’ vocalizations. All but one of the children’s vocalizations increased during the study.

Not only has BST been shown to be an effective training tool, the strategies taught during BST are also effective. Least-to-most prompting (LTM) is a prompting procedure that includes providing a directive to a student (e.g., “Touch the fruit”, “Multiply”), followed by a set wait time before delivering a specific set of prompts (DiCarlo, Baumgartner, Caballero, & Powers, 2017; Ulke-Kurkcuoglu, 2015; Xin & Leonard, 2014). Researchers have used LTM prompting to teach both students and paraeducators a variety of skills including communication (Xin & Leonard, 2014), pretend play skills (Ulke-Kurkcuoglu, 2015), and compliance (DiCarlo et al., 2017).

In a study conducted by DiCarlo et al. (2016), researchers used LTM prompting to increase preschool aged children’s rate of compliance when given a teacher directive. The study consisted of two preschool classrooms and six preschool teachers. During baseline, on average
the teachers were implementing LtM prompting with an average of 3% fidelity. The six teachers were trained to implement LtM prompting using written instructions, examples, role-playing, and addition coaching in their classrooms. After this training, teacher implementation fidelity increased to 87% on average (DiCarlo et al., 2016). Not only did teacher implementation fidelity increase, but the rate at which the children complied with teacher directives also increased. Prior to the training, the children were complying on average to 50% of the teachers’ directive. After the training, the children were complying with 94% of the teacher’s directives. No generalization data were taken on the teachers’ behavior or the children’s behavior.

Xin and Leonard (2014) also sought to determine the effectiveness of using LtM prompting but focused on communication rather than compliance. During baseline, researchers provided the three participants, three 10 years-olds previously diagnosed with autism, with an iPad loaded with Sonoflex (a communication app) with no further instruction. No efforts to communicate using Sonoflex were made during baseline. During intervention, the participants were taught to use Sonoflex using LtM promoting. They were given an instruction, and if there was no response after 5 s, the teacher implemented the first prompt of the hierarchy and continued if the student still did not emit an independent response. After the introduction of LtM, all students were able to increase their requests and responses using Sonoflex (Xin & Leonard, 2014). While the students’ communication was assessed in both their respective classrooms and an additional setting, no other generalization data were collected.

Based on the results of these articles, it has been demonstrated that LtM prompting is a versatile prompting method and has the potential to generalize to different tasks. To ensure that students are gaining everything they can from LtM prompting, it is imperative that paraeducators are able to generalize the use of this strategy.
Although all of these studies have added to the existing literature regarding BST, several limitations still exist. Gianoumis et al. (2012) showed the effectiveness of using BST to train two specific strategies, but data were not collected regarding the paraeducators’ ability to generalize these strategies to novel tasks. Similarly, Hogan et al. (2014) demonstrated that BST was successful in teaching paraeducators to correctly implement BIPs, but no measures of generalization were assessed. DiCarlos et al. (2016) explained that LTM was a useful strategy when teaching new skills to preschool-aged children, but did not address whether the skills would generalize. Teachers and paraeducators must be able to use skills across environments, stimuli, and people (Cooper, Heron, & Heward, 2007). The majority of studies that have utilized BST to train LTM to teach students with ASD have shown that these methods are effective. What is lacking in many of these studies, however, is an aspect of generality (Britton et al., 2017; Gianoumis et al., 2012; Himle & Wright, 2014; Hau et al., 2013; Hogan et al., 2014; Miller et al., 2014; Rogers et al., 2010).

Presently, however, there have only been a handful of studies that have examined whether or not skills taught to paraeducators after BST would generalize to novel students or tasks (Koegel, Russo, & Rincover, 1997; Sarakoff and Sturmey, 2007). Sarkoff and Sturmey (2007) showed the generalizing effects of BST. They trained three paraeducators using BST to implement discrete trial training (DTT) to a single child. During baseline, researchers probed for a target skill along with a generalized skill. All paraeducators conducted DTT sessions with approximately 50% accuracy in baseline (Sarkoff & Sturmey, 2007). After BST was used to train the necessary strategies, each of the participants implemented DTT with 100% fidelity with their target child. The authors also showed that each participant generalized the use of DTT to an untrained skill and to a novel student.
The purpose of the present study was to extend the current literature regarding paraeducators and their generalization of strategies taught using BST to novel tasks. The present study utilized BST to train three paraeducators to implement LTM with a time delay. Data were collected on both a trained academic task and an untrained academic task. The two specific research questions were (a) is BST an effective method to use to train paraeducators to implement LTM with a time delay, and (b) after being trained using BST, can paraeducators generalize to an untrained academic task?
Chapter 2

Methods

Participants

A board certified behavior analyst (BCBA) employed by the school where the study took place was asked to recommend paraeducators who would benefit from additional training. Three paraeducator and student dyads who had previously worked together were included in this study. To be included in this study, paraeducators had to implement LTM with a delay with less than 50% accuracy across 5 trials. All students included in this study were high school aged and diagnosed with ASD. Prerequisite skills required for student participation included sitting and attending to an academic activity for a minimum of 1 min as well as following vocal instructions such as, “Do this” and “Watch me.” Student assent, paraeducator consent, and parent permission (Appendix A) were obtained before the start of this study. Student assent was measured by the absence of dangerous behaviors (e.g., self-injurious behaviors, property destruction, endangering others) for the duration of the task.

Dyad 1. Linda was a 25-year-old, white female. She had worked in the field of special education for 2 years. She had a bachelor’s degree in psychology and had received no previous training on CTD. She reported previously receiving training in least-to-most (LTM) prompting and various other trainings from her current employer. Prior to the start of this study, Linda had directly worked with Anthony for 6 months.

Anthony was a 20-year-old male with diagnoses of ASD and neurofibromatosis, a genetic disorder that causes tumors to form on nerve tissue. He had limited verbal language (i.e., 1–2-word utterances), exhibited no spontaneous requests, and did not use an augmentative and alternative communication (AAC) device. His school utilized an abbreviated Assessment of
Basic Language and Learning Skills (ABLLS). This assessment eliminates some of the components of the ABLLS assessment, and contains five sections: Functional academics, social skills, communications, daily living skills/vocational skills, and behavior. Each task was scored based on level of independence on a rating scale of either 2 or 4, depending on the task, with a total of 176 available points. Anthony’s final score was 11 out of 176 (6%). Out of the five categories, Anthony scored the lowest on functional academics. He only completed 2 of the 27 tasks, both requiring prompts. Anthony was unable to complete academic task such as counting, writing his own name, and identifying sight words.

