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Effects of pyramidal behavior skills training on the procedural integrity of school staff when delivering functional communication training to students.

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EFFECTS OF PYRAMIDAL BEHAVIOR SKILLS TRAINING ON THE PROCEDURAL INTEGRITY OF SCHOOL STAFF WHEN DELIVERING FUNCTIONAL COMMUNICATION TRAINING TO STUDENTS

By

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DEDICATION

This dissertation is dedicated to

Mom and Dad for the how,

and Justin and Rowan for the why.

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Tim, Terry, Erick, and Jon – it's easy to feel dwarfed when mentored by individuals whose intellect and skill are immense. Rather than casting a long shadow, you opened every door and valued my contributions. I can't quantify my gratitude for the knowledge and experience you've given me and the respect you've shown me by regarding me as a colleague. Just know that I'll do my best to pay it forward.

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ABSTRACT

EFFECTS OF PYRAMIDAL BEHAVIOR SKILLS TRAINING ON THE PROCEDURAL INTEGRITY OF SCHOOL STAFF WHEN DELIVERING FUNCTIONAL COMMUNICATION TRAINING TO STUDENTS

Erica B. McClure

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Behavioral skills training (BST) is a commonly used, well-researched method for delivering training that has been shown to generate mastery and fidelity across multiple populations and skills. Despite the evidence supporting its use across multiple settings with a variety of populations, few studies have examined the use of pyramidal BST to train educators in a public school setting in the implementation of functional communication training (FCT). This study utilized a concurrent multiple probe across participants design to examine the effects of pyramidal BST on the procedural integrity of general education teachers providing FCT as part of an intervention plan. BST was provided by the researcher to a special education teacher participant in one training session; the special education teacher then utilized BST to provide FCT implementation training to general education staff in single subsequent training sessions. No additional coaching was provided beyond these training sessions. Data collected throughout the study indicated that pyramidal BST provided in one session resulted in an increase in procedural integrity across all general education teacher participants with strong positive effect sizes (d_p estimates range: 11.97 – 16.56). Social validity data indicate that the teacher participants viewed the training as valuable and expressed an interest in receiving further training. The results of this study support the use of pyramidal BST to train general education teachers in the implementation of FCT.

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CHAPTER 1

INTRODUCTION

Research examining the efficacy and efficiency of specific training approaches is needed to ensure individuals with disabilities are receiving access to evidence-based practices implemented by trained and qualified service providers.

Statement of the Problem

According to the U.S. Census Bureau, estimates suggest that 12.5% of the total nonincarcerated civilian population of the United States, approximately 41,089,958 individuals, identify as disabled (United States Census Bureau, 2019). The Centers for Disease Control and Prevention provide an even higher percentage, reporting that 26% of adults living in the United States - 61,000,000 individuals - have some type of disability (Centers for Disease Control and Prevention, 2018). Additionally, the number of students receiving special education services in the U.S. has risen to 7,300,000, or 14% of all public school students (Institute of Educational Sciences, 2021). Support needs for these individuals range from providing environmental accommodations ensuring equitable access to the provision of specially designed instruction and significant modifications to support participation in and acquisition of daily living skills. In addition to these support needs, many individuals with disabilities engage in behaviors that are challenging and may interfere with multiple aspects of daily life, including skill acquisition, quality of life, and safety (Poppes et al., 2010). These behaviors are likely to worsen without effective treatment and persist throughout adulthood (Matson & Rivet, 2008).

The provision of intervention strategies and other support services to individuals with disabilities requires the use of evidence-based practices (Cook et al., 2012). Multiple

organizations have emphasized the importance of their inclusion within the service delivery framework (National Autism Center, 2015; National Institute for Health and Care Excellence, 2015; No Child Left Behind Act of 2001, 2002), which has led to the development of multiple standards for evaluating the quality and rigor of research promoting the use of specific strategies (Council for Exceptional Children, 2014; What Works Clearinghouse, 2020). Several researchers have applied these standards to evaluate research examining interventions for individuals with disabilities (Cowan et al., 2017; Steinbrenner et al., 2020; Wong et al., 2015; Zimmerman et al., 2018), identifying multiple strategies with a significant evidence base supporting their use in providing services to individuals with disabilities.

Despite the continued contribution of rigorous research to an ever-expanding evidence base supporting the use of specific practices with individuals with disabilities, a gap between research and practice persists (Odom et al., 2013). Service providers working with individuals with disabilities are required by governmental agencies and insurance companies to implement evidence-based practices but receive little guidance in how to identify such practices (Odom et al., 2010). Many service providers also lack qualifications directly related to their role (Campbell, 2010), and this lack of skills can lead to significant consequences for individuals with disabilities and their service providers (Gormley et al., 2020). Fortunately, research has shown that service providers can be effectively trained to implement evidence-based practices when the training program is well-designed and comprehensive (Maffei-Almodovar & Sturmey, 2018). Training in evidence-based practices is additionally linked with lower levels of staff burnout and higher levels of job satisfaction (Gormley et al.).

Given the prevalence of disabilities and the need for well-designed and comprehensive training for service providers in implementing evidence-based interventions, the purpose of the present study is threefold. First, use behavior skills training (BST) to train a K-12 public school teacher certified in special education in providing functional commu-

nication training (FCT) training to general education teachers. Second, apply pyramidal training using BST to engage a special education certified teacher in training general education teachers to provide FCT. Third, examine the relationship between pyramidal training using BST and general education teachers' implementation fidelity. Finally, the study also aims to assess participants' views of the social validity and acceptability of the training included in the study. Specifically, the following research question(s) are addressed:

RQ1: What is the effect of using BST in a pyramidal model utilizing a special education teacher to train general education teachers on FCT procedural integrity?

RQ2: How do participants (e.g., special education teacher, general education teachers) regard the social validity or acceptability of pyramidal training using BST to provide training in FCT?

The remainder of this chapter offers descriptions of behavior skills training, a training method with a significant evidence base demonstrating its efficacy across individuals, settings, and skills, and pyramidal training, a method of training implementation that incorporates a cascading model that provides an efficient way of disseminating information to a range of trainees, before describing how training may contribute to the development of service providers' procedural integrity when implementing functional communication training.

Behavior Skills Training: Processes and Procedures

While there are research studies supporting a wide variety of training approaches, behavioral skills training (BST) is a commonly used, well-researched method for delivering training that has been shown to generate mastery and fidelity across multiple populations and skills (Kirkpatrick et al., 2019). Researchers have used BST to efficaciously train service providers, primarily educators and caregivers, to implement a variety of interventions and strategies, including discrete trial teaching (Clayton & Headley, 2019;

Fetherston & Sturmey, 2014; Forte et al., 2018; Lerman et al., 2008; Nosik et al., 2013; Pollard et al., 2014; Sarokoff & Sturmey, 2004), preference assessments (Bishop & Kenzer, 2012; Lavie & Sturmey, 2002; Pence et al., 2012; Roscoe & Fisher, 2008; Weston et al., 2020), mand training (Nigro-Bruzzi & Sturmey, 2010), incidental teaching (Fetherston & Sturmey, 2014; Sawyer et al., 2017), functional analyses (Rios et al., 2020; Wallace et al., 2004; Ward-Horner & Sturmey, 2012), behavior intervention plans (Hogan et al., 2015; Madzharova et al., 2018), and functional communication training (Clay et al., 2021; Gormley et al., 2019; Gregori et al., 2021; Sawyer et al., 2017). BST has also been used in conjunction with pyramidal training to train service providers in implementing specific strategies (Andzik & Canella-Malone, 2019; Andzik & Schaefer, 2019; Conklin & Wallace, 2019; Erath et al., 2020; Gregori et al., 2022).

BST includes four steps that promote skill acquisition: instruction, during which the trainer provides direct instruction in use of the skill; modeling, in which the trainer demonstrates application of the skill; rehearsal, during which the trainees are provided with multiple opportunities to practice application of the skill while the trainer observes; and feedback, in which the trainer provides specific feedback to each trainee on their performance of the skill (Hogan et al., 2015). Each step can be repeated as needed until trainees meet a preestablished criteria for mastery. BST is designed to be individualized to the trainee and may involve additional supports, including video modeling, verbal vs. visual feedback, and supported practice (Kirkpatrick et al., 2019). Trainers may also combine or modify the order of BST components as needed or eliminate some aspects of training and still effect positive outcomes (Madzharova et al., 2018).

BST Research: Evidence of Efficacy

In order to evaluate the evidence base and identify the variety of practical applications that have been examined in previous studies, multiple researchers have conducted comprehensive reviews to assess the body of research exploring the efficacy of BST. A few have incorporated an analysis of the quality and rigor of the included studies (e.g.,

Kirkpatrick et al., 2019) and quantitative analysis of outcomes, including calculation of effect sizes (Brock et al., 2017; Maffei-Almodovar & Sturmey, 2018), while others have focused primarily on synthesizing aspects of the body of BST research (e.g., Gormley et al., 2020). Multiple reviews examined and summarized factors of BST research, including participants, skills included in training, settings, and outcome measures. Additionally, several reviews noted the positive training outcomes associated with BST and its applicability across various settings and service providers.

In their meta-analysis of practitioner training studies, Brock et al. (2017) evaluated peer-reviewed single-case-design studies in which researchers examined the effects of training on practitioner implementation of educational strategies. Of the 118 studies included in their review, only seven studies identified BST as the specific method of training implemented with participants. When discussing the results of their analyses, Brock et al. noted that BST was associated with the most consistent improvement of practitioner implementation fidelity, with components of BST (feedback, modeling, and instruction) having significantly strong effects on implementation fidelity. Brock et al. also reported that most of the included studies involved in-service special education teachers or paraprofessionals as trainees.

Similarly, Maffei-Almodovar and Sturmey (2018) conducted a meta-analysis to evaluate the procedures used to train service providers how to conduct discrete trial teaching, preference assessments, and mand training. Researchers scored 32 studies using quality indicators based on criteria proposed by Horner et al. (2005) before calculating the percent of non-overlapping data (Scruggs et al., 1987), improvement rate difference (Parker et al., 2009), and effect sizes for 195 participants' data. Across the included studies, researchers most commonly used BST, which Maffei-Almodovar and Sturmey noted was consistently and highly efficacious in changing trainees' behaviors. BST and pyramidal BST also had the largest effect sizes with the narrowest confidence intervals. When reflecting on the results of their analyses, the researchers noted that BST is a highly efficacious method for

training service providers.

Additional literature reviews also provided further evidence that BST leads to positive outcomes. Kirkpatrick et al. (2019) cogently designated BST as "an effective and empirically validated teaching method to train or teach new skills…" (p. 355). Shapiro and Kazemi (2017) also observed that BST and similar training approaches establish and maintain high procedural fidelity and that BST's efficacy has been well-established. In their review of staff training, Gormley et al. (2020) described BST as a training method that "has been repeatedly implemented to effectively and efficiently educate frontline staff…" (p. 201). These reviews and analyses support the designation of BST as an efficacious training strategy and promote its use across skills with a variety of service providers.

BST within a Pyramidal Training Model

Though BST has a significant evidence base supporting its application, it requires the use of limited resources, namely the amount of time needed to train individuals and an expert in the targeted skill who can provide the training (Shapiro & Kazemi, 2017). One way to minimize the number of training sessions delivered by one expert is to use a pyramidal or cascading model of training to create multiple trainers who can in turn train additional staff in the skill, efficiently disseminating training to a range of service providers (Walker et al., 2021). By utilizing service providers (e.g., preservice BCBAs, special education teachers) as staff trainers, researchers build capacity in these individuals while increasing procedural integrity in the trained skills (Andzik & Canella-Malone, 2019). Additionally, the pyramidal model is cost and time efficient, in that an expert is able to train a small group of individuals who can then disseminate the training to a broader group of staff.

Pyramidal training has been shown to increase the procedural integrity of different types of service providers (direct care staff, teachers, paraprofessionals, and caregivers) engaging with various target populations (e.g., individuals with developmental disabilities, children engaging in problem behavior, adults in day treatment programs; Pence et al.,

2014). Additionally, BST embedded within a pyramidal model has been applied in multiple settings to increase skills of service providers in several strategies, including behavior management plans (Ducharme et al., 2001; Kuhn et al., 2003; Page et al., 1982; Shore et al., 1995), functional analyses (Pence et al., 2014), preference assessments (Pence et al., 2012), discrete trial teaching (Lerman et al., 2020), and functional communication training (Walker et al., 2021).

Functional Communication Training

Functional communication training (FCT) is a strategy utilized to address challenging behaviors that focuses on increasing an individual's skill area in the use of a socially acceptable functional communication response in lieu of the challenging behaviors to access reinforcers (Carr & Durand, 1985). FCT has been deemed an evidence-based practice for individuals with autism spectrum disorder, intellectual disabilities, other health impairments, and multiple disabilities and is supported by a large body of research that has accumulated over several decades (Muharib & Pennington, 2019). Practical application of FCT has been demonstrated across multiple settings to address varied behaviors, resulting in a significant reduction of problem behavior ($\geq$ 80%) in 90% of recorded research applications (Ghaemmaghami et al.; 2021).

Despite the significant evidence supporting the implementation of FCT with individuals with disabilities and the use of BST as a training method, few studies have examined the use of BST to train direct service providers in the implementation of FCT (Gregori et al., 2021). In a recent review of functional communication training research, Gerow et al. (2018) found that 73% of interventionists were researchers, and only 7% were non-school professionals trained by researchers to implement FCT. Of these studies, only two (Gregori et al., 2022; Walker et al., 2021) used BST within a pyramidal model to train service providers to implement BST when training additional staff in the use of FCT. Both studies found that the use of BST within a pyramidal model increased practitioners' procedural integrity when implementing FCT with individuals post-training.