**Dyad 2.** Kenny was 28-year-old, white male. He had worked in the field of special education for 6 months. He had a bachelor’s degree in communication. Prior to the onset of this study, Kenny had received no training on CTD and was not familiar with BST. Kenny had worked with Oliver for 5 months.

Oliver was a 14-year-old, white male diagnosed with ASD and attention deficit hyperactivity disorder. He had limited functional verbal language (i.e., 4 to 5-word utterances), and sporadically and inconsistently used a high-tech communication app on an Accent 800 (i.e., Language Acquisition through Motor Planning [LAMP]). His school utilized the same abbreviated ABLLS assessment as Anthony. Oliver’s final score was 47 out of 176 (27%). Out of the five categories, Oliver scored the lowest on functional academics. He only completed 1 of the 27 tasks independently, and 8 out of the 27 with prompts. Oliver refused to complete many of the task presented to him, which resulted in no score being given. He only completed the “count the objects” task. This assessment was not an accurate representation of this skill repertoire.

**Dyad 3.** Eddie was 27-year-old, white male diagnosed with Asperger Syndrome. He had worked in the field of special education for 2 years. He had a bachelor’s degree in outdoor
education and recreation with a minor in music. Previously, Eddie worked as a behavior technician for an applied behavior analysis (ABA) company where he received training on basic ABA principles, but he had no prior knowledge of BST. Eddie had worked with Miguel for 1 year.

Miguel was a 21-year-old, white male diagnosed with ASD. He could verbally communicate in full sentences. A school teacher at Miguel’s school administered the AASCD to him. His english, language arts (ELA) score was 384, mathematics was 398, science was 399, and social studies was 403. His scores in ELA, mathematics, and science fall within the basic range on the test scoring scale. He was below average for his age range in these areas. His science score fell within the proficient range on the test scoring scale.

**Setting**

Baseline, intervention, and generalization sessions took place in the students’ regular classrooms, and training sessions took place in an adjacent office. Both rooms were located in a charter school for students with ASD and other developmental disabilities located in a Midwestern state. This suburban school served over 300 children and young adults ranging from preschool to high school (ages 3 to 22).

**Training room.** The room consisted of three desks, classroom materials (e.g., art supplies, reinforcers), and three filing cabinets. Within the room, the paraeducators were trained at a desk that was placed along the wall. The room was empty except for the trainer and paraeducator.

**Classroom.** The classrooms consisted of between 5 and 7 students. Each student had a desk that was arranged in a semi-circle, with the teacher’s desk in the back left corner of the room. Behind each desk were work folders where student schedules, worksheets, and materials
were stored. There was also a table in the back of the classroom where the teacher could conduct one-on-one or group learning sessions. Each classroom was equipped with two white boards. The daily schedule was displayed on the white board at the front of the class, and current student goals were displayed on the other white board. The classroom expectations (i.e., hands and feet to self, complete all work, stay with teacher, ask for help when needed) were posted in the front of the classroom.

**Tasks and Materials**

The first author created a data sheet for CTD by outlining each distinct step, including the three levels of prompts that could be used (see Appendix B). I used the single-trial use data sheet to collect data for each academic task presented. For each task, appropriate materials were available for use by the paraeducator. For example, when teaching sight words, the paraeducator was provided with the necessary sight word flash cards for that specific student. Prior to the study, a preference assessment was conducted for each student and the most highly preferred reinforcers identified were also available during each session. If a student showed signs of satiation, I conducted an abbreviate preference assessment with other previously identified reinforcers. Reinforcers were either tangibles (e.g., iPad, toys) or edibles (e.g., crackers, cookies).

**Dependent Variables and Data Collection**

The dependent variable measured in this study was paraeducator implementation fidelity of LTM with a delay. I collected data on a trained academic skill and a second academic skill not previously targeted for each student. The second skill was included to determine if the paraeducator could generalize the use of LTM with a delay to teach a new skill. Researchers also collected student-level behavior data to determine if students were benefitting from the
intervention. Additional data regarding prompt levels were tracked within the LTM with a delay data sheet. If students were not independently completing a task, but were responding, on average, to less intrusive prompts, paraeducators moved on to the next phase of the intervention. For example, if the student no longer required a physical prompt and now only needed a gestural prompt, they were moved to the next phase of intervention. Paraeducators moved on to the next phase of intervention if student independent responding increased.

The researchers collected data on implementation fidelity on the same data sheet that was provided to the paraeducators during training. Correct and incorrect responses were recorded with a plus or minus. A correct response by the paraeducator was correct implementation of the step in the task analysis. If a student made an error, the paraeducator provided prompts throughout the activity. If they were delivered correctly, this was marked as a correct response for the paraeducator. If a student responded correctly, a plus was recorded if the paraeducator gave reinforcement and moved on to the next trial. For example, if the student pointed to a sight word correctly, a plus was documented on the data sheet for the student. If students required prompts, the level at which a correct prompted response was obtained was recorded on the data sheet. If the student did not respond after a physical prompt was administered, a 0 s time delay with a physical prompt was implemented and the trial was ended. Sessions were defined as one completed academic task (e.g., one worksheet, a task bin). All student responses, besides the math worksheet, required students to select the correct answer from a field of choices. Percentage of steps completed correctly for both paraeducators and students were calculated separately after each session by dividing the number of correct steps by the total number of possible steps and multiplying the total by 100. Because student independent responding may not
show a complete picture of learning, prompt levels required were also tracked. Duration of each session was also recorded.

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

I collected IOA data with a secondary data collector for at least 30% of sessions. IOA was calculated as agreements divided by agreements plus disagreements multiplied by 100 (Cooper, Heron, & Heward, 2007). One graduate student in special education served as secondary data collector. I trained the secondary data collector by modeling how the data sheet was to be used and providing examples and non-examples prior to leading an opportunity for rehearsal. The first two IOA sessions were used as training sessions and were not included in the overall percentage of IOA. Overall point-by-point IOA agreement for paraeducators over all phases was 98.2% (range: 83–100%). Point-by-point IOA agreement for all students over all phases was 97.3% (range: 96–100%).

Procedural integrity data were collected by a secondary data collector during all training sessions by indicating whether I performed sessions as outlined by the task analysis and checklist provided (see Appendix C). Procedural integrity was calculated as steps completed divided by the total number of steps multiplied by 100. Overall point-to-point- procedural integrity was 100% for all all training sessions.

**Social Validity**

Social validity was assessed through paraeducator surveys and participant results. The social significance of the intervention goals, the social appropriateness of the invention procedures, and the social importance of the effects (Wolf, 1978) were assessed. I used the data collected for both paraeducators and students to assess the social importance of the effects, along with the appropriateness of the intervention. Surveys and questionnaires were not given to
students because of the nature of their disabilities. The researcher utilized visual analysis of the students’ data to determine efficacy of the intervention. Surveys with 3 likert-type scale questions and 2 open-ended questions were provided for feedback from the paraeducators. Answers were collected post-intervention.

**Experimental Design**

I used a multiple probe across participants design to evaluate the generalized fidelity of LTM prompting with a delay implementation following BST for three paraeducators (Cooper, Heron, & Heward, 2007). The first paraeducator was moved to intervention after at least five sessions of stable responding trend in baseline. After the first paraeducator began intervention, the remaining two participants were probed again in the baseline phase. Once the first paraeducator reached at least five stable data points in the intervention phase, the other two paraeducators were probed again. The second and third paraeducators then entered intervention, following the pattern described above. All paraeducators entered generalization after stable responding in intervention occurred 5 times each. The paraeducators were asked to use LTM prompting with a delay with an untrained academic task with the target student. If the paraeducator was performing LTM prompting with a delay with at least 80% fidelity over five consecutive trials, the dyad was moved to the next phase. After meeting the 80% mastery criterion over the course of five consecutive sessions and showing a clear effect of intervention with a stable state of increasing trend for both baseline and intervention, paraeducators were moved into the maintenance phase of the experiment.

**Procedures**

**Baseline.** Paraeducators were instructed to teach a student an academic task using CTD in their respective classrooms during the regularly scheduled instruction time. If paraeducators
asked what CTD was, the researcher responded, “Present the task how you would normally present it.” The researcher recorded the response of each step on the data sheet. Regardless of performance, paraeducators were given non-specific praise at the end of the task (i.e., “Thank you for letting me watch your session.”). During baseline, no error correction was used. If paraeducators presented the task, but did not wait 3 s before prompting, or waited longer than 3 s, the trial was terminated. The trial was also terminated if the paraeducator repeated the SD at any point during the trial. Due to a misunderstanding, I asked the paraeducators to implement CTD, but assessed LTM prompting in the intervention phases.

Paraeducator Training. I taught each paraeducator individually to use LTM with a delay using BST. First, the paraeducators were provided with a printed handout (see Appendix E) and a vocal explanation of LTM prompting with a delay. During this portion of the training, I explained each step of the task analysis, beginning with how to gain the student's attention, ending with an explanation of LTM. I also explained that the purpose of using LTM with a delay is to eventually have the student be independent in the single-step academic task.

Next, I modeled how to use LTM prompting with a delay when teaching an academic task specific to their student (e.g., how to teach a student to subtract single digit numbers). I provided modeling using the same task analysis used to collect data. I began by playing the role of the paraeducator. The paraeducator was instructed to not respond to the presented task. After there was no response for 3 s, I began to implemented and explain how to use LTM prompting, according to the task analysis. The LTM prompting hierarchy was chosen to align with the prompting strategies used at the school where the students were educated.

The first prompt used was a gestural prompt. If the paraeducator still did not respond, I moved on to a model prompt. If there was again no response, the final prompt used was a
physical prompt (i.e., hand-over-hand). I then instructed the paraeducator to respond correctly to the task presented to model how to provide praise. Once all of the paraeducator’s questions were answered, the roles were switched and I acted as the student.

The same process previously described was used for this portion of the instruction. I responded correctly to the presented task until the paraeducator performed the task with 100% fidelity across three trials. Next, I emitted no response, and the paraeducator prompted correctly throughout the trial. This continued until the paraeducator performed with 100% fidelity across three trials. The researcher then responded incorrectly and the paraeducator prompted throughout the trial until 100% fidelity across three trials was met. If the paraeducator made a mistake, I stopped the trial and explained the correct implementation. If no mistakes were made, the paraeducator completed the trial and I then provided specific praise before the next trial. Feedback included specific praise and feedback on weaker parts of implementation as needed, such as, “You did a great job getting the student’s attention and presenting the instruction, but you need to present reinforcement quicker” or, “You moved through the prompts in the correct order, giving the appropriate time in between.” Rehearsal continued until the paraeducator performed the task with 100% accuracy across three consecutive trials. Data were collected by myself and a graduate student using the same data sheet. I also collected data on the duration each paraeducator took to complete six successful trials.

**Post-Training.** The post-training phase followed the same steps as baseline with added corrective feedback, if necessary. As the paraeducator presented the task to the student, I collected data on the implementation fidelity of the paraeducator using the data sheet as described above. If the paraeducator made a mistake during the trial, I allowed the paraeducator to complete the trial. Corrective feedback was presented at the end of the completed trial. If the
paraeducator made no mistakes during the trial, I provided positive, specific praise. This praise included phrases such as, “You did great! You presented the task appropriately and allowed enough time for student responding before beginning prompts.” The length of each post-training session was between 5 min and 30 s and 10 min and 35 s.