As the previous sections indicate, while there is a large body of research supporting the use of BST and FCT, few studies have examined the effects of using BST in a pyramidal model utilizing preservice BCBAs to train behavior technicians on FCT procedural integrity. As efficacy of interventions can change across individuals, settings, and behaviors, repeated application and replication of previously efficacious interventions is essential to determine if a practice can be considered evidence-based and potentially effective when applied outside of the experimental setting. Given that the body of research examining the effects of BST in a pyramidal model on trainees' FCT procedural integrity is comparatively small, this study aims to contribute to the body of research building an evidence base promoting the use of this practice. The next chapter describes the limited research examining the application of BST with educators and the use of pyramidal training with service providers, while subsequent chapters outline the methodology and results of the current study.

CHAPTER 2

LITERATURE REVIEW

As the previous chapter outlined, more research is needed to identify the most efficacious and efficient methods for training service providers how to implement evidence-based practices. Therefore, a literature review was conducted to identify how researchers have used BST to teach service providers how to implement programming. Results from this review were used to inform the current study that sought to examine the effects of BST within a pyramidal model on the procedural integrity of FCT procedures implemented by general education teachers.

Method

An electronic search was conducted of the Educational Research Information Center (ERIC), Academic Search Complete, PsycINFO, and Psychology and Behavioral Sciences Collection databases using the keywords behavior skills training or BST AND pyramidal training. The initial search generated 8 results; limiting the results to full-text articles that were peer-reviewed yielded 4 results. Titles of the articles were reviewed to determine relevancy to the current review; three articles met the following inclusion criteria: (a) published in a peer-reviewed, English-language journal; (b) the study utilized an experimental design; (c) the study focused on measuring the effects of BST within a pyramidal model on service providers' procedural integrity; (d) the outcomes included quantifiable measures; and e) the outcome measures provided data that permitted parsing out effects on training outcomes, specifically service provider participants' procedural integrity.

To supplement the initial search and ensure that additional studies were not over-

looked, the following searchers were conducted using the same databases: behavior skills training AND train the trainer, which yielded 1 duplicate result; behavior skills training AND coaching, which yielded no new results that met inclusion criteria; and pyramidal training, which yielded six articles which met inclusion criteria, three of which were duplicates. In addition, ancestral searches were conducted of two published meta-analyses (Brock et al., 2017; Maffei-Almodovar & Sturmey; 2018) and three articles, selected for their relevance to the current study (Walker et al., 2021), datedness (Pence et al., 2012), and currency (Gregori et al., 2022). Searches of the five sources yielded an additional six articles that met initial inclusion criteria. The following sections summarize the 13 research studies found through these searches that met all inclusion criteria.

Participants and Settings

Table 1 outlines the number of participants and setting for all studies included in this review. The 13 studies included 159 participants who received BST as part of a pyramidal training model. The ages of participants ranged from 22 to 59 years, and participants' years of experience ranged from 0 (new to the position) to 32. Only 7% of the included participants for whom researchers reported sex were male, and, of the 30 participants whose race/ethnicity was provided, 90% were White. Researchers described 49% of participants as teachers; additional participants were paraprofessionals (19%), staff or clinicians (27%) or college students (5%). Three studies (Pence et al., 2012; Pence et al., 2014; Walker et al., 2021) noted that 22 total participants were either currently enrolled in or had previously taken coursework in applied behavior analysis. All articles included in the review reported settings in which training was provided. Over half of the included studies (54%) utilized school classrooms or libraries as training locations. An additional three studies (23%) included a university observation room as a training setting. In the remaining three studies, training occurred in a room within an administrative building, a childcare facility, or group homes.

Table 1

Study Design, Training Content, Number/Role of Participants, and Setting

Author(s), Date	Design	Training Content	No./Role of Participants	Setting
Andzik & Canel-la-Malone (2019)	Multiple probe	Opportunities to initiate, least-to-most prompting	3 teachers, 4 paraprofessionals	Junior high/high school classrooms
Andzik & Schaefer (2020)	Multiple probe	Incidental teaching, opportunities to initiate	4 preservice teachers	University campus office
Brock & Carter (2016)	Multiple probe	Peer support arrangements	4 teachers, 4 paraprofessionals	Middle school classrooms
Demchak & Browder (1990)	Multiple probe	Prompting, behavior-specific praise	6 direct service staff	Group homes
Demchak, Kontos, & Neisworth (1992)	Multiple baseline	Behavior management strategies	9 direct service personnel	Childcare center
Erath et al. (2020)	Multiple baseline (nonconcurrent)	Reinforcing desirable behaviors	25 direct service providers	Space in organization's main office building

Table 1 (cont.)

Study Design, Training Content, Number/Role of Participants, and Setting

Author(s), Date	Design	Training Content	No./Role of Participants	Setting
Gregori et al. (2022)	Multiple baseline (nonconcurrent)	FCT	2 teachers, 3 paraprofessionals	Preschool
Lerman et al. (2020)	Multiple baseline	Discrete-trial teaching	16 teachers, 16 paraprofessionals	University-based clinic therapy rooms
Martocchio & Rosales (2016)	Multiple baseline (nonconcurrent)	Picture Exchange Communication System	8 college students	University observation room
Parsons et al. (2013)	Multiple probe	Behavior specific praise, least-to-most prompting, providing choice	7 teachers, 1 paraprofessional, 2 technicians	Adult education program library & classrooms
Pence et al. (2012)	Multiple probe	Preference assessments	26 teachers, 1 clinician	Elementary school library / classrooms, school administrative building

Table 1 (cont.)

Study Design, Training Content, Number/Role of Participants, and Setting

Author(s), Date	Design	Training Content	No./Role of Participants	Setting
Pence et al. (2014)	Multiple baseline	Functional analysis methods	12 teachers	School library / classrooms
Walker et al. (2021)	Multiple baseline	FCT	3 teachers, 3 paraprofessionals	Elementary school class-rooms

Study Designs and Training Content

Table 1 also outlines the study design, number of participants, and training content of each included study. Seven (54%) of the studies covered in the review included a multiple baseline design. A multiple baseline is a time-lagged design in which implementation of the treatment condition is delayed or staggered at specific intervals across tiers, permitting a comparison of baseline (A) and treatment (B) conditions across settings, participants, or behaviors (Ledford & Gast, 2018). Six of the studies included in the review utilized a multiple baseline across participants design and the remaining six studies utilized a multiple probe design. A multiple probe design, similar to a multiple baseline design, involves implementing treatment conditions on a delayed schedule but doesn't require continuous measurement of participants prior to introducing the treatment condition (Ledford & Gast). Rather than continuously measuring the dependent variable during each participant's baseline condition, researchers who use a multiple probe design conduct probes to monitor participant performance after introducing the treatment condition to the top, or first, tier participant.

Training content across the 13 studies is varied, but similarities and patterns are observable. Six of the trainings included strategies for increasing student or client communication skills (e.g., opportunities to initiate, FCT), while three of the trained interventions included identifying or considering the function of a targeted behavior (e.g., functional analysis). Three trainings focused on increasing trainees' skills in delivering a specific type of instruction (e.g., discrete-trial teaching, incidental teaching). Eight of the trainings included some form of differential reinforcement (e.g., reinforcing desired behaviors, behavior specific praise, Picture Exchange Communication System). All of the studies investigated whether BST would result in an increase in procedural fidelity.

Pyramidal BST

As noted in the first chapter, BST is an evidence-based method for training when targeting skill development and procedural integrity. While, in some studies, the compo-

nents involved in BST (instructions, modeling, rehearsal, and feedback) have been adapted or removed to meet situational needs, research studies have consistently demonstrated the efficacy of BST as a training method (Madzharova et al., 2018). This section will provide a description of each component of BST and elements of the method that are commonly included.

Expert-generated Task Analysis

Prior to beginning BST, a trainer must identify what skill will be taught and develop a concise written description outlining essential components of the skill's implementation (Parsons & Rollyson, 2012). This commonly requires the development of a task analysis, the process of breaking a targeted skill down into smaller, more manageable steps. Development of a task analysis typically necessitates observing or consulting with an expert in the skill to ensure that all essential components of a skilled execution of the task are included in the written description. After identifying the steps involved in completing the targeted skill, trainers use this information to behaviorally define the task using a tool (e.g., a performance checklist; Lattimore et al., 1984). The trainer should also identify mastery criteria and establish goals and a rationale for training prior to beginning instruction with a trainee.

In addition to the task analysis, trainers may also need to provide trainees with a written summary of how staff should respond in different scenarios (Macurik et al., 2008). This is particularly prudent when training a service provider in a skill intended to address a student or client's challenging behavior. For example, if the service provider is receiving training in FCT, the trainer should provide a written summary of how the service provider needs to respond if the individual engages in the behavior targeted for reduction (e.g., planned ignoring, prompting, differential reinforcement). Again, these descriptions should be clear and succinct, focusing on exactly what the service provider should do in the provided scenarios. Referring the trainee to a lengthier document with superfluous information may result in a lack of access and awareness of key components (Parsons & Rollyson, 2012). As with all of the components of BST, modifications can and should be made to

accommodate individual trainee needs.

Instruction

Instruction in the targeted skill requires sharing detailed information regarding the individual components necessary to proficiently complete a task as outlined by the task analysis. When beginning instruction, the trainer should share training goals and the rationales for training with the trainee before introducing the task analysis. Instruction can include either spoken or written instructions which should be individualized to the targeted skill and the trainee as needed. Instruction should be provided using concise language that promotes understanding and a smooth transition to rehearsal. Similar to modeling and rehearsal, instruction can occur in a separate training area or in the environment in which the skill will eventually be applied (in-situ; e.g., a classroom). Instruction should include introduction of any tools developed to assess performance (e.g., procedural integrity checklist) and can include modeling when appropriate.

Instruction in the targeted skill requires sharing detailed information regarding the individual components necessary to proficiently complete a task as outlined by the task analysis.

Modeling

Once instruction has been provided, the trainer should model performance of the skill. Modeling, a demonstration by the trainer of each essential step included in the task analysis, can involve role play, video models, or in-situ presentation of the skill. In some cases, instruction is delivered in conjunction with a model (e.g., saying the steps as they are modeled). If a trainer uses role play, they will need a confederate if the target skill includes interaction with another individual. The role play demonstration must be well-scripted and rehearsed prior to modeling with a trainee to ensure that involved parties accurately demonstrate all essential components of the target skill (Adams et al., 1980). While role play involves the in-person demonstration of a skill with a confederate, video modeling allows the same opportunities for presentation of the skill while also permitting demon-

stration in relevant contexts and standardization of training models (Catania et al., 2009). Video modeling, in its uniformity, does not permit differentiation of training modeling to meet trainee needs as readily as role play; it does, however, provide the opportunity to ensure that the target skill is proficiently demonstrated in its entirety prior to presenting the model to trainees. The video can be recorded in a training area or in the environment where the skill will be utilized by trainees.

In-situ modeling, providing a demonstration of the target skill in the setting where the trainee will apply it, permits the trainer to show proficient application using the natural environment. This may help with generalization and maintenance of the target skill in settings where the trainee is expected to proficiently execute the skill post-training (Miltenberger et al., 2005). In-situ modeling does not offer the same level of control, which may limit opportunities to differentiate and select a preferred demonstration from a sample. Regardless of which model is selected, the trainer should ensure that the model includes a proficient demonstration of all essential components of the target skill as outlined by the task analysis and any accompanying performance assessment tool (e.g., procedural integrity checklist) and that the model meets or exceeds mastery criteria outlined prior to beginning training.

Rehearsal

Following demonstration of the target skill, trainees are provided with opportunities to rehearse the skill in situations similar to the provided model (either role play or in-situ). If a video model was provided, the rehearsal setting should replicate the video as much as possible. Trainees should begin rehearsing the easiest steps of the skill first before adding in more complicated components. Additionally, trainees should have access to all materials needed to complete the skill; these should closely replicate materials that will be used to execute the skill outside of the training session if the actual items are not available. During rehearsal, the trainer should assess the trainee's current level of mastery and take notes as needed to provide praise and clear, corrective feedback immediately after the

trainee performs the skill. The trainee should continue to rehearse each component of the skill until they reach mastery criteria. Though many training programs may omit opportunities to practice a skill, rehearsal is a critical feature of BST and should be required of each trainee (Nigro-Bruzzi & Sturmey, 2010).

Feedback

Immediately following trainee rehearsal, trainers should provide individualized praise and corrective feedback. Praise should outline exactly what the trainee did correctly, while corrective feedback should describe how the trainee erred in their execution (Parsons & Rollyson, 2012). As with instruction, feedback should be clear, concise, and descriptive and may take different forms (e.g., vocal, written, graphic). Though provision of accurate and thorough feedback is important, corrective feedback should not attempt to address too many errors at once. Additionally, feedback may include instruction and modeling to demonstrate skills that the trainee completed incorrectly. Trainers should refer to data collected while observing rehearsal to provide detailed feedback based on the previously established mastery criteria. Rehearsal and feedback, with additional instruction and modeling as needed, should be cycled through until the trainee meets mastery criteria in the training environment. Once mastery criteria has been met, the trainer can ensure that skills generalize outside the training environment and are maintained over time by conducting in situ observations. Modeling, rehearsal, and feedback can continue as needed.

Pyramidal Model

Although BST is supported by a multitude of studies demonstrating its efficacy, the practice can require a significant amount of an expert's time, particularly if many people need to receive training. Embedding training within a pyramidal model is an efficient method for disseminating training to multiple recipients that reduces the length of time needed to build capacity within the group. Additionally, when staff within a setting are trained to support the skill acquisition of other staff, the continued presence of those trainers may in-

crease maintenance of the newly acquired skills (Demchak et al., 1992). Pyramidal training involves a senior trainer (an expert in the targeted skill) providing training to a small group of staff who then train additional individuals in the target skill (Parsons et al., 2013). Researchers have investigated the effects of pyramidal BST on practitioner procedural fidelity across various settings and target skills. The next section outlines these studies, including methodology and observed results.

Pyramidal BST Research

In Demchak & Browder's (1990) study investigating the application of pyramidal BST, three supervisors working in group homes received training in delivering BST, prompting, and behavior specific praise. Once they met mastery criteria, these supervisors then used BST to train residential aides in the application of a systematic prompting hierarchy and behavior specific praise. Throughout baseline, post-training, and maintenance phases, researchers used a multiple probe design to observe the effect of training on participants' procedural integrity. Researchers utilized a task analysis and procedural checklist to measure procedural integrity across interventions and participants. Results indicated that all participants increased their use of prompts and praise with clients; these changes were significant and maintained throughout generalization and maintenance probes.