**Generalization.** When each paraeducator displayed at least 80% accuracy across five consecutive LTM prompting sessions, they were instructed to teach the same student an untrained task. Tasks were selected that required paraeducators to apply the previously learned prompts with different materials. If needed, corrective feedback was given to the paraeducators. For example, in post-intervention, Linda was instructed to teach Anthony sight words in a field of six. In the generalization phase, she taught him to sort two dimensional pictures based on their class (i.e., fruits and cars). Although both of the task involved two dimensional pictures, the student response had a different topography. Instead of selecting an option out of an array, the student had to sort a pile of 10, two dimensional pictures into separate piles based on class. In the post-intervention phase Kenny taught Oliver to identify two dimensional pictures, based on their features, in a field of three. In generalization, however, Kenny taught Oliver to match objects to their coinciding word in a field of five. Again, the topography of the student’s response and therefore, the topography of Kenny’s prompt was changed. Eddie’s initial task was single digit subtraction. In generational, he taught Miguel to sort food into the various food groups. If the student was still in the acquisition phase of the trained task, the paraeducator moved on to a novel task only if the novel task was unrelated to the initial task. Generalization sessions were conducted in the students’ respective classrooms.

**Maintenance.** Maintenance data, both of the training and generalization task, were probed every 2 weeks for two dyads after they had reached criteria of at least 80% across 5
consecutive trials in intervention. During the maintenance phase, no feedback was given to the paraeducators. I was unable to collect maintenance data on Linda and Anthony because Linda stopped working at the school. I collected data in the classroom during the regularly scheduled academic instruction time.
Chapter 3

Results

In this chapter, I will present the results for each dyad. In addition, results from social validity are also reported. Figure 1 shows the percentage correct for paraeducator implementation fidelity and percentage correct for student responses. Figure 2 shows the needed prompt level for each student.

Linda and Anthony.

During baseline, Linda’s implementation fidelity of LTM prompting with a delay was at a stable level of 52.4% (range: 50–58%) correct responses (see Figure 1). All trials during baseline were terminated after step one or two of the task analysis because Linda would incorrectly perform a step. For example, following the presentation of the task, Linda would either prompt too quickly or not quickly enough.

Intervention training sessions for Linda lasted a total of 10 min and 25 s. Following the training sessions in post-intervention, Linda’s implementation fidelity of LTM prompting with a delay was at a stable and trend level, with no variability with a mean percentage of 97.2% (range: 87–100%). Post-intervention session lasted between 5 min and 30 s and 10 min with an average of 9 min and 5 s. During post-intervention sessions, Linda provided between 7 to 13 trials to the student with an average of 10 trials. During generalization, Linda performed at 100% for all sessions.

During post-intervention, Anthony’s independent responses were highly variable with no stable level or trend. Data during post-intervention had a mean percentage of 18% (range: 0%–50%). During generalization, Anthony’s independent responses were slightly variable with a variable level and increasing trend. Anthony performed with a mean percentage of 47% (range:
10%–67%) correct responses. Table 1 shows the prompts needed during each session to obtain a correct response for the student.
Table 1.

*Number of each prompt level needed to complete task during each session for Anthony*

<table>
<thead>
<tr>
<th>Sessions</th>
<th>6</th>
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<th>9</th>
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<td>1</td>
<td>6</td>
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<td>4</td>
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<tr>
<td>Physical</td>
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<td>0</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
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<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Figure 1.

Dyad 1 and 2 data

Denotes two week break

Percentage of opportunity correct

Sessions

Baseline Post-Intervention Maintenance

Linda

Anthony

Kenny

Generalization

Denotes
Figure 2.

Dyad 2 and 3 data

Percentage of opportunity correct

Sessions

Oliver

Eddie

Miguel
**Kenny and Oliver**

During baseline, Kenny's implementation fidelity of LTM prompting with a delay was at a stable level with a mean percentage of 51.1% (range: 50 –54%) (see Figure 1). All trials during baseline were terminated after step one or two of the task analysis because Kenny would incorrectly perform a step on the task analysis (i.e., prompt too quickly or not soon enough). Kenny made the same error as Linda, in that he did not adhere to the 3 s delay.

Intervention training sessions for Kenny lasted a total of 13 min and 35 s. In post-intervention, Kenny’s implementation fidelity of LTM prompting with a delay was at a stable level with a mean percentage of 99.6% correct responses (range: 98 –100%). Post-intervention sessions lasted an average of 9 min and 52 s (range: 7 min and 45 s–10 min). Post-intervention sessions had between 6 to 20 trials, with an average of 12 trials. During generalization, Kenny’s implementation fidelity of LTM prompting with a delay was at a stable level with a mean percentage of 99.8% (range: 99.2 –100%).

During post-intervention, Oliver’s independent responses were stable, with slight variability and an upward trend. Data during intervention had a mean percentage of 19.8% (range: 8–47%). During generalization, Oliver’s independent responses were slightly variable with a variable level and increasing trend. Oliver’s independent responses had a mean percentage of 46.2% (range: 17–75%). Table 2 shows the prompts needed during each session to obtain a correct response during all phases. During post-intervention, Oliver required many prompts to obtain a correct answer. By the end of maintenance and generalization, however, Oliver’s independent responses increased and the number of physical prompts decreased.
Table 2.

*Number of each prompt level needed to complete task during each session for Oliver*

<table>
<thead>
<tr>
<th>Sessions</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>19</th>
<th>20</th>
<th>21</th>
<th>22</th>
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<tr>
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<td>0</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Physical</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>9</td>
<td>3</td>
<td>8</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>41</td>
</tr>
</tbody>
</table>
Eddie and Miguel

During baseline, Eddie’s implementation fidelity of LTM prompting with a delay was at a stable level with a mean percentage of 4.5% correct responses (range: 0–25% correct) (see Figure 1). Like the other participants, all trials during baseline were terminated after step one or two of the task analysis in Appendix B (i.e., wait 3 seconds for learner to respond). For example, following the presentation of the task, Eddie waited too long to prompt Miguel, or he did not present an SD (i.e., place material in front of student with no further instruction).

Intervention training sessions lasted a total of 16 min and 45 s. In post-intervention sessions, Eddie’s implementation fidelity of LTM prompting with a delay was at a stable level with a mean percentage of 98.3% (range: 91.7–100%). Post-intervention sessions lasted an average of 9 min and 23 s (range: 8 min and 50 s–10 min and 35 s). Post-intervention sessions had between 6 to 8 trials presented to the student with an average of 7.67 trials. During generalization, Eddie’s implementation fidelity of LTM prompting with a delay was 100%.