Demchak et al. (1992) evaluated the effect of BST embedded within a pyramidal model on childcare center staff's implementation of behavior management strategies. Researchers trained three staff members in the use of contingent ignoring, time-out, and verbal reprimands before these staff trained additional individuals in the procedures. Measurement of participant performance was embedded within a multiple baseline design, and researchers collected data on procedural integrity using a checklist. Results showed that staff selection and implementation of trained skills increased after training across both sets of trainees. Additional measures assessing the social validity of the provided training indicated that 97% of the participants viewed the training procedures favorably, and 100% of included staff reported that the training was beneficial in enabling them to use behavior

management techniques to improve child behavior.

In their analysis of the effects of pyramidal BST training on teachers' implementation fidelity of preference assessments, Pence et al. (2012) utilized a multiple probe design across two experiments with 27 total participants. In the first experiment, eight teachers and one clinician who were also students in a course sequence designed to prepare teachers to become BCBAs received training in preference assessments. Researchers trained three of the teacher participants in providing BST to the other six participants, who then received BST in preference assessments from the trained teachers. All participants showed a significant increase in procedural integrity when implementing preference assessments post-training. In the second experiment, five of the trainees from the first experiment provided BST in administering preference assessments to 18 preschool teachers while the three teacher trainers from the first experiment took procedural integrity data and provided feedback. Training resulted in immediate increases in procedural integrity for all trainees, and all trainees met mastery criteria for all included preference assessments.

Parsons et al. (2013) utilized pyramidal BST to train 10 service providers working in an adult education program to provide behavior specific praise, least-to-most prompting (LTM), and choice opportunities. Researchers used a multiple probe across participants design across three groups of participants. Participants received training in BST and the targeted skills during a series of training sessions before researchers observed the service providers training other staff in on-the-job assessment sessions. After post-training observation sessions, researchers asked participants to complete a social validity survey. All three groups increased their procedural fidelity and correct implementation of training steps post-training. Additionally, participants rated the training as highly useful and practical.

In Pence et al.'s (2014) study analyzing the impact of pyramidal BST of participants' procedural integrity, twelve special education teachers received training in conducting functional analyses (FAs). All of the included participants were previously or currently enrolled in a course sequence designed to prepare teachers to become BCBAs (none of the

participants were certified throughout the duration of the study). Using a multiple baseline design, an experienced behavior analyst with over ten years' experience conducting FAs trained six participants in conducting functional analysis conditions and delivering BST in a pre-experimental workshop. These six participants then used BST to train six additional teacher participants in conducting FAs. Researchers utilized a procedural integrity checklist to assess participants' progress towards mastery criteria (≥ 90% of trained components). Fidelity for all trainees rapidly increased to mastery levels after training, and skills remained at mastery level when generalized to a classroom setting.

Brock and Carter (2016) included four teacher and paraprofessional pairs in their study examining the effects of pyramidal BST on the procedural integrity of paraprofessionals facilitating peer support arrangements. All participants supported students with disabilities who attended middle schools in a rural or large urban school district. Researchers utilized a multiple probe design to assess the efficacy of pyramidal BST and determined participant proficiency using multi-step implementation checklists across skills (i.e., teacher-led training and facilitation of peer support arrangements). After collecting baseline data, researchers trained the four teacher participants in BST and facilitation to mastery prior to the teachers engaging the paraprofessional participants in BST targeting facilitation skills. While results varied across paraprofessionals, only one paraprofessional showed a consistent significant increase in facilitation skills post-training.

Martocchio and Rosales (2016) investigated the impacts of BST embedded in a pyramidal model on eight university students' procedural integrity when implementing the Picture Exchange Communication System (PECS) with a confederate learner. Researchers conducted all observation sessions in a university observation room. After collecting baseline data, Martocchio and Rosales trained three graduate students in PECS and utilization of BST to train other individuals until the students reached mastery criterion. The three graduate students then trained the remaining five student participants in PECS implementation using BST as a training method. All participants' procedural integrity increased

significantly post-training, with all participants achieving mastery criteria within 2-12 sessions. When discussing the results, researchers noted that the data support the use of the BST pyramidal training model to teach implementation of PECS.

In their study examining the effects of a pyramidal training approach to implementing BST, Andzik and Cannella-Malone (2019) taught three special education teachers to train four paraeducators to provide students with intellectual and developmental disabilities with opportunities to initiate social interactions (OTI) and provide LTM. Teachers were paired with paraprofessional trainees based on classroom placement and student assignment in a junior high and high school in a rural school district. Using a multiple probe design, researchers observed procedural integrity during training, generalization, and maintenance phases, using implementation checklists to record data and assess mastery of the targeted skill. Additionally, researchers observed students across various settings during baseline and intervention phases and documented the rate of initiations with and without prompting.

After collecting baseline data, Andzik and Cannella-Malone utilized BST during ~22-minute training sessions in the teachers' classrooms to train teachers in providing OTI and LTM and providing BST to paraprofessionals. Once trainees reached mastery criteria, researchers then observed teachers using BST to teach OTI and LTM to paraprofessionals. After completion of BST, researchers continued to observe paraprofessionals implementing the target skills as well as track students' rates of initiations across settings and through treatment and maintenance phases. Data showed an increase in procedural integrity across participants from 0% during baseline to 93-100% following teacher-led training. Similarly, students' initiations increased across all participants as well. Researchers also measured the social validity of BST as applied in the study by asking participants Likert-type questions; results indicated high social validity across interventions.

Similarly, Andzik and Schaefer (2020) implemented BST within a pyramidal training model to observe its effects on the procedural integrity of service providers using incidental teaching to increase OTI for students with complex communication needs. Re-

searchers recruited four preservice special education teachers to participate in the study; all baseline, treatment, and generalization sessions took place in an office on a university campus. Using a multiple probe design, Andzik and Schaefer assessed participants' mastery of the target skill using incidental teaching and BST checklists. Baseline data for all participants were low, with individual data points ranging from 0-20% procedural integrity. After receiving training in incidental teaching and BST, participants' procedural integrity across skills rose significantly to 90-100%. Participants continued to demonstrate mastery across maintenance phases. Additionally, researchers asked participants to complete a survey to assess the social validity of the provided training; results indicated high social validity of the provided BST.

In their study examining the impact of pyramidal BST on staff-delivered training and procedural integrity of behavioral procedures implemented by staff, Erath et al. (2020) provided BST using a one-time group-training format to 25 service providers at a residential treatment facility. Using a nonconcurrent multiple baseline design, researchers trained participants to provide BST in reinforcement procedures during the group training session which lasted approximately 50 minutes. During baseline and post-observation sessions, researchers instructed participants to train a confederate staff member to reinforce a desirable behavior outlined in a provided scenario. Erath et al. used a procedural integrity checklist to assess participants' progress towards the mastery criterion of 100%. Additionally, they asked each participant to complete a modified version of the Intervention Rating Profile (IRP-15; Martens et al., 1985) to assess the social validity of the provided BST. Results showed that 10 participants met mastery criterion following training, while an additional 10 participants required supplemental feedback post-training to reach 100% procedural fidelity. Of the five participants who did not meet the mastery criterion, only two did not demonstrate significant improvement in procedural fidelity post-training. All 25 participants rated the provided training as highly socially valid.

Using a multiple baseline design, Lerman et al. (2020) evaluated 16 teachers' use of

BST to train paraprofessionals to implement discrete-trail teaching (DTT). After collecting baseline data assessing paraprofessional procedural integrity, researchers used BST to train each teacher to implement DTT with students and use BST to train paraprofessionals. Once each teacher reached mastery criteria, researchers gave the teachers training materials and instructed the teachers to train paraprofessionals in DTT procedures. Experimenters then observed the paraprofessional conducting multiple sessions with a research assistant playing the role of the student. Researchers provided feedback to teachers if any paraprofessionals did not perform components of DTT with at least 85% accuracy. Five teachers were then trained to generalize the skill to new training targets (i.e., paraprofessionals). After the conclusion of training sessions, researchers asked participants to complete a satisfaction survey assessing social validity of the included interventions. All participants demonstrated an increase in procedural integrity post-training, and results indicated a significant impact of feedback on paraprofessional performance. Additionally, the survey's results indicated that participants liked each component of BST and viewed BST as effective in teaching new skills.

Walker et al. (2021) examined the effects of special education teachers' delivery of BST within a coaching model on paraprofessional implementation of FCT with student participants. Training was embedded within a multiple baseline design; researchers introduced the teacher-delivered BST after observing stability across baseline sessions and/or a clear level change occurred post-training for participants in other tiers. Researchers collected procedural integrity across participants using an implementation fidelity checklist during all observation sessions. Prior to training staff, researchers conducted functional behavior assessments (FBAs) for each student participant to identify functions of target behaviors and develop an FCT implementation plan based on FBA results. Once researchers finalized the FCT implementation plan, they trained teachers in implementation of individualized FCT and use of BST to train paraprofessionals in FCT procedures. During baseline observation sessions, special education teachers provided paraprofessionals with copies of the

FCT plan but did not provide any training in its implementation. When transitioning into the treatment condition, each paraprofessional received BST in FCT implementation with student participants. Once treatment observations had concluded, Walker et al. asked participants to complete a social validity survey. Results showed that paraprofessionals' procedural integrity increased post-training and remained at or above mastery criteria during maintenance probes. Participants also agreed or strongly agreed with items on the social validity survey related to effectiveness, delivery, and value of teacher-delivered BST.

Gregori et al. (2022) utilized pyramidal BST as part of a program designed to train teachers to serve as coaches for paraprofessionals in a special education elementary school. Using a multiple baseline design, researchers evaluated the effects of the training program on paraprofessional procedural integrity when implementing FCT with students. Gregori et al. also measured student engagement in challenging behavior and use of appropriate communication. Researchers collected data during five-minute observation sessions using procedural integrity checklists and 10-second partial interval recording. After collecting baseline data, teachers received training in BST and FCT prior to training and coaching paraprofessionals in FCT implementation. Results indicated that all paraprofessionals' procedural integrity rose significantly post-training, reaching mastery criterion. As paraprofessionals' procedural integrity increased, students' levels of challenging behavior decreased and use of mands increased.

As outlined throughout this section, there are multiple studies examining the efficacy of a pyramidal BST in increasing the procedural integrity of service providers implementing a variety of interventions. Several studies involved staff in an educational setting, including teachers and paraprofessionals; many of these studies utilized special education teachers as coaches and trainers of other support staff. Other studies included direct services providers working in residential facilities or adult education centers. Experience levels of direct service providers and other participants varied widely. Additionally, a small portion of the studies included students who were either preservice teachers or currently

enrolled in a course sequence designed to prepare educators to become BCBAs. A large majority of the studies included in this review (92%) yielded results that demonstrated an increase in the procedural integrity of participants after provision of pyramidal BST, indicating the presence of effective practices that should be examined further to provide high quality evidence to support the use of pyramidal BST with preservice BCBAs and behavior technicians.

Limitations and Implications

As noted previously, disabilities are fairly widespread among the U.S. population and can lead to the need for significant supports and the provision of evidence-based interventions by direct service personnel. Both factors indicate a substantial need for research identifying effective and efficient training models for educators to increase skills in specific strategies. Despite this need, however, limited research has been conducted. This may be a result of researchers training educators and caregivers to ensure consistent procedural fidelity across the protocols being investigated. As needs for well-trained educators arise, however, identification of effective and efficient training models becomes increasingly necessary and relevant. Additional research is also needed to demonstrate the applicability of pyramidal BST to specific evidence-based strategies (e.g., FCT) across a variety of direct service providers. As evidence-based interventions and effective training models are needed, researchers must engage in methodologically rigorous studies to identify them.

While several of the 13 studies included in this review could conceivably contribute to the evidence base supporting pyramidal BST as an effective training model, there is a dearth of high-quality studies investigating application of this method of training with special education certified and general education teachers implementing FCT. Replication of previous studies that provided positive results would lead to the development of a sufficient evidence base identifying effective practices to efficiently train educators and increase procedural integrity. When identifying studies to replicate, however, researchers should prioritize training models that are efficient, minimally intrusive, socially signifi-

cant, and practical. Researchers should also ensure that data collection is accurate and task analyses are described explicitly to allow identification of factors that may influence an intervention's efficacy while also clarifying participants and strategies with which specific training models may yield positive results. Additionally, researchers should ensure that any interventions included in a study examining the efficacy of pyramidal BST have a significant evidence base supporting their implementation to avoid possible confounding variables influencing the training's efficacy.

Despite the scarcity of research studies examining this topic, most of the studies included in this review yielded promising results. A vast majority of the reviewed studies (92%) reported significant increases in the procedural integrity of trained participants. Additionally, studies that included student or client outcomes as a dependent variable reported positive results (i.e., increase in behaviors targeted for growth, decrease in behaviors targeted for reduction). Across all included studies, researchers or experts provided limited trainings to staff who, in turn, provided training and support to their trainees. This decreased the need for expert time devoted to building capacity in service providers and permitted trainers to provide ongoing support and feedback as well as additional training as needed. Future research should continue to focus on the efficacy and efficiency of pyramidal BST across service providers, settings, and evidence-based strategies while expanding the included participants. Additionally, researchers should include measures to assess the social validity of any treatments or trainings implemented as part of the study to ensure that the interventions are socially significant to both students and their service providers.

Conclusion

In Brock et al.'s 2017 comprehensive review and meta-analysis of practitioner training studies, the authors noted the importance of bridging the research-to-practice gap and practitioner training as one possible method to achieve this goal. In addition to identifying multiple training strategies – including BST - that are associated with consistent, significant effects on service provider procedural integrity, the authors also found that dif-

ferent interventions may be difficult to train to fidelity. They also noted that "there is still much to learn about what training strategies are most effective, how to make training more feasible, and which combinations of training and practices best promote student outcomes" (p. 25). Identifying which strategies are most efficacious and efficient will require the accumulation of an evidence base across research groups engaging in high-quality research. Other reviews by Gormley et al. (2020), Kirkpatrick et al. (2019), and Shapiro & Kazemi (2017) similarly emphasized the need for additional research in this area in order to increase service provider procedural integrity when implementing research-based practices and identify efficacious training models to aid with practitioner skill development.