During post-intervention, Miguel’s independent responses were stable, with slight variability and an upward trend. Data during intervention had a mean percentage of 64.3% (range: 37.5–100%). During generalization, Miguel’s independent responses were low in variability, with a stable level and increasing trend. Miguel’s independent responses had a mean percentage of 90% (range: 50–100%). Table 3 shows the prompts needed during each session to obtain a correct response during all phases. Miguel did not require any physical prompts throughout the duration of intervention, generalization, or maintenance. After only seven sessions, Miguel required no prompts and was able to answer independently.

Social Validity
All three paraeducators were given a survey with three likert-type scale questions and 2 open-ended questions. They all rated that the professional development they received was “very-effective.” They also noted that the evidence-based practice was “very effective” when implementing with a student. Each of the paraeducators were also “very likely” to participate in a similar professional development opportunity in the future. Based on the student-level data, it can also be assumed that this intervention was socially valid. Each of the students independent responses increased post-intervention.
Table 3.

*Number of each prompt level needed to complete task during each session for Miguel*

<table>
<thead>
<tr>
<th>Sessions</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
<th>21</th>
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<th>24</th>
<th>25</th>
<th>26</th>
<th>27</th>
<th>28</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>1</td>
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<td>0</td>
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</tr>
<tr>
<td>Model</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>1</td>
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<td>0</td>
<td>0</td>
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<td>0</td>
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<td>0</td>
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</tr>
<tr>
<td>Physical</td>
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<td>0</td>
<td>0</td>
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</tbody>
</table>
Chapter 4

Discussion

The purpose of the present study was to extend the literature regarding paraeducators and generalizing a strategy taught using BST. Following BST, each of the paraeducators was able to implement LTM prompting with a delay with a trained task (i.e., teaching sight words, teaching single digit subtraction, teaching functions, features, and class). They also generalized LTM prompting with a delay to an untrained academic task without any additional training. In addition to the increase in paraeducators’ implementation fidelity, the students also completed the tasks with more independence when compared to baseline levels. The results of this study indicate that using BST can be an effective training strategy when teaching paraeducators to generalize the use of LTM prompting with a delay.

Based on the results of this study, BST is an appropriate training method to use when training paraeducators to generalize the implementation LTM prompting with a delay. At the beginning of the study, on average, all of the paraeducators were implementing LTM prompting with a delay with less than 50% fidelity and making errors before students were able to respond. The most common errors made by the paraeducators were waiting too long to prompt after the presentation of a prompt, prompting too soon after the presentation of a task, or not presenting the task in a clear manner (i.e., placing materials in front of the student with no further instruction). Using BST allowed the paraeducators to access training to increase their fidelity without taking more than 13 min 35 s on average (range: 10 minutes 25 s to 16 minutes 45 s) away from their respective classrooms and students did not miss out on instruction. Aside from employing the researcher, BST did not cost the school extra to implement. I provided all of the training within the school without any special technology.
The methods the researcher used showed that the paraeducators generalized the skills learned from BST to an untrained task. After the introduction of BST, each of the paraeducators increased their implementation fidelity of LTM prompting with a delay to an average 98.5% (range: 87–100%) fidelity when instructing their target student. Paraeducators were directed to target skills such as sight word recognition, single digit subtraction, and categorizing object by their feature, function, and class. Following the post-intervention phase, the paraeducators also implemented LTM prompting with a delay with an untrained task with an average of 99.9% fidelity (range: 99.2–100%) across all paraeducators. Although the untrained tasks were also academic, they varied from the initial trained task. Each of the untrained tasks were of different topography from the initial task selected. The patterns of responding for each paraeducator demonstrated that BST was a successful training procedure for increasing implementation fidelity and promoting generality between tasks.

This study extended the literature in a number of ways. First, the findings from this study add to the small body of literature that suggests once given the proper training, paraeducators are able to effectively implement LTM prompting with a delay with higher fidelity and generalize to an untrained skill. Carter et al. (2009) surveyed paraeducators and learned that as a whole, they wanted more training on evidence-based practices. This study extended those findings and demonstrated that BST was an effective training model.

Second, the current study took a generalization measure following the onset of BST and post-training sessions. By taking a generalization measure, I was able to show that BST is successful in giving paraeducators the tools to teach more students.

Third, this study extended a study conducted by Sarkoff and Sturmey (2007). That study examined the effects of BST and paraeducators ability to implement the generalized use of DTT.
Although it is important that paraeducators are able to use DTT, the current study extends this by training paraeducators to use LTM prompting with a delay, extending paraeducators repertoire of evidence-based practices. By training the paraeducators to use LTM prompting with a delay, I was able to show that BST is versatile when teaching new evidence-based practices.

**Limitations and Future Research**

Although the present study assessed generalized effects of paraeducator implemented LTM prompting with a delay procedures, there are several limitations to consider. First, the current researcher focused on paraeducators working with high school students with ASD. High school students with ASD only make up a small portion of the special education population, and it is important to train paraeducators working with all age ranges of students. Although many special education classrooms focus on daily living skills, it is also important to build students’ skill sets to complete academic tasks. Without the ability to complete simple academic tasks, like those targeted in this study, high school students receiving special education services fall even further behind peers who do not have a diagnosis. Future researchers should consider assessing the same intervention with paraeducators who work with students in elementary and middle school. Future researchers should also consider choosing students with a wider range of disabilities.

Another limitation of this study was how generalization was assessed. Generalization was only evaluated with a single untrained task. Focusing on a single task, I ensured that all of the paraeducators were implementing to the best of their abilities, but I also potentially limited them in what they could teach the students. Prior to the intervention, none of the paraeducators were implementing LTM prompting with a delay to any task with 100% fidelity. Once the paraeducators showed they could generalize to one untrained task, however, it can be predicted that they have the potential to generalize to a multitude of tasks, expanding the student’s
academic repertoire. Generalizing to a novel task also allows the paraeducators to use LTM prompting with a delay with another student who may be targeting the same skill. Future researchers should assess generalization over several settings and with at least one novel student. By targeting generalization in more than one way, future researchers can further expand paraeducators access to evidence-based practices and ability to teach students with disabilities. Future researchers should also include daily living skills and other nonacademic tasks, along with chained skills (i.e., skills with multiple steps). Additionally, generalization was not assessed during baseline. This allowed paraeducators to enter into intervention more rapidly, but I was unable to show their improvement on implementing with the generalized skill.

During baseline, I asked the paraeducators to use CTD, but during intervention, I measure LTM prompting with a delay. This created an additional limitation. I am unable to determine if the paraeducators increased their knowledge and ability to implement LTM prompting with a delay because of this. Another limitation from the methods of this study comes from the maintenance and generalization phases of the experiment. Feedback was given to the paraeducators during generalization, but not during maintenance, even though they were concurrent. The addition of feedback had the possibly to effect paraeducators performance during maintenance. Future researchers should ensure they are asking paraeducators to implement the same skill during baseline and intervention. They should also consider not giving feedback during generalization, or having the paraeducators enter into the maintenance phase after reaching criterion for generalization.

I did not collect student level data during baseline, which is another limitation of this study. I made the decision to terminate trials after an error was made by the paraeducators, which did not give students the opportunity to respond. Although I was able to end trials before the
paraeducators continued practicing errors, it is hard to tell from the data how much the students’ independent responses improved from the current data. Future researchers should consider including a measure of student level baseline data to improve the functional relationship between the intervention and student’s improved independent responding.

Another limitation of this study was related to social validity. I only administered social validity surveys post-intervention and utilized anecdotal information, such as participant results. Although the post-intervention surveys showed that the paraeducators found this study helpful and increased their confidence implementing evidence-based practices, an additional measure would have shown the change they felt throughout intervention. To strengthen social validity, future researchers should consider taking both pre- and post- intervention surveys, along with including other measures of social validity, such as direct observations. This would also show if there is a functional relationship to the paraeducators’ confidence in implementing and the study.

**Implications for Practice**

There are many important implications for teachers and paraeducators who work with students with ASD and other developmental disabilities that can be gained from this study. Given the ease of implementation that comes with BST, future researchers can use it in more classrooms with the paraeducators. Once paraeducators have been trained by researchers, they can increase their confidence was working with students with ASD. Additionally, the results of this study show that students would also benefit from this added training. When implementing these procedures, researchers should first consider whether or not paraeducators have any prior training with LTM prompting with a delay. If the paraeducator is already performing with a high fidelity, BST may not be needed. Researchers may also try to implement BST in regard to other evidence-based practices.
School administrators also benefit from the results produced by this study. First, school administrators should consider utilizing BST as an intervention to train their staff, including teachers and paraeducators. Results from this indicate that BST can be used to effectively teach paraeducators to use LTM prompting with a delay with higher fidelity than other training (i.e., professional development lectures, conferences, handouts). BST is also efficient and less time consuming than other training procedures, taking less time away from students. It is imperative that paraeducators working with students with ASD have proper training to provide the most support effective possible. Second, with ASD and other development disabilities on the rise, the need for paraeducators has also risen. School administrators can make use of BST to increase the rate that paraeducators are trained. This will allow paraeducators to enter the classroom at a more rapid rate with a more adequate amount of training. The generalization results of this study are also helpful to school administrators. Paraeducators do not need to be explicitly trained on every, related academic task they will be teaching to students in the classroom, which cuts down on training time as well. For example, once a paraeducator has been trained to implement LTM prompting with a delay with one task, they will likely generalize that skill to another task without being explicitly trained to do so.

Conclusion

Results from this study show that once given effective training using BST to implement LTM prompting with a delay, paraeducators can effectively implement LTM prompting with a delay to teach students both a trained and untrained task. Based on these results, I have demonstrated that BST is an appropriate training model for increase paraeducators fidelity when implementing evidence-based practices. Although there are many training procedures, BST is
cost effective and efficient. In the future, researchers should consider using BST to train paraeducators other evidence-based practices to increase their repertoire.
References


Appendix A

Consent forms
Dear Teachers, Para-professionals, and Related Service Personnel:

We invite you to participate in a research study about professional development coaching to help practitioners use evidence-based practices. We hope to learn the degree to which different professional development strategies enable practitioners to use evidence-based practices, and if use of these practices results in student progress. To this end, we are inviting students with developmental disabilities and the practitioners who work with them to participate.

What Will My Participation Involve?
We will offer professional development to help you implement an evidence-based with one of your students with a developmental disability. This will involve a time commitment of 30-90 minute each week for up to 16 weeks. Professional development may include accessing online modules, group training meetings, and/or one-to-one coaching.

What Information Will You Collect?
We will observe in your classroom 1-5 times each week. During these observations, we will collect information about how well you are using the strategies. At the end of this project, we will ask you for your opinion about the professional development and the evidence-based practice.

Are There Any Benefits to Me?
As part of this project, you will learn useful strategies that you can use with your students. We will also share back with you what we learn about professional development.

Are There Any Risks?
As we publish or present findings from this study, the names of participating students and practitioners will never be used. To minimize the risk that any information we gather could be connected back to individual participants, we store all data securely in our project offices and de-identify it using codes. All efforts, within reason, will be made to keep your personal information in your research record confidential, but total confidentiality cannot be guaranteed. Records may be reviewed by the Office for Human Research Protections or other federal, state, or international regulatory agencies; or The Ohio State University Institutional Review Board or Office of Responsible Research Practices.

This project has been approved by your school system; however, your participation is completely voluntary. If you decide not to participate—or to later withdraw from the study—it will have no effect on your employment status with the school. Your decision will not affect your future relationship with The Ohio State University.

What If I Want More Information?
For any questions or if you feel that you were negatively affected as a result of study participation you may contact Matt Brock at 614-688-1421 (brock.184@osu.edu). For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251.
Dear Parent:

We invite your child to participate in a research study about training teachers to use effective strategies. We hope to learn how well the training helps teachers to teach new skills to students with developmental disabilities. Your child is being invited because he/she was recommended because one of your child’s teachers wants to use these new skills to help your child.

How Will this Project Impact Your Child?
We will work with your child’s teacher to use a strategy that we think will help your child to learn new skills.