Of the 13 articles identified and included in this review, seven included special education certified teachers providing training to additional school staff. Only one of these studies involved certified teachers training other teachers, none of which included general education teachers. As general education teachers are increasingly tasked with providing instruction to students with disabilities, research identifying efficacious training models with these populations is critical. Many general education teachers do not have training in special education, nor do they feel confident in their abilities to meet the needs of students with disabilities; this lack of training and skills, when coupled with the demands of supporting students with increasingly diverse needs, can contribute significantly to teacher burnout, attrition, and turnover (Gilmour et al., 2022). The dearth of studies investigating the effects of pyramidal BST provided by special education certified teachers on the procedural integrity of general education teachers indicates a significant need for additional research that includes the application of various evidence-based strategies. This becomes increasingly consequential when coupled with the need for well-trained educators to provide support services to a widening group of individuals with disabilities.

CHAPTER 3

METHOD

The purpose of this chapter is to describe the methodology proposed for this study, by outlining and addressing the following: participants, independent and dependent variables, research design, measurement procedures, and plan for data analysis. The study is designed to evaluate the effectiveness and acceptability of pyramidal training delivered by a special education certified teacher using behavioral skills training (BST) to teach general education teachers how to implement an intervention including functional communication training (FCT). Specifically, the following research question(s) were addressed:

RQ1: What is the effect of using BST in a pyramidal model utilizing a special education teacher to train general education teachers on FCT procedural integrity?

RQ2: How do participants (e.g., special education teacher, general education teachers) regard the social validity or acceptability of pyramidal training using BST to provide training in FCT?

Participants

Recruitment procedures

Once the University of Louisville Institutional Review Board formally approved the study, the researcher contacted the director of special education in a rural school district in the state of Kentucky to identify potential participants for inclusion in the study. The researcher sent an email that provided a description of the study and a copy of the recruitment flier. Participants met the following criteria for inclusion in the study: special education teacher working with a student currently engaging in task-avoidant behavior who had not previously

received instruction or training in BST OR general education teacher working with the same student who had not previously received instruction or training in BST or FCT. After identifying potential participants, the researcher met with school staff to describe the study and review consent documents. After the researcher explained the consent form and answered all questions posed by potential participants, all teachers provided signed consent for participation in the study. All study procedures occurred during the 2023 Spring semester.

Teacher participants were recruited from a rural school district located in Kentucky. According to the most recent data available (i.e., reflecting the 2021-2022 school year; Kentucky Department of Education, n.d.), 10,159 students were enrolled in the district's 17 schools. Students identified as female by the district made up 48.49% of the student population (district data only presented binary gender identifiers). Twenty-three percent of the students were classified as racial minorities (6.16% African American, 0.13% American Indian or Alaskan Native, 0.89% Asian, 10.79% Hispanic or Latinx, 0.16% Native Hawaiian or Pacific Islander, and 5.10% classified as two or more races). The remaining 76.78% of the student body was classified as White (not Hispanic). Among all preschool through 12th grade students, 51.12% were identified as economically disadvantaged, 18.72% were identified with a disability and received special education services, and 4.36% were identified as English language learners. Additionally, 141 students (1.39%) were in foster care, 1,604 students (15.79%) were identified as gifted and talented, and 341 students (3.36%) were identified as homeless by the district.

The district employed 604 full-time teachers, 496 (82.12%) of whom were identified by the district as female (district data only presented binary gender identifiers). Teacher population in the district included 14 (2.32%) identified as African American, 2 (0.33%) identified as Asian, 5 (0.83%) identified as Hispanic or Latinx, 3 (0.50%) identified as Native Hawaiian or Pacific Islander, and 1 (0.17%) identified as two or more races. The remaining 95.86% of teachers working in the district were identified as White (not Hispanic). The average student to teacher ratio across the district was reported as 16:1. Educator qualifica-

tions were reported by the district as follows: 0.20% Associate's degree, 24.70% Bachelor's degree, 48.10% Master's degree, 24.10% Rank I, 2.30% Specialist, and 0.60% Doctorate. The average school experience across all full-time teachers was reported by the district as 10.6 years, with 32 (5.30%) teachers having only one year of experience. The district experienced 14.6% teacher turnover (92 teachers) during the previous school year (Kentucky Department of Education, n.d.).

Teacher Participants

Five teacher participants agreed to participate and completed all phases of the study. All teachers provided instruction to the same 6th grade team of students; the special education teacher participant co-taught with all general education teacher participants but was only present in two class periods (i.e., Math and Social Studies) during which observers collected procedural integrity data on general education teachers' implementation of the intervention plan with FCT.

Participant 1. Participant 1 was a 32-year-old White male who taught 6th grade Science. His primary spoken language was English, and his annual household income was $50,000-99,999. He had previously earned a Master's degree in education and had been teaching for 5 years. This was his first year at his current placement. Prior to teaching 6th grade, he had taught Science at another middle school and at a high school. While he had taken classes on classroom management as part of his degree coursework, he had not previously received training in FCT or BST. He indicated that he did not have a disability diagnosis. He did not co-teach with participant 5 during the selected observation class period.

Participant 2. Participant 2 was a 33-year-old White female who taught 6th grade English and Language Arts. Her primary spoken language was English, and her annual household income $50,000-99,999. She had previously earned a Bachelor's degree in secondary English education and had been teaching for 9 years. This was her seventh year at her current placement. She had not previously received training in FCT or BST. She reported to the researcher that she had anxiety and was recently diagnosed as an adult. She did not

co-teach with participant 5 during the selected observation class period.

Participant 3. Participant 3 was a 41-year-old White female who taught 6th grade Math. Her primary spoken language was English, and her annual household income $100,000-200,000. She had previously earned a Bachelor's degree in business management and marketing. This was her first year of teaching. She had not previously received training in implementing interventions with students, including FCT or BST. She indicated that she did not have a disability diagnosis. She co-taught with participant 5 during the selected observation class period.

Participant 4. Participant 4 was a 35-year-old White female who taught 6th grade Social Studies. Her primary spoken language was English, and her annual household income $50,000-99,999. She had previously earned a Master's degree in education and had been teaching for 12 years. This was her first year at her current placement. She had not previously received training in FCT or BST but indicated a strong interest in receiving support and training in multiple skills related to teaching and classroom management. She reported receiving diagnoses for her anxiety and depression which were obtained through a doctor's evaluation when she was 34 years old. She co-taught with participant 5 during the selected observation class period.

Participant 5. Participant 5 was a 46-year-old White male who co-taught with the four other participants in the study, providing special education services to 6th grade students in their classes. His primary spoken language was English, and his annual household income was $100,000-200,000. He had previously earned a Master's degree in special education and had been working in schools for 10 years. This was his fifth year at his current placement. Prior to teaching special education, he had worked as a paraprofessional in a school setting and had taught for several years in another state. All of his experience in education occurred at middle and high schools. While he had taken classes on classroom management and behavior supports as part of his degree coursework, he had not previously received training in FCT or BST. He indicated that he did not have a disability diagnosis.

Table 2

Participant Demographic and Education Data

Participant	Age	Sex	Race/Ethnicity	Education Level	Years' Experience
Participant 1	32	M	White	Master's	5
Participant 2	33	F	White	Bachelor's	9
Participant 3	35	F	White	Master's	12
Participant 4	41	F	White	Bachelor's	<1
Participant 5	46	M	White	Master's	10

Settings

Study site

This study occurred at a public middle school (grades 6-8) in a rural district in Kentucky. Per the most recent data publicly available (Kentucky Department of Education, n.d.), 822 students attended the middle school during the 2021-2023 school year. Female students comprise 49.5% of the student body. Racial demographics of the student population were as follows: 7.2% African American, 0.9% Asian, 11.2% Hispanic or Latinx, 5.0% two or more races, and 75.8% White. One hundred twenty four students (15.1%) received special education services for an identified disability, while 145 students (17.6%) were labeled as gifted and talented. Four hundred thirty three students (52.7%) were identified at economically disadvantaged. The researcher conducted all study procedures during the Spring semester of the 2022/2023 school year beginning in February and concluding in March.

Training setting

All BST training sessions occurred in a special education classroom in the 6th grade hallway on the second floor of the middle school. Participants received trained in the classroom during designated teacher planning time scheduled for the last class period

of each day. The classroom contained ten desks pushed together in two rows of five desks facing each other with the front of the desks touching each other in pairs. This created a shape similar to a long table in the center of the room. The room also held multiple bookshelves, a dry erase/SMART board, and a teacher desk. The researcher and special education teacher utilized the ten desks in the center of the room for training. No other individuals, outside of the researcher, trainer, and trainee, were present during training sessions.

Implementation settings

General education teachers implemented the intervention in their classrooms. Participant 1 taught Science in a classroom with tables in four rows. A teacher desk and a lab table lined the front wall of the classroom, which was covered with a dry erase/SMART board. Additional lab tables lined the perimeter of the classroom. Students sat in chairs at the four rows of tables facing the front of the classroom. There was a gap in each row near the center of the classroom to permit students and the teacher to walk in between rows. The teacher provided most instruction from the front of the classroom but would circulate frequently to provide feedback to and directly engage with students. The student who received the intervention sat in the first row of tables on the end near the middle of the classroom.

Participant 2 taught English/Language Arts in a classroom with multiple desks arranged in groups of four or five. The front of desks faced each other or sat next to each other to form square (groups of five had an additional desk sitting on one end). Students sat in chairs facing the desks' surfaces and each other. Multiple bookshelves sat against the back classroom wall, while a teacher desk filled the corner of the room opposite the door. The front wall of the classroom was covered by a dry erase/SMART board along with a small table and storage bin with paper and other school supplies. The teacher moved throughout the room while reading passages but would also provide instruction from the front of the classroom. When students worked independently, she would sit either at her desk or a group of desks near the middle back of the classroom. The student who received the intervention sat at the group of desks near the middle back of the classroom.

Participant 3 taught Math in a classroom with desks in four rows. Desks were clustered in groups of two, three, or four, sitting next to each other with the front of the desk directed towards the front of the classroom. Students sat in chairs at desks facing the front of the classroom. A teacher desk filled the corner opposite the door. The front wall of the classroom was covered with a dry erase/SMART board along with a small table and storage bin with paper and other school supplies. There was a gap in each row every two to four desks to permit students and the teacher to walk in between rows. The teacher moved throughout the room while students worked independently but would also provide instruction from the front of the classroom. The student who received the intervention sat at a desk in the middle of the row nearest the back of the classroom.

Participant 4 taught Social Studies in a classroom with multiple desks arranged in groups of four or five. The front of desks faced each other or sat next to each other to form square (groups of five had an additional desk sitting on one end). Students sat in chairs facing the desks' surfaces and each other. Multiple bookshelves sat against the back classroom wall, while a teacher desk filled the corner of the room opposite the door. The front wall of the classroom was covered by a dry erase/SMART board along with a small table and storage bin with paper and other school supplies. The teacher mostly provided instruction from the front of the classroom or her desk but also moved throughout the room while reading passages to students. When students worked independently, she would sit either at her desk or move around the classroom. The student who received the intervention sat at the group of desks near the middle back of the classroom.

Experimenter and Data Collectors

The researcher served as the primary interventionist during the special education certified teacher training session and directly supervised intervention implementation during general education teacher training and FCT implementation sessions in all baseline and post-training conditions. The researcher, a doctoral candidate in Curriculum and Instruction at the University of Louisville with a focus in special edu-

cation and applied behavior analysis, is a Board Certified Behavior Analyst (BCBA) with 12 years' experience working as a special education teacher and behavior coach with a variety of populations (e.g., individuals with intellectual disabilities, individuals with autism, individuals with emotional behavioral disabilities, individuals with learning disabilities, etc.). Secondary observers, doctoral students within the College of Education and Human Development at the University of Louisville, collected reliability and treatment fidelity measures on a pre-determined schedule across all conditions.

Dependent Variables

The primary dependent variable addressing the first research question was the percentage of components completed correctly on a BST treatment fidelity checklist (see Table 3). Steps executed in any order were scored as correctly implemented. Additionally, the researcher encouraged the trainer to solicit questions and provide answers throughout the training process. The implementation checklist was adapted from the checklist developed by Andzik and Schaefer (2020), which was based on the practice guidelines for using BST as a teaching method proposed by Parsons et al. (2013). In addition to the four basic components of BST (i.e., instruction, modeling, rehearsal, and feedback), the checklist included providing a rationale for the training, asking and answering any questions, providing trainees with needed materials, and prompting the trainees to reflect on their performance. Data collectors scored this measure by observing the researcher and special education certified teacher executing the training with other participants. Specifically, data collectors circled "yes" for every BST component executed correctly and "no" for every BST component that was omitted or executed incorrectly.

Table 3

BST Components

Component	Direction
1	Provide rationale for FCT
2	Vocally describe the steps of the FCT programming
3	Provide the trainee with a written summary of the FCT programming
4	Model implementation of FCT programming
5	Ask if the trainee has any questions and answer all questions asked
6	Provide trainee with all needed FCT materials
7	Have trainee rehearse FCT programming
8	Observe trainee during rehearsal and collect data on FCT implementation using checklist
9	Provide supportive and corrective feedback using data collected during rehearsal
10	Ask trainee which components of FCT they perceive they implemented (in)correctly
11	Ask if the trainee has any questions and answer all questions asked
12	Repeat components 2-11 until the trainee meets mastery criteria as assessed by the FCT implementation checklist

The secondary dependent variable addressing the second research question across conditions was the procedural integrity of FCT procedures implemented by general education teachers. The researcher recorded and reported data as percentage of components

correctly implemented per observation session. Paper copies of FCT intervention procedural integrity checklists were based on FCT programming developed prior to the study by the researcher in collaboration with other school staff. As the purpose of the study did not include examining the effects of FCT programming on student behavior, the researcher did not conduct a traditional functional behavior assessment to hypothesize the function of the student's behavior or collect data on specific student behavior. Rather, the researcher directed teachers to identify one student they all shared whom they believed consistently engaged in task-avoidant behavior. All teacher participants unanimously agreed on one student prior to collaborating with the researcher to develop an intervention plan including a concurrent schedule of reinforcement and FCT. Again, as the focus of the study included examining the effect of pyramidal BST on teacher procedural fidelity when implementing an FCT intervention, conducting a functional behavior assessment to confirm the function of the student's behavior was irrelevant. As the researcher did not conduct a formal assessment to hypothesize the function of the student's behavior, the intervention was not function-based but rather a behavioral intervention that included aspects of FCT.

The purpose of the FCT intervention procedural integrity checklist was to measure the fidelity of FCT procedures implemented by general education teacher participants before and after exposure to BST. Data collectors scored this measure by observing general education teachers executing FCT during baseline and post-training observation sessions and circling "yes" for every FCT component executed correctly and "no" for every FCT component that was omitted or executed incorrectly. Data collectors circled "NA" on components for which conditions facilitating their use were not presented during the observation (e.g., the student did not request a one-minute break).

Social Validity

As noted by Baer et al. (1987), the purpose of social validity measures is not only to assess the acceptability of interventions by stakeholders but also to avoid rejection of an intervention when it is later disseminated to other relevant populations. Considering

the need for research examining pyramidal training involving special education certified and general education teachers and the potentially widespread practical applicability of the topic, it appears logical to include a measure of social validity. In this study, participants were asked to fill out the Training Impact Questionnaire (Training IQ) to assess the general acceptability of the interventions. The Training IQ tasks a rater with scoring 20 items using a Likert-type scale, all of which assess acceptability of the training's procedures and results (DeWine, 1987). Additionally, the tool has high internal consistency (Cronbach's alpha = .88) and is generally considered a reliable measure (Lester et al., 2014). The researcher adapted the Training IQ to reflect the specific training included in the study (e.g., changed the wording of some items) prior to administration. Additionally, the researcher eliminated multiple items from the questionnaire prior to implementation due to a lack of relevancy (e.g., questions asking about the "company," questions asking about learning skills "on the job" that were not included in the training).

Materials

Recording Device

A password-protected video recording device (i.e., laptop) was used to record all training sessions. Videos were uploaded into a secure, password-protected cloud storage system safeguarded by the University of Louisville (i.e., CardBox). Once the primary researcher and a secondary observer reviewed videos for scoring and reliability measures, videos were deleted from the laptop and CardBox.

Copies of Procedural Integrity Data Sheet and Treatment Fidelity Checklist

The researcher provided paper copies of FCT intervention procedural integrity data sheets and BST treatment fidelity checklists to secondary observers during observation sessions conducted to measure interobserver agreement. Additionally, the researcher filled out copies of the checklists during all observation sessions. Only the researcher had access to the completed forms. Once data collection sources were no longer needed for the purposes

of the study, completed data sheets were shredded.

Functional Communication Training Programming and Materials

The researcher developed a student task checklist to outline the steps involved in FCT programming (see Figure 1). In addition to the student task checklist, trainers also utilized and provided trainees with a copy of the FCT intervention procedural integrity data sheet which outlined the steps of the intervention plan. The researcher and participants used the materials during baseline and treatment conditions to engage in FCT.

Figure 1.

Student Task Checklist

Task Checklist

Remember, you can ask for a short break or complete the items on the checklist for a longer break with a preferred activity!

Class:_____

1. Bellringer	
2.	
3.	
4.	
5. Clean up area before leaving the room	

Copies of the Training Impact Questionnaire (Training IQ)

The researcher utilized the Training IQ to assess participants' perceptions of the social validity of the training. After conclusion of the final treatment session, each participant was tasked with completing a copy of the Training IQ. The researcher gave each participant

a copy of the form before asking them to complete the form anonymously and give their completed copy to the special education certified teacher participant. Forms were completed privately and anonymously returned to the researcher in an unmarked, sealed envelope.

Interobserver Agreement

Interobserver agreement (IOA) was collected during 40% of all baseline and treatment sessions; observers recorded the inclusion of individual BST components implemented by the special education teacher by assessing the percentage of components completed correctly on a BST implementation checklist. Observers also collected procedural integrity data for individual FCT components performed by general education teachers using a FCT intervention procedural integrity data sheet. Secondary observers, recruited from the doctoral program within the special education department in the College of Education and Human Development at the University of Louisville, remained blind to the study's conditions and purpose. The primary researcher used BST (see Scheel, 2020) to train secondary observers in the use of the BST treatment fidelity checklist and the FCT intervention procedural integrity data sheet to record implementation fidelity. Training ended once the researcher and secondary observer reached 100% agreement across three consecutive observations when recording data. During all conditions, the researcher calculated IOA using an exact agreement-per-item method by dividing the sum of items for which both observers recorded the same response by the total number of items. The resulting value was then be multiplied by 100% to obtain a percentage of agreement.

$$\frac{\text{\# of items with same response}}{\text{total \# of items}} \times 100 = \text{exact-agreement-per-item IOA\%}$$

Table 4 reports IOA between the researcher and secondary observers for FCT across all conditions.

Table 4

Mean Interobserver Agreement for Procedural Integrity

Participant	Baseline	Post-training Observations
Participant 1	100%	97%
Participant 2	97%	100%
Participant 3	100%	100%
Participant 4	100%	100%
Participant 5	NA	100%

Study Design

The researcher used a concurrent multiple probe across participants design to analyze the effect of pyramidal training on the special education teacher's BST treatment fidelity and general education teachers' FCT procedural integrity. Multiple probe designs evaluate several baseline-treatment (A-B) comparisons by initiating baseline (A) to treatment (B) condition changes for three or more different targets at different points in time. Multiple probe designs are well-suited for studies examining the effects of a particular intervention on skill acquisition, as the knowledge gained from the training or instruction provided as part of the intervention cannot be reversed or withdrawn (Ledford & Gast, 2008). This design provides the opportunity for three potential demonstrations of effect through the comparison of phase changes across at least three baseline and treatment conditions.

As it provides the opportunity to measure training efficacy, a concurrent multiple probe design was selected for the current study. While a multiple baseline design would also be applicable to this study, a multiple probe design was selected for its ability to control for testing threats to internal validity throughout extended baseline conditions. The researcher addressed history, a common threat to the internal validity of multiple probe

studies, by increasing the length of conditions if data were not stable. The researcher addressed additional threats, including procedural infidelity and attrition bias, by measuring treatment fidelity during all conditions and randomly assigning participant clusters to tiers.

Study Procedures

Developing FCT Procedural Integrity Data Sheet and BST Treatment Fidelity Checklist

As accurately and reliably measuring the procedural integrity of any treatment implementation is dependent upon clear, concise, and objective descriptions of the included processes, the researcher developed the FCT intervention procedural integrity data sheet and BST treatment fidelity checklists to measure both BST treatment fidelity and FCT procedural integrity. The process of development involved consulting with school staff to develop an FCT intervention plan which involved a concurrent schedule of reinforcement including FCT. The intervention required teachers to remind the student as he entered the classroom that he could either request a brief one-minute break while working or request a checklist of tasks he could complete to earn a longer higher-quality break with access to preferred tangible items (i.e., technology, candy). If the student did not request either after transitioning into the classroom, the teacher would approach the student to provide a second verbal reminder. If the student requested a break, the teacher would set a timer for one minute and prompt the student to return to the assigned task once one minute had passed. If the student requested the checklist, the teacher would provide a copy of the checklist and review the task list with the student. As the student completed tasks on the list, the teacher would mark the list to indicate task completion. If the student engaged in task refusal behaviors (e.g., pushing assignment away from him across the desk surface, standing up and walking around the room, lying head on desk or back of chair with eyes closed or face turned away from the task), the teacher would approach and remind the student that he can ask for a short break or complete the tasks on the checklist for a longer higher-quality break. A BCBA with multiple years' experience who was blind to the study's purpose reviewed the FCT intervention procedural integrity data sheet and BST treatment

fidelity checklist to ensure that each essential component was included and the checklists accurately reflected the intervention's contents.

Baseline

Data collection began with a baseline condition to determine the initial pre-intervention procedural integrity of general education teachers implementing the intervention including FCT. Prior to the baseline condition, the researcher described the intervention plan to the general education teachers by providing verbal instructions in implementing the programming. This included verbal instruction in the FCT intervention and a provided opportunity for general education teachers to ask the researcher questions about implementing the FCT intervention. The researcher then randomly assigned all general education participants to tiers. For the participant in the first tier, data collection occurred for five baseline sessions. After four observation sessions, the researcher provided training in BST and the intervention plan to the special education teacher. Training occurred across one session and lasted until the special education teacher scored 100% implementation fidelity on both the BST treatment fidelity checklist and FCT procedural integrity data sheet. As the baseline data were stable in level and trend across the first five observation sessions, the first tier participant received training in the intervention plan from the special education teacher utilizing BST prior to transitioning into the post-training condition. Additional baseline conditions for all other participants consisted of single weekly probe sessions prior to transitioning into the treatment condition as all baseline data remained stable in both level and trend. The number of baseline probes was determined by the continued stability of data in all tiers and an observed BST treatment fidelity and FCT procedural integrity in post-training conditions in other tiers of $\geq 80\%$ for five consecutive sessions.

The researcher then observed each teacher daily in their classroom interacting with the previously identified student while recording the procedural integrity for individual intervention components using a paper copy of the FCT intervention procedural integrity data sheet. Observations during baseline sessions lasted for 40 minutes. Secondary ob-

servers were present for 40% of baseline sessions and scored procedural integrity for FCT components using a paper copy of the FCT intervention procedural integrity data sheet to obtain IOA.

Training Sessions

Special Education Teacher Training. The researcher engaged the special education teacher in BST, providing training in the FCT intervention and the use of BST to train general education teachers how to implement the intervention with fidelity. BST with the special education teacher included the following components: instruction, modeling, rehearsal, and feedback. Training began with instruction in BST through the review of a paper copy with highlighted components, a paper copy of the BST treatment fidelity checklist, and a PowerPoint presentation describing components of BST. The researcher then modeled implementation of BST with the intervention plan. After answering questions posed by the special education teacher, the researcher prompted the special education teacher to rehearse implementing the intervention plan with the researcher. The researcher collected data on the special education teacher's procedural integrity using the FCT intervention procedural integrity data sheet. Once the special education teacher had the opportunity to practice implementation, the researcher provided feedback utilizing the data sheet as a reference tool. The special education teacher received opportunities for rehearsal followed by feedback until procedural integrity, as scored by the data sheet, reached 100%.

After answering questions posed by the special education teacher, the researcher prompted the special education teacher to rehearse implementing BST with the researcher. The researcher collected data on the special education teacher's treatment fidelity using the BST treatment fidelity checklist. Once the special education teacher had the opportunity to practice implementation, the researcher provided feedback utilizing the BST treatment fidelity checklist as a reference tool. The special education teacher received opportunities for rehearsal followed by feedback until treatment fidelity, as scored by the BST checklist, reached 100%. Secondary observers reviewed a video recording of the session and scored

intervention and BST implementation to obtain treatment fidelity measures.

BST Implementation by Special Education Teacher. General education teachers received training in the intervention based on tier placement and stability of baseline data. The researcher prompted the special education teacher to train each general education teacher individually in implementing the intervention including FCT. During these training sessions, the special education teacher served as interventionists with general education teachers while the researcher observed and served in the role of student. The special education teacher engaged the general education teacher in BST, providing training in the implementation of the intervention programming with fidelity. BST with the general education teachers included the following components: instruction, modeling, rehearsal, and feedback. Training began with instruction in the intervention including FCT through the review of a paper copy with highlighted components and a paper copy of the procedural integrity data sheet. The special education teacher then modeled implementation of the intervention with the researcher acting as the student. After answering any questions posed by the general education teacher, the special education teacher then prompted the general education teacher to rehearse implementing the intervention with the researcher. After the rehearsal phase, the special education teacher encouraged the general education teacher to reflect on their performance before providing feedback and prompting the general education teacher to practice implementation again (as needed). The training session ended once the special education teacher indicated that he was finished with training. The researcher recorded the treatment fidelity for individual BST components using the BST treatment fidelity checklist. Secondary observers reviewed video recordings of each training session and scored BST implementation to obtain IOA measures.

Post-training Observations

During these sessions, the researcher collected data on each general education teacher's implementation of the intervention using the procedural integrity data sheet. The researcher acted in the role of total observer during these observation sessions. Observa-

tions during post-training sessions lasted 40 minutes in duration. The researcher recorded the procedural integrity for individual intervention components using the FCT intervention procedural integrity data sheet. As the post-training data were stable in level and trend across the first five observation sessions, the researcher then conducted single weekly probe observations of participants beyond the first week after they received training in the intervention plan from the special education teacher. Secondary observers were present for 40% of post-training observation sessions and scored procedural integrity for FCT components using the FCT intervention procedural integrity data sheet to obtain IOA.

Social Validity

The researcher provided a copy of the Training IQ and an unmarked envelope to each participant. The researcher instructed participants to complete the form privately (i.e., without the researcher present) and return the completed form to the researcher in the envelope, sealed and unmarked. The researcher opened the sealed envelopes once forms had been anonymously completed and returned to the researcher by all participants. Both the researcher and a secondary observer scored copies of the form independently to ensure reliability.

Treatment Fidelity

The researcher completed treatment fidelity checklists for all training sessions. The secondary observer, recruited from the doctoral program within the special education department in the College of Education and Human Development at the University of Louisville, also completed treatment fidelity checklists for all video recorded training sessions. The primary researcher used BST (see Scheel, 2020) to train the secondary observer in the use of the treatment fidelity checklist to assess treatment fidelity. Training ended once the researcher and secondary observer reached 100% agreement. The researcher calculated treatment fidelity by dividing the sum of components observed by the total number of planned components. The resulting value was then multiplied by 100% to obtain a percentage of fidelity. Results are outlined in Table 5.

$$\frac{\text{\# of observed components}}{\text{total \# of planned components}} \times 100 = \text{treatment fidelity \%}$$

Table 5

Mean Treatment Fidelity Across Observers

Participant	Training
Participant 1	100
Participant 2	100
Participant 3	100
Participant 4	100
Participant 5	100

Data Analysis

Visual Analysis

The researcher used visual analysis to identify the effect of using BST in a pyramidal model utilizing a special education teacher to train general education teachers on BST treatment fidelity and FCT procedural integrity. Data for each participant across conditions was graphed and analyzed to examine the effects. The researcher examined six features of the graphed data: level, trend, variability, consistency of the data, immediacy of the effect, and overlapping data points. The researcher compared these components across adjacent and corresponding conditions across participants, specifically analyzing these features to determine in an intervention effect is present. The researcher assumed an effect if there was an observable difference in these specific components.

Statistical Analysis

To measure the effect size of the training, the researcher calculated the effect size

across all participant data by determining the within-case standardized mean difference (SMD) across conditions. Gingerich (1984) and Busk and Serlin (1992) proposed calculating the within-case SMD for estimating effect sizes of treatments examined using single-case designs. The standardized mean difference parameter δ is defined as the difference between the mean level of the outcome in phase B and the mean level of the outcome in phase A, scaled by the within-case standard deviation of the outcome in phase A (note: if the baseline *sd* = 0, a pooled *sd* across both conditions may be substituted for the phase A *sd*):

$$\delta = \frac{\mu_B - \mu_A}{\sigma_A}$$

with μA and μB signifying the mean levels of phases A and B, respectively, and σA and σB signifying the standard deviations of the outcomes within phases A and B, respectively. Gingerich (1984) and Busk and Serlin (1992) recommended scaling by the SD from phase A only, as inconsistent variance across phases is possible. If constant variance across conditions can be reasonably assumed, the pooled sample SD can be used to calculate the SMD, defined as:

$$s_p = \sqrt{\frac{(m - 1)\, s^2_A + (n - 1)\, s^2_B}{m + n - 2}}$$

with m and n denoting the number of observations in phases A and B, and s_A and s_B indicating the standard deviation across phases A and B, respectively. The pooled sample *sd* is then utilized to calculate the estimated SMD, d_p:

$$d_p = \left(1 - \frac{3}{4(m + n) - 9}\right) \frac{\bar{y}_B - \bar{y}_A}{sp}$$

As σ_A represents within-individual variability only, the scale of the within-case SMD is

not comparable to the scale of the SMD from a between-groups design (e.g., Cohen's *d*); estimates tend to be much larger in scale.

To calculate the effect size, the researcher used an online single-case effect size calculator for multiple-series data (Pustejovsky et al., 2023). For the current study, estimated SMD effect sizes were considered large if $d_p > 10.00$.

Social Validity

The researcher analyzed results of the Training IQ individually and across participants to provide an overall summary of participants' responses to each item. Aggregation involved identifying the mean response to each item using numerical values assigned to each response option (i.e., Strongly Disagree = 1; Disagree = 2; Sometimes Agree and Sometime Disagree = 3; Mostly Agree = 4; Agree = 5; and Strongly Agree = 6). Mean scores greater than or equal to four on questions 1, 2, 3, and 7 were considered indicative of social validity, while mean scores less than three on questions 4, 5, and 6 were considered indicative of social validity.

CHAPTER 4

RESULTS

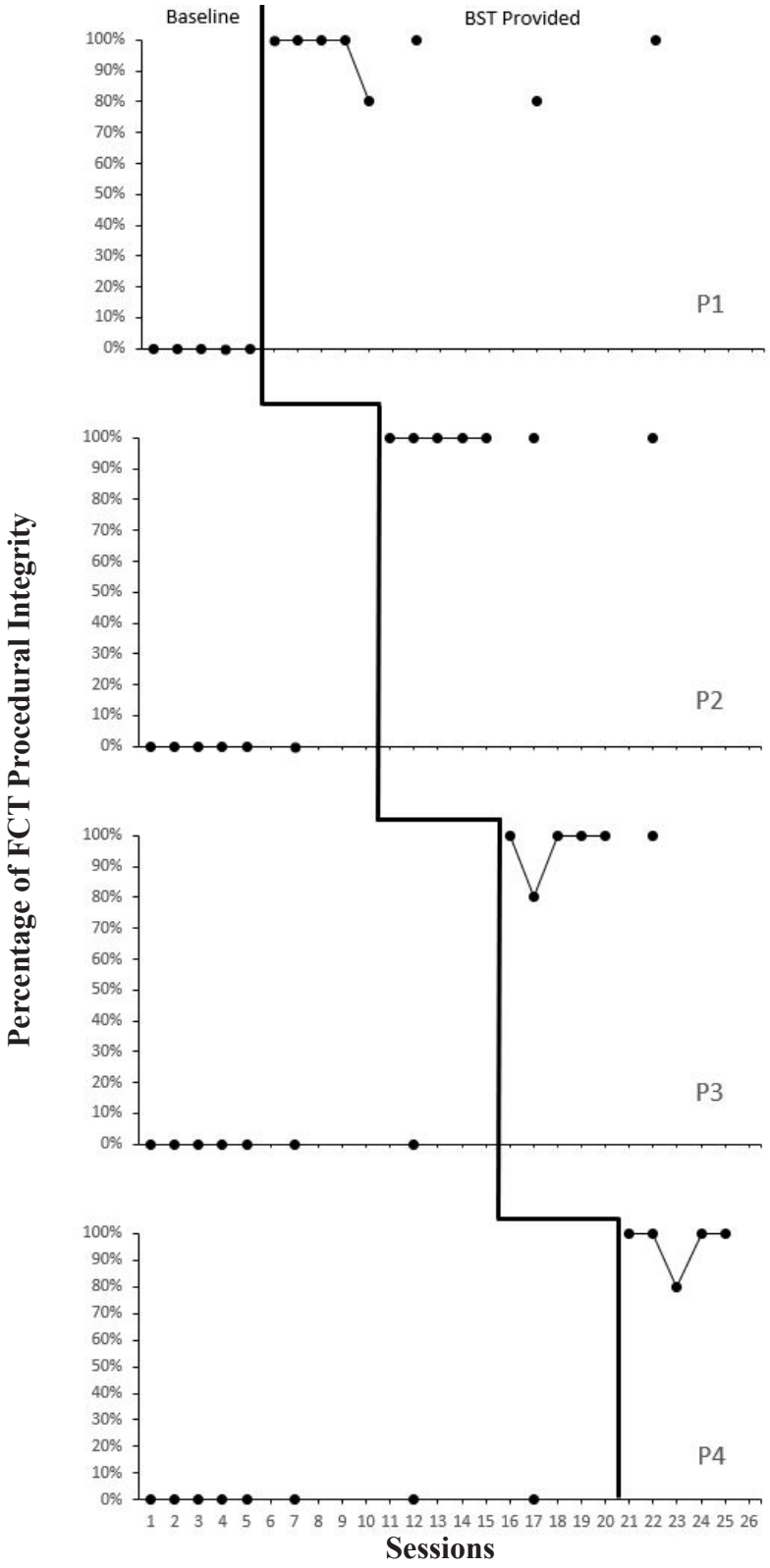
The purpose of this chapter is to present the results of pyramidal BST and its effects on the procedural integrity of general education teachers' implementation of an intervention plan involving FCT. Results also include interobserver agreement and treatment fidelity measures across all baseline and post-training phases. This is followed by graphic and statistical analyses of intervention effects in implementation settings across baseline and post-training phases. The chapter concludes with a report on the training social validity ratings by the five participants included in the study.

Pyramidal Behavior Skills Training in Intervention Implementation

Following the establishment of stable baseline performance across the four participants included in this study, the researcher trained Participant 5 to use BST to train the other participants how to implement FCT programming with integrity. Once post-training procedural integrity levels for Participant 1 were stable (after five post-training observation sessions), Participant 5 trained Participant 2 using BST in implementation of the FCT intervention. The researcher repeated this pattern until Participant 5 provided training to all general education teacher participants. Baseline conditions and post-training conditions occurred in the same settings (i.e., general education teacher participants' classrooms). The primary dependent variable was percentage of FCT intervention components implemented correctly and observed during each 40-minute observation session. Figure 2 presents graphed results for each participant specific to the percentage of FCT components observed across baseline and post training phases using a multiple baseline across participants design.

Figure 2.

Percentage of Procedural Integrity across Participants



Participant 1

Figure 2's top graph panel displays the procedural integrity of intervention implementation in the percent of correct steps for Participant 1. During baseline, researchers did not observe Participant 1 correctly implementing any component of the intervention plan, resulting in a mean baseline procedural integrity percentage of 0. Level and trend remained stable at zero levels throughout baseline. After Participant 1 received BST in implementation of the FCT intervention, percentages of procedural integrity immediately rose to 100% and remained at or near that level for the remainder of the study (i.e., four weeks post-training). Visual analysis indicated a rapid increase in procedural integrity after BST with stable and high-level data throughout the post-treatment condition. BST in FCT intervention implementation had a strong positive effect on procedural integrity (d_p = 11.97, 95% CI = 7.20 to 16.73, $p < .05$).

Participant 2

Figure 2's second-level graph panel displays the procedural integrity of intervention implementation in the percent of correct steps for Participant 2. During baseline, researchers did not observe Participant 2 correctly implementing any component of the intervention plan, resulting in a mean baseline procedural integrity percentage of 0. Level and trend remained stable at zero levels throughout baseline. After Participant 2 received BST in implementation of the FCT intervention, percentages of procedural integrity immediately rose to 100% and remained at that level for the remainder of the study (i.e., three weeks post-training). Visual analysis indicated a rapid increase in procedural integrity after BST with stable and high-level data throughout the post-treatment condition. BST in FCT intervention implementation had a strong positive effect on procedural integrity (d_p = 16.19, 95% CI = 9.81 to 22.56, $p < .05$).

Participant 3

Figure 2's third-level graph panel displays the procedural integrity of intervention implementation in the percent of correct steps for Participant 3. During baseline, research-

ers did not observe Participant 3 correctly implementing any component of the intervention plan, resulting in a mean baseline procedural integrity percentage of 0. Level and trend remained stable at zero levels throughout baseline. After Participant 1 received BST in implementation of the FCT intervention, percentages of procedural integrity immediately rose to 100% and remained at or near that level for the remainder of the study (i.e., two weeks post-training). Visual analysis indicated a rapid increase in procedural integrity after BST with stable and high-level data throughout the post-treatment condition. BST in FCT intervention implementation had a strong positive effect on procedural integrity (d_p = 16.34, 95% CI = 9.91 to 22.77, $p < .05$).

Participant 4

Figure 2's bottom graph panel displays the procedural integrity of intervention implementation in the percent of correct steps for Participant 4. During baseline, researchers did not observe Participant 4 correctly implementing any component of the intervention plan, resulting in a mean baseline procedural integrity percentage of 0. Level and trend remained stable at zero levels throughout baseline. After Participant 4 received BST in implementation of the FCT intervention, percentages of procedural integrity immediately rose to 100% and remained at that level for the remainder of the study (i.e., one week post-training). Visual analysis indicated a rapid increase in procedural integrity after BST with stable and high-level data throughout the post-treatment condition. BST in FCT intervention implementation had a strong positive effect on procedural integrity (d_p = 16.56, 95% CI = 10.04 to 23.08, $p < .05$).

Participant 5

Table 6 displays the accuracy of BST implementation in the percent of correct steps for Participant 5. After receiving training in BST and the FCT intervention from the researcher, Participant 5 consistently and correctly implemented 100% of components of BST when training the general education teacher participants. Percentages reflect number of components observed as implemented correctly divide by the total number of com-

ponents included in the Treatment Fidelity Checklist for BST – Participant 5 as Trainer checklist (see Appendix B).

Table 6

Participant 5 BST Treatment Fidelity by Participant

Participant	Percentage of Correct Components
Participant 1	100
Participant 2	100
Participant 3	100
Participant 4	100

Overall Effect Size

Table 7 outlines the effect sizes of the BST intervention for each participant. Effects of BST on procedural integrity were strong across participants (d_p estimates range: 11.97 – 16.56). The omnibus effect size estimate across all participants' baseline to post-BST was also strong.

Table 7

Within-case Standardized Mean Difference Effect Sizes by Participant

Participant	SMD	SE	CI Lower	CI Upper
1	11.97	2.43	7.20	16.73
2	16.19	3.25	9.81	22.56
3	16.34	3.28	9.91	22.77
4	16.56	3.33	10.04	23.08

Social Validity

Table 8 displays individual participant responses to each question included in the

Training IQ in addition to the overall mean scores for each question across participants. Questions were scaled from 1 to 6, with a score of 1 indicating strong disagreement with a question and a score of 6 indicating strong agreement. The mean of participant responses (M = 5.6) to the first question denoted strong agreement with the statement "I will use this skill regularly on the job." Similarly, participants also strongly agreed (M = 5.6) with the third question, which stated, "I learned to perform the task well in the training program because the program was effective." Participants also indicated strong agreement (M = 5.2) with questions 2 ("After this training program I would perform this skill without practicing") and 7 ("After attending this training program, I am interested in attending other training programs"). Participants strongly disagreed with questions 5 ("I had trouble learning the skill because the training program was confusing") and 6 ("The skill would have been easier to learn with more reference materials"), with M = 1 and M = 1.8, respectively. Additionally, participants disagreed with question 4 ("The skill could be learned from a manual or an instruction sheet as easily as in a training program"), responding with a mean score of 2.2.

Table 8

Social Validity Responses by Participant

Responses	Q 1	Q2	Q3	Q4	Q5	Q6	Q7
Response 1	6	5	6	3	1	2	5
Response 2	5	5	4	1	1	2	6
Response 3	6	6	6	3	1	1	4
Response 4	6	5	6	1	1	1	5
Response 5	5	5	6	3	1	3	6
Mean	5.6	5.2	5.6	2.2	1	1.8	5.2

Q - question

CHAPTER 5

DISCUSSION

The purpose of this chapter is to interpret the results within the context of previous research and the current study's research questions. This is followed by a discussion of study limitations and suggested implications for practice and future research.

Overview

As the number of individuals who need behavioral supports in schools increases, the exigency for educators to acquire skills in proficiently implementing evidence-based interventions intensifies. This creates a significant need for effective and efficient training programs that require little time while providing substantial results that generalize over time and individuals. This study examined the use of one specific method of training – BST embedded in a pyramidal training model – to train general education teachers in the implementation of one evidence-based intervention. Many studies have examined the efficacy of BST across a variety of settings, individuals, and skills, demonstrating its applicability across a wide range of areas (Maffei-Almodovar & Sturmey, 2018). Additionally, pyramidal training models are often employed when training large groups of people in order to increase efficiency of training, as one focus of the training becomes increasing the number of individuals able to train others in the group.

In this study, the researcher trained a special education teacher in the use of BST to train four general education teachers in the use of an intervention embedding FCT in a concurrent schedule of reinforcement. This is similar to another study conducted in a school that utilized pyramidal BST with special education teacher-paraeducator dyads, in which researchers trained three special education teachers using components of BST in

FCT prior to directing the teachers to use the same method to train paraprofessionals in the FCT intervention (Gregori et al., 2022). In this previous study, the three special education teacher-paraprofessional dyads worked in the same classrooms with the same students. Additionally, special education teachers served as coaches throughout the duration of the study, providing continuous feedback and support as both staff members implemented the FCT intervention with the student in the same setting. Gregori et al. utilized a nonconcurrent multiple baseline design to collect data on paraprofessional implementation fidelity, child behavior targeted for reduction, and child use of mands, observing an increase in fidelity across all paraprofessional post-training and decreases in child behaviors targeted for reduction. Another study, conducted by Walker et al. (2021), also utilized a multiple baseline design to examine the effects of pyramidal BST on the procedural fidelity of paraprofessionals' implementation of FCT. Similar to Gregori et al., the three special education teacher-paraprofessional dyads worked in the same classrooms with the same students. Special education teachers served as coaches throughout the duration of the study, providing coaching support as both staff members implemented FCT with the student in the same setting. While Walker et al. did not collect data on student behavior, they noted that results indicated an immediate change in level and increase in stability of procedural fidelity data across all paraprofessional participants.

The current study is not a direct replication of either of the previously described studies; rather, specific components of each study have been modified to contribute to the evidence base supporting the use of pyramidal BST with educators while extending the research conducted by Gregori et al. (2022) and Walker et al. (2021). This study paired one special education teacher with four general education teachers who all provided instruction to the same 6th grade students, including the student selected to receive the FCT intervention as part of this study. The special education teacher was not in the classroom with all participants as they implemented the intervention; two of the teachers did not co-teach with the special education teacher during the class period in which they taught the student receiv-

ing the intervention. The special education teacher and researcher did not provide additional feedback beyond the initial training session for each participant, which lasted approximately 20 to 30 minutes. Finally, the researcher conducted the current study in a middle school with all participants engaging in the same role (i.e., classroom teacher); both studies outlined in the previous paragraph took place in elementary schools, with the trainer/coach serving in a different role from the trainee (special education teacher vs. paraprofessional).

Research Questions

The researcher designed the study to answer the following questions: (a) What is the effect of using BST in a pyramidal model utilizing a special education teacher to train general education teachers on FCT procedural integrity; and (b) How do participants (e.g., special education teacher, general education teachers) regard the social validity or acceptability of pyramidal training using BST to provide training in FCT? Measures collected on general education teachers' procedural integrity and responses to the Training IQ survey address these questions and are outlined in the following section.

Summary of Findings

Pyramidal BST provided by the researcher and special education teacher in the FCT concurrent schedule of reinforcement intervention resulted in immediate increases in procedural integrity across all general education teacher participants. This is consistent with previous research studies examining the use of pyramidal BST to train school staff in FCT interventions (e.g., Gregori et al., 2022; Walker et al., 2021). Across all four general education teacher participants, procedural integrity remained at zero levels throughout baseline before immediately increasing to at or near 100% post-training. These levels maintained throughout the remainder of the study (i.e., one to four weeks after receiving BST). Additionally, the special education teacher maintained 100% treatment fidelity when training all four teachers, one of whom was trained three weeks after the researcher trained the special education teacher in delivering BST (general education teachers were trained in isolation,

one per week). Statistical analysis of study data, which involved analysis of standardized mean differences across study phases by participant, indicated strong positive effects of BST on procedural integrity. Additionally, participants indicated that they strongly agreed that the training was effective, they would use this skill regularly on the job, they were able to perform the skill after training without additional practice, and they were interested in additional trainings. They denoted that they did not agree that the training was confusing, they could have learned the skill as easily from a manual, or that they would have benefitted from more reference materials. These responses demonstrate high social validity of the provided BST.

The data resulting from the current study support the following responses to the research questions. What is the effect of using BST in a pyramidal model utilizing a special education teacher to train general education teachers on FCT procedural integrity? The effect is a strong positive increase in procedural integrity. How do participants (e.g., special education teacher, general education teachers) regard the social validity or acceptability of pyramidal training using BST to provide training in FCT? Participants strongly agreed that the provided training was socially valid and acceptable. These results contribute to the current research base supporting the use of pyramidal BST to train school staff in the implementation of FCT interventions and further extend this research by indicating that BST provided in isolation by special education teachers who do not work in the same setting as trainees can still result in significant increases in trainee procedural integrity.

Limitations

When interpreting the results of this study, the following threats to validity should be considered.

Internal Validity

Internal validity refers to the degree to which the reported results accurately represent the phenomena under study (Ledford & Gast, 2018). When threats to internal validity

are large, study results are not necessarily valid and should be interpreted with caution. The current study included the following potential threats to internal validity: testing and session experience, due to the inclusion of a multiple baseline design; procedural infidelity, due to the nature of pyramidal training and various implementers of the FCT intervention; and observer drift, due to the number of repeated observations conducted by the researcher using the same measurement tool. Other possible confounding variables include diffusion and teacher experience. Each of these threats were addressed as part of the study to limit their impact on the validity of the observed outcomes.

Testing and session experience are common threats to the internal validity of studies, particularly when studies include repeated measures using the same assessment tool or require participants to engage in the same task repeatedly (Ledford & Gast, 2018). In the current study, the researcher opted to limit the number of repeated observations during baseline and post-treatment phases by utilizing a multiple probe design. A multiple probe design limits testing and session experience threats to internal validity by reducing the number of repeated measures during conditions as long as data remain stable. During baseline phases for the current study, the researcher observed each participant for five sessions prior to either transitioning the participant into the treatment phase (Participant 1) or fading the observation schedule from daily to weekly (Participants 2, 3, & 4). Additionally, the researcher observed each participant five times after they had received training before fading the observation schedule from daily to weekly (Participants 1, 2, & 3). The researcher maintained this schedule throughout phases as long as data remained stable.

Procedural infidelity can occur when the procedure of introducing or providing a treatment is not implemented with consistency or accuracy. Due to the inclusion of pyramidal training in the treatment design, multiple trainers were responsible for the provision of the independent variable (i.e., BST). This provided numerous opportunities for procedural infidelity to occur. To ensure trainers maintained procedural fidelity throughout the duration of the study, both the researcher and two independent observers completed treatment

fidelity measures of all training sessions. The resulting data indicated 100% treatment fidelity across all training sessions, with IOA between observers measured at 100%. These data indicate that procedural integrity was an unlikely confounding variable, as procedural fidelity remained high throughout the study.

Observer drift is another threat to internal validity that can occur when one observer repeatedly collects data on a specific dependent variable (DV) using a specific measurement tool. These repeated measures can result in inaccurate data collection over time, as the observer "drifts" or adjusts their data collection in response to the repeatedly observed phenomena or additional variables. To ensure that observer drift was not significantly impacting data, at least one additional independent observer collected data during 40% of observation sessions during baseline and post-training phases. Data collected by the researcher and the independent observers were compared to assess IOA for each session during which both observers were present. The researcher measured IOA across conditions as 97-100%, indicating a reduced likelihood of observer drift impacting internal validity of the collected data.

Diffusion remained a potentially significant threat throughout the duration of the study. Diffusion occurs when treatment effects from one group or participant impact the performance of another group or participant. Due to the close proximity of classrooms and the collaborative nature of the teachers' relationships with one another, training effects could have been observed or shared with other untrained participants. To reduce the potential impacts of diffusion, teachers received training individually in the same setting, with the special education teacher training one general education teacher participant per week. Additionally, general education teachers who received the training were unable to observe trained teachers implementing the intervention, as all teacher participants provided instruction to students on the same schedule (i.e., each teacher participant was engaged in their classroom and was, therefore, unable to observe the trained participants engaging in the intervention). Finally, the researcher and general education teacher requested that

participants avoid discussing the contents of the training with untrained participants. The researcher did observe one instance of collaborative discussion of intervention implementation; this occurred after all four teachers had been trained.

Teacher experience may also serve as a confounding variable, particularly when teacher experience is considerably varied across participants. Years of experience in education across participants ranged from less than one year to 12 years, indicating substantial variance in teacher experience. This potentially would have been a confounding variable if data had indicated observed differences in performance across participants; rather, data were consistent across participants in both baseline and post-treatment observation sessions. This indicates a lack of influence on procedural integrity after the provision of BST, thus implying that teacher experience did not act as a confounding variable in the current study.

External Validity

External validity refers to the degree to which the reported results are generalizable to similar individuals, situations, and settings not included in the study (Ledford & Gast, 2018). In other words, a study is considered externally valid if applying the same treatment to similar groups under similar conditions would likely result in the same outcomes. When threats to external validity are large, treatments that demonstrated efficacy in the study should be utilized under similar conditions with caution. One potential threat due to external validity in the current study is the potential for selection bias, due to the convenience sampling of participants and shared setting (i.e., 6th grade hallway). As participants were not randomly selected (i.e., all were from same school and same grade level/team), selection bias may considerably impact the external validity of the current study. The researcher attempted to address this threat by providing descriptions of participants, settings, and procedures while also demonstrating experimental control.

Lack of Student Measurement

Previous studies examining the effects of pyramidal BST on procedural integrity of school staff providing an intervention including FCT also measured the effects of procedural integrity on student behavior (e.g., Gregori et al., 2022). While most studies examining the efficacy of pyramidal BST do not include a measure of student behavior, the inability to measure the impact of the included intervention on student behavior is a significant limitation of the current study. As the researcher was unable to collect data on the student receiving the intervention, the study did not include a functional behavioral assessment, a common tool used to hypothesize the function of a target behavior prior to developing or implementing a function-based intervention (Cooper et al., 2020). As such, the researcher directed teacher participants to identify a student engaging in task-avoidant behavior to receive the intervention. As functional analyses can be impractical in school settings and completing a functional behavior assessment was not the focus of the current study, the researcher chose to implement a function-based intervention without conducting a formal functional assessment. Instead, the researcher collaborated with school staff to identify a student engaging in task-avoidant behavior that was likely escape-maintained. Under these circumstances, delivering the social reinforcer most commonly associated with task-avoidant behaviors (brief teacher attention and escape from demands) could improve behavior. Previous researchers (e.g., St. Peter & Marsteller, 2017) have observed high rates of appropriate requests and reduced rates of problem behavior when delivering function-based interventions without conducting a formal functional assessment of the target behavior. While this is not ideal, the selection of a student who would potentially benefit from the intervention and was not at the time of the study receiving any behavioral supports suggests that the provision of the concurrent schedule of reinforcement utilizing FCT would likely cause no harm and could, rather, potentially increase student engagement. While measuring the effects of the intervention on student behavior was not the focus of current study, a possible extension in future research could include replication of this study with

the addition of a student behavior data as a DV.

Lack of Generalization and Maintenance Data

In addition to the lack of student behavior data, the current study also reported limited maintenance data and no measures of generalization. While the study did include two weeks post-training maintenance data for two of the participants, the researcher was unable to determine if procedural integrity was maintained for all four participants. Additionally, the study included no measures of generalization; while the researcher observed the general education teacher participants adapting the intervention to different activities in the classroom, the researcher did not measure generalization across materials, settings, or individuals. Future research studies should measure and report maintenance data for all included participants and include a measure of generalization if possible.

Recommendations for Future Research

As noted in the previous sections, pyramidal BST demonstrated a strong positive effect on general education teachers' procedural integrity when implementing an FCT intervention. These effects were observed across participants and settings, and the researcher reported data noting the maintenance of procedural fidelity two weeks post-training for two participants but neglected to collect maintenance data for all general education teacher participants. Future researchers should record maintenance data for all participants to ensure the generalization of procedural integrity across time. Future studies should also include a teacher self-monitoring tool to possibly increase the maintenance of skills and provide opportunities for self-reflection and feedback without the continuance of trainer coaching. In order to assess participant generalization of trained skills, future researchers should also measure teacher generalization across settings to examine if procedural integrity is generalizable to other settings beyond the classroom.

In addition to these components, future studies should include measures of student behavior similar to the methods employed by Gregori et al. (2022). This would involve

conducting a functional behavioral assessment prior to implementing pyramidal BST to ensure that the hypothesized function of the student's target behavior is addressed by the FCT intervention. In addition to observing the effects of FCT on student behavior, future researchers should examine student generalization of the components of FCT (e.g., utilizing a trained functional communication response) across settings and individuals. This could be achieved by implementing the same FCT intervention across multiple settings while measuring the rate of FCT components employed by the student across all intervention settings. Examining the effects of procedural integrity on student generalization would potentially inform researchers and practitioners about the generalizability of students' FCT components use and how this may be impacted by teachers' procedural integrity.

Implications for Practice

The purpose of research is to observe phenomena to increase our understanding, which we can then use to change or influence the world around us. The current study aimed to contribute to our understanding of the effects of pyramidal BST on general education teacher procedural integrity, which would enable researchers to make specific recommendations to educators based on the observed results. Given the outcomes of the study, pyramidal BST may be an effective and efficient way to enable special education teachers to implement an evidence-based method to train general education teachers in implementation of interventions. The training included in the current study was 20-30 minutes in duration and occurred once. When compared with the duration of training provided in other studies, which lasted for 40-60 minutes per session and included additional coaching or feedback beyond the initial training sessions (e.g., Gregori et al., 2022; Walker et al., 2021), the current study demonstrated the potential efficacy of a more efficient method. Utilizing pyramidal BST increases capacity in school-level staff by equipping them with a way of training other individuals working with students in implementing evidence-based strategies, thus ensuring that procedural integrity of interventions is maintained across settings and individuals. Based on the current study' results, training sessions can occur in isolation

as long as treatment fidelity of BST remains high; trainers need to provide opportunities for retraining if procedural integrity drops below predetermined mastery criteria. This is why ongoing data collection monitoring the procedural integrity of implementation is important; practitioners should also have access to performance data to enable reflection on performance.

Conclusion

The results of the current study suggest that the effects of pyramidal BST on the procedural integrity of general education teachers' FCT implementation is strong and positive. Additionally, participants indicated high social validity of the included training. As there are some limits to the external validity of the outcomes, however, applying these practices to similar individuals should be done with caution and consistent monitoring of data. Future research should focus on including measures of student behaviors and possibly including teacher self-monitoring. Given the extensive support base for BST and the emerging evidence promoting its use in a pyramidal model, practitioners should consider utilizing this method of training to increase educator's procedural integrity of specific strategy implementation.

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LIST OF APPENDICES

Appendix A: BST Treatment Fidelity Checklist – Researcher as Trainer

Appendix B: BST Treatment Fidelity Checklist – Participant 5 as Trainer

Appendix C: Procedural Integrity Checklist

Appendix D: Training Impact Questionnaire (Training IQ)

APPENDIX A: BST TREATMENT FIDELITY CHECKLIST –
RESEARCHER AS TRAINER

Observer Initials: _____ **Date:** _____

Circle **Yes** to indicate if you observe the trainer completing a step of behavior skills training.
Circle **No** if you do not observe the trainer completing a step of behavior skills training.
Circle **NA** if conditions were not in place requiring the trainer to complete a step.

Step/Component	Was this observed?
The trainer provides a rationale for utilizing behavior skills training (BST) to train staff.	**Yes** **No**
The trainer vocally describes the steps of BST.	**Yes** **No**
The trainer provides the trainee with a written summary of BST components/steps.	**Yes** **No**
The trainer models implementation of BST.	**Yes** **No**
The trainer asks if the trainee has any questions and answers all questions asked.	**Yes** **No**
The trainer provides the trainee with all needed BST materials.	**Yes** **No**
The trainer has the trainee rehearse BST.	**Yes** **No**
The trainer observes the trainee during rehearsal and collects data on BST implementation using checklist.	**Yes** **No**
The trainer provides supportive and corrective feedback using data collected during rehearsal.	**Yes** **No**
The trainer asks the trainee which components of BST they perceive they implemented (in)correctly.	**Yes** **No**
The trainer asks if the trainee has any questions and answers all questions asked.	**Yes** **No**
The trainer repeats components 2-11 until the trainee meets mastery criteria as assessed by the BST implementation checklist (100% accuracy).	**Yes** **No** **NA**

Totals: **Yes –** _____ **No –** _____ **NA -** _____

Percentage of fidelity (total # of Yes / 12 – total # of NA x 100): _____**%**

APPENDIX B: BST TREATMENT FIDELITY CHECKLIST –
PARTICIPANT 5 AS TRAINER

Observer Initials: _____ **Date:** _____

Circle **Yes** to indicate if you observe the trainer completing a step of behavior skills training.
Circle **No** if you do not observe the trainer completing a step of behavior skills training.
Circle **NA** if conditions were not in place requiring the trainer to complete a step.

Step/Component	Was this observed?
The trainer provides a rationale for utilizing functional communication training (FCT) as part of the plan.	**Yes** **No**
The trainer vocally describes the steps of the FCT programming.	**Yes** **No**
The trainer provides the trainee with a written summary of the FCT programming.	**Yes** **No**
The trainer models implementation of FCT programming.	**Yes** **No**
The trainer asks if the trainee has any questions and answers all questions asked.	**Yes** **No**
The trainer provides the trainee with all needed FCT materials.	**Yes** **No**
The trainer has the trainee rehearse FCT programming.	**Yes** **No**
The trainer observes the trainee during rehearsal and collects data on FCT implementation using checklist.	**Yes** **No**
The trainer provides supportive and corrective feedback using data collected during rehearsal.	**Yes** **No**
The trainer asks the trainee which components of FCT they perceive they implemented (in)correctly.	**Yes** **No**
The trainer asks if the trainee has any questions and answers all questions asked.	**Yes** **No**
The trainer repeats components 2-11 until the trainee meets mastery criteria as assessed by the FCT implementation checklist (100% accuracy).	**Yes** **No** **NA**

Totals: **Yes –** _____ **No –** _____ **NA -** _____

Percentage of fidelity (total # of Yes / 12 – total # of NA x 100): _____**%**

APPENDIX C: PROCEDURAL INTEGRITY CHECKLIST

Observer Initials: _____ **Date:** _____

Circle **Yes** to indicate if you observe the trainer completing a step of behavior skills training.
Circle **No** if you do not observe the trainer completing a step of behavior skills training.
Circle **NA** if conditions were not in place requiring the trainer to complete a step.

Step/Component	Was this observed?
As M enters the room, the general education teacher will remind M that he can either ask for a brief break or ask to work for a longer high-quality break.	**Yes** **No**
Once students have transitioned into the room, M should approach the general education teacher to let them know if he wants a brief break or if he wants to complete his work checklist for a longer high-quality break. The general education teacher should set a timer for one minute (if M requests a break) OR provide a copy of his work checklist (if M requests to work for a longer high-quality break).	**Yes** **No** **NA**
If M does not approach the general education teacher, the general education teacher will approach M's desk with a copy of his work checklist.	**Yes** **No** **NA**
If M vocally requests a brief break, the general education teacher will set a timer for one minute.	**Yes** **No** **NA**
After one minute passes, the general education teacher will prompt M to begin working.	**Yes** **No** **NA**
If M vocally requests to work for a high-quality break, the general education teacher will give M his work checklist.	**Yes** **No** **NA**
As M completes each task on his checklist, the general education teacher will review his work before writing a checkmark in the corresponding box.	**Yes** **No** **NA**
If M begins to engage in work refusal behaviors, the general education teacher will remind M that he can either ask for a brief break or ask to work for a longer high-quality break.	**Yes** **No** **NA**
If, when reminded, M does not request a break or to work for a longer high-quality break, the general education teacher should continue to prompt M to work while providing reminders every ~30 seconds of M's ability to ask for a break.	**Yes** **No** **NA**
The trainer asks the trainee which components of FCT they perceive they implemented (in)correctly.	**Yes** **No** **NA**
The trainer asks if the trainee has any questions and answers all questions asked.	**Yes** **No** **NA**
The trainer repeats components 2-11 until the trainee meets mastery criteria as assessed by the FCT implementation checklist (100% accuracy).	**Yes** **No** **NA**

Totals: **Yes –** _____ **No –** _____ **NA -** _____

Percentage of fidelity (total # of Yes / 9 – total # of NA x 100): _____**%**

APPENDIX D: TRAINING IMPACT QUESTIONNAIRE (TRAINING IQ)

Training Impact Questionnaire

Please circle the number (1 – 6) that best describes your agreement or disagreement with each of the following statements about the intervention developed for the problem behavior.

1. I will use this skill regularly on the job.

Strongly Disagree	**1**	**2**	**3**	**4**	**5**	**6**	**Strongly Agree**

2. After this training program I would perform this skill without practicing.

Strongly Disagree	**1**	**2**	**3**	**4**	**5**	**6**	**Strongly Agree**

3. I learned to perform the task well in the training program because the program was effective.

Strongly Disagree	**1**	**2**	**3**	**4**	**5**	**6**	**Strongly Agree**

4. The skill could be learned from a manual or an instruction sheet as easily as in a training program.

Strongly Disagree	**1**	**2**	**3**	**4**	**5**	**6**	**Strongly Agree**

5. I had trouble learning the skill because the training program was confusing.

Strongly Disagree	**1**	**2**	**3**	**4**	**5**	**6**	**Strongly Agree**

6. The skill would have been easier to learn with more reference materials.

Strongly Disagree	**1**	**2**	**3**	**4**	**5**	**6**	**Strongly Agree**

7. After attending this training program, I am interested in attending other training programs.

Strongly Disagree	**1**	**2**	**3**	**4**	**5**	**6**	**Strongly Agree**

CURICULUM VITAE

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EDUCATION AND PROFESSIONAL CREDENTIALS

		Year Conferred
Ph.D.	University of Louisville, Louisville, KY	2023
	Special Education/Applied Behavior Analysis	
M.A.	Bellarmine University, Louisville, KY	2008
	Special Education/High School English	
B.F.A.	University of Louisville, Theatre Performance	2005

Licenses/Certifications

Board Certified Behavior Analyst (BCBA) # 1-21-52740

Licensed Behavior Analyst – Kentucky # 274422

Kentucky Teaching Certificate – Learning and Behavior Disorders (K-12)

Kentucky Teaching Certificate – English (8-12)

Approval for Teacher Consultant in Program for Exceptional Children

PROFESSIONAL EXPERIENCE

Clinical Assistant Professor — 8/2022 to current

-Purdue University

Adjunct Professor 8/2022 to 12/2022

-University of Louisville

Instructional Coach 3/2018 - 6/2019

-Marion C. Moore School, Jefferson County Public Schools

Behavior/Special Education Consultant 1/2016 - 3/2018

-Bullitt County Public Schools

Special Education Department/ARC Chair/LBD Teacher 8/2013 – 12/2016

-North Bullitt High/Bullitt Lick Middle, Bullitt County Public Schools

LBD Classroom Teacher 8/2007 – 7/2013

-Buckner Alternative High, Oldham County Public Schools

PROFESSIONAL PRESENTATIONS

International Conference Presentations

1. Pollard, J., & McClure, E. B. (2022, Sept. 3). *A Systematic Review of Research-based Behavior Analytic Interventions for Inappropriate Sexual Behaviors* [Conference session]. The Association for Behavior Analysis International 11th International Conference, Dublin, Ireland.

National Conference Presentations

1. Pollard, J., & McClure, E. B. (2023, May 29). *Research-based Behavior Analytic Interventions for Sexual Behaviors: A Review of the Research and Implementation Procedures* [Conference session]. The Association for Behavior Analysis International 49th Annual Convention, Denver, CO.

2. McClure, E. B., & Landrum, T. (2023, Feb. 24). *From Micro to Macro: Embedding Equity and Cultural Responsiveness into a PBIS model* [Conference sessions]. Midwest Symposium for Leadership in Behavior Disorders, Kansas City, MO.

3. McClure, E. B., Page, D., & Landrum, T. L. (2022, July 18). *Disparities in Discipline and How to Combat Inequity* [Conference session]. The Office of Special Education Programs Leadership and Project Directors' Conference, online.

4. McClure, E. b., & Landrum, T. L. (2022, Feb. 18). *Utilizing Behavior Skills Training with Educators to Increase Implementation Fidelity of Behavior Intervention Plans* [Conference session]. Midwest Symposium for Leadership in Behavior Disorders, Kansas City, MO.

5. Landrum, T. L. (2022 Jan. 28). *Inappropriate Sexual Behaviors: What We Know & How to Address Them* [Conference session]. 2022 International DADD Conference on Autism, Intellectual Disability, and Developmental Disabilities, Clearwater, FL.

6. McClure, E. B., Page, D., & Landrum, T. L. (2022 Jan. 18). *Disparities in Discipline: The Influences of Sociodemographics on Students' Risk of Suspension and How to Combat Inequity* [Conference session]. Council for Exceptional Children International Conference, Orlando, FL.

7. McClure, E. B., Page, D., & Landrum, T. L. (2021 Nov. 19). *Disparities in Discipline: The Influences of Sociodemographics and Specific Disability on Students' Risk of Suspension* [Conference session]. Teacher Educators for Children with Behavioral Disorders Conference, Tempe, AZ.

8. McClure, E. B., Pennington, R. C., & Bewley, S. C. (2021 Mar. 9). *Evidence-Base Supporting Writing Instruction Strategies for Students with Autism Spectrum Disorder: A Meta-Analysis of Experimental Research* [Conference session]. Council for Exceptional Children International Conference, online.

9. Collins, L., Landrum, T. J., McClure, E. M., & Riggs, L. (2020 Feb. 7) *Zero Tolerance for Zero Tolerance: Implications and Alternatives for Students With EBD* [Conference session]. Council for Exceptional Children International Conference, Portland, OR.

10. Scott, T., & McClure, E. M. (2019 Oct. 4). *Classroom Systems: Evaluating & Improving the Quality & Effectiveness of Student-Teacher Interactions* [Conference session]. National PBIS Leadership Forum, Chicago, IL.

11. Robertson, S., Whitney, P., & McClure, E. B. (2017 Sept. 28). *On-boarding a District for Multi-tiered System of Support Technical Assistance: Challenges & Opportunities* [Poster session]. National PBIS Leadership Forum, Chicago, IL.

State and Local Presentations

1. McClure, E. B., & Page, D. (2022 June 16). *From Micro to Macro: Embedding Equity and Cultural Responsiveness into a PBIS model by Changing Practices at the Classroom and School-wide Levels* [Poster session]. KYCCBD Behavior Institute, Louisville, KY.

2. McClure, E. B., Page, D., & Landrum, T. J. (2022 Apr. 29). *Including and Supporting Diversity in a PBIS Classroom* [Conference session]. KEEP Summit, online.

3. Landrum, T. J., Brewer, B., McClure, E. B., & Riggs, L. (2019, Nov. 26). *