What Information Will You Collect?
We will observe in your child’s classroom 1-5 times each week. During these observations, we will collect information about much progress your child is making on his/her goal. We will collect this information by observing your child during ongoing class activities or by having the teacher ask your child questions about what he/she is learning. In addition, we would ask you to allow the school to provide us a copy of your child’s IEP. We will review your child’s IEP to learn basic information about your child (age, educational diagnosis, test scores, and examples of IEP goals). At the end of the study, we will ask your child questions about how he/she perceived the intervention; this interview will not take longer than 5 minutes.

What Are the Benefits to You and Your Child?
In previous projects, students have made progress and learned new skills when their teachers participated in this kind of training. We will send a letter to you at the end of the study to show you how much progress your child has made.

Are There Any Risks?
To minimize the risk that any information we gather could be connected back to individual participants, we store all data securely in our project offices and de-identify it using codes. All efforts, within reason, will be made to keep your personal information in your research record confidential, but total confidentiality cannot be guaranteed. Records may be reviewed by the Office for Human Research Protections or other federal, state, or international regulatory agencies; or The Ohio State University Institutional Review Board or Office of Responsible Research Practices.

This project has been approved by your child’s school district; however, your child’s participation is completely voluntary. If you decide not to have your child participate or want to later withdraw him/her from the study, it will have no negative effect on the educational services your child is receiving. Your decision will not affect your future relationship with The Ohio State University.

What If I Want More Information?
For any questions or if you feel that your child was negatively affected as a result of study participation you may contact Matt Brock at 614-688-1421 (brock.184@osu.edu). For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251.
Verbal Assent Script

I am from The Ohio State University. We want to learn how to help teachers new ways to teach their students. This is called a research study.

If it is okay with you, we would like to watch you to see what you are learning. We would come to your classroom up to five times each week. Also, we would ask you some questions about what you learned.

Your parent(s) said is okay for you to do this. But, you do not have to do this if you do not want to. And if you ever want to stop, just tell a teacher or us. It will be no problem. You or your parents can contact Matt Brock at 614-688-1421 or brock.184@osu.edu with any questions.

Can we watch in your classroom to see what you are learning? □ Yes □ No □ No Response
Can we ask you questions about what you learned? □ Yes □ No □ No Response

Name of Student: ________________________________________

Investigator/Research Staff
I have read the assent script (above) to the participant. He or she responded in the way indicated above (i.e., yes, no, no response). There are no blanks in this document. A copy of this form has been given to the participant or his/her representative.

__________________________  __________________________  _______________
Name                        Signature                      Date
Appendix B

Data Sheet
**Time Delay: Implementation Fidelity Checklist**

<table>
<thead>
<tr>
<th>Step Description</th>
<th>Trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gain learner’s attention by:</td>
<td></td>
</tr>
<tr>
<td>a. Present the cue/instruction</td>
<td></td>
</tr>
<tr>
<td>2. Wait 3 seconds for learner to respond</td>
<td></td>
</tr>
<tr>
<td>3. Respond to the learner’s attempts</td>
<td></td>
</tr>
<tr>
<td>a. If <strong>correct</strong>:</td>
<td></td>
</tr>
<tr>
<td>i. Provide reinforcement</td>
<td></td>
</tr>
<tr>
<td>b. If learner does not respond/response incorrectly during response interval</td>
<td></td>
</tr>
<tr>
<td>i. Deliver a <strong>gestural</strong> prompt</td>
<td></td>
</tr>
<tr>
<td>ii. Wait 3 seconds</td>
<td></td>
</tr>
<tr>
<td>d. If learner response <strong>correctly</strong> after the prompt:</td>
<td></td>
</tr>
<tr>
<td>(a). Provide reinforcement</td>
<td></td>
</tr>
<tr>
<td>e. If learner response <strong>incorrectly</strong> after the prompt:</td>
<td></td>
</tr>
<tr>
<td>i. Deliver a <strong>model</strong> prompt</td>
<td></td>
</tr>
<tr>
<td>ii. Wait 3 seconds</td>
<td></td>
</tr>
<tr>
<td>f. If learner response <strong>correctly</strong> after the prompt:</td>
<td></td>
</tr>
<tr>
<td>(a). Provide reinforcement</td>
<td></td>
</tr>
<tr>
<td>g. If learner response <strong>incorrectly</strong> after the prompt:</td>
<td></td>
</tr>
<tr>
<td>i. Deliver a <strong>physical</strong> prompt</td>
<td></td>
</tr>
<tr>
<td>ii. Wait 3 seconds</td>
<td></td>
</tr>
<tr>
<td>f. If learner response <strong>correctly</strong> after the prompt:</td>
<td></td>
</tr>
<tr>
<td>(a). Provide reinforcement</td>
<td></td>
</tr>
<tr>
<td>h. If the learner response <strong>incorrectly</strong> after physical prompt:</td>
<td></td>
</tr>
<tr>
<td>i. Paced/Tutor represents task</td>
<td></td>
</tr>
<tr>
<td>ii. Using 0 second time delay, physical prompt correct response</td>
<td></td>
</tr>
<tr>
<td>iii. Moves on to next trial</td>
<td></td>
</tr>
</tbody>
</table>

**Percentage of Opportunity Correct**

*Record “+” if performed correctly, “-” if performed incorrectly, or “n/a” if no opportunity to perform step.*
Appendix C

Researcher / Teacher Treatment Integrity Checklists:

Using BST to Teach Educators CTD
<table>
<thead>
<tr>
<th>Steps for Implementing CTD</th>
<th>Yes / No / NA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td>Provide rationale for CTD</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td>Provide trainee with written summary of CTD steps</td>
</tr>
<tr>
<td><strong>Step 3</strong></td>
<td>Vocally describe steps of CTD</td>
</tr>
<tr>
<td><strong>Step 4</strong></td>
<td>Demonstrate or Model CTD</td>
</tr>
<tr>
<td><strong>Step 5</strong></td>
<td>Have trainee practice performing CTD (Provides participant with all needed materials)</td>
</tr>
<tr>
<td><strong>Step 6</strong></td>
<td>Monitor participant during practice</td>
</tr>
<tr>
<td><strong>Step 7</strong></td>
<td>Provide supportive and corrective feedback (the latter if applicable).</td>
</tr>
<tr>
<td><strong>Step 8</strong></td>
<td>Repeat Steps 5, 6, and 7 until trainee can perform the skill with 100% accuracy</td>
</tr>
<tr>
<td><strong>Step 9</strong></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 5</th>
<th>Have trainee practice performing CTD (Provides participant with all needed materials)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 6</td>
<td>Monitor participant during practice</td>
</tr>
<tr>
<td>Step 7</td>
<td>Provide supportive and corrective feedback (the latter if applicable).</td>
</tr>
</tbody>
</table>
Appendix D

Social Validity
1. To what degree do you feel that professional development you received was effective? (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 evidence-based practice you implemented with your student was effective? (circle a choice below)

   1 = Not Effective at All
   2 = Not Very Effective
   3 = Somewhat Effective
   4 = Quite Effective
   5 = Very Effective

3. In your opinion, what was the most effective component of the professional development?

4. What, if anything, would they change about the professional development?

5. 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
Appendix E

CTD handout
Tips for Home or School

Using The System of Least to Most Prompts

By: C. J. Fields

Spring 2013

What is a response prompt?
A response prompt is a teacher/parent behavior targeted at eliciting a child to present correct responding in a method appropriate to that child's communication capabilities. Response prompts are used to increase the probability of correct responding from the child.

What is a prompting hierarchy?
Response prompts exist on a continuum referred to as a prompting hierarchy. The prompting hierarchy is defined by the amount of assistance/intrusion that each prompt requires from the teacher for the child to present a correct response.

What does a prompting hierarchy look like?
Below is an example of a typical response prompting hierarchy:

- **Independent** – the child is able to perform the task on his/her own with no prompts or assistance
- **Gesture** – indicate with a motion what you want the child to do (e.g., pointing)
- **Indirect (Verbal or Nonverbal)** – tell the child that something is expected, but not exactly what (e.g., “Now what?” “What’s next?”, etc.) or use body language (e.g., expectant facial expression, questioning hand motion with a shrug, etc.)
- **Direct Verbal** – tell the child what he/she is expected to do or say (e.g., “Turn your power chair right.”)
- **Modeling** – show the child what you want him/her to do
- **Partial Physical Assistance** – provide minimal supported guidance
- **Full Physical Assistance** – provide hand-under-hand guidance to help the student complete the desired task

What is the system of least to most prompts?
The system of least prompts, also referred to as least intrusive prompts and increasing assistance, is a prompting strategy where the teacher/parent progresses through a prompting hierarchy (like the one shown above) from the assumed least intrusive prompt to the most intrusive prompt necessary to obtain a correct response from the child. When a teacher/parent is utilizing the system of least to most prompts when providing a learning opportunity for a child, it is important to always begin by allowing the child an opportunity to respond correctly to the natural cue or question posed without any prompt being given (i.e., a chance for the child to respond independently). It is also important that the last prompt in the prompting hierarchy ensures that the child responds correctly. This is known as the controlling prompt, and effectively allows the child to successfully and correctly respond during each learning opportunity. This is important in building the child's understanding of what type of correct response is expected, and in providing consistent opportunities for success regardless of the child’s abilities. All correct responses should be accompanied by positive reinforcement that is meaningful to the child. If a child responds incorrectly at any point in the prompting hierarchy the parent/teacher will immediately move to the next prompt in the prompting hierarchy. The ultimate goal of the system of least prompts is for the child to provide a correct response before a prompt is given.

When are prompts used and how are they faded?
Prompts are only used as a support mechanism for students when necessary, and only for as long as is necessary. At whatever the least intrusive prompt level a child responds correctly, that is where the trial for that specific learning task ends. Therefore, the prompts in the system of least to most prompts are self-fading, meaning that as a child begins to learn how to perform a skill correctly at prompting levels of decreased intrusiveness, then the more intrusive prompts that were previously used are no longer necessary.
How not to use response prompting

A prompting hierarchy is not meant to be used in a way that produces prompt dependency in the child. Prompts are also not used to fill in quiet space while a child is processing/responding.

Example of a least to most prompting hierarchy:

<table>
<thead>
<tr>
<th>Activity: Using a spoon to eat</th>
<th>Prompt hierarchy: Independent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Interval Between Prompts: 3 Seconds</td>
<td>Gesture</td>
</tr>
<tr>
<td></td>
<td>Indirect Verbal</td>
</tr>
<tr>
<td></td>
<td>Direct Verbal</td>
</tr>
<tr>
<td>Reinforcer: Verbal descriptive praise (e.g., &quot;Great job picking up the spoon!&quot;)</td>
<td>Model</td>
</tr>
<tr>
<td></td>
<td>Partial Physical Assistance</td>
</tr>
<tr>
<td></td>
<td>Full-Physical Assistance</td>
</tr>
</tbody>
</table>

Independent
1. Place food item and spoon in front of child and wait 3 seconds to see if the child responds independently

Gesture
2. If the child does not respond in 3 seconds, direct the child to the spoon by pointing (gesturing) to the spoon

Indirect Verbal
3. If the child does not respond in 3 seconds, ask the child, “What do you do with the spoon,” or “How do you eat your…” (The indirect verbal prompt can be paired with the gesture prompt)

Direct Verbal
4. If the child does not respond in 3 seconds, tell the child to “Use your spoon to eat your…” (The direct verbal prompt can be paired with the gesture prompt)

Model
5. If the child does not respond in 3 seconds, pick up the spoon and model scooping the food item and taking it to your mouth. (The model prompt can be paired with the direct verbal prompt)

Partial Physical Assistance
6. If the child does not respond in 3 seconds, use physical assistance to help guide the child’s hand to the spoon but do not use full physical assistance to help the child complete the task of using the spoon to eat the food item. (The partial physical assistance prompt can be paired with the direct verbal prompt)

Full Physical Assistance (Controlling Prompt)
7. If the child does not respond in 3 seconds, use full physical assistance (hand over hand guidance) to fully assist the child in grasping the spoon, scooping the food, and bringing the food to the child’s mouth. (The full physical assistance prompt can be paired with the direct verbal prompt)

References & Sources:
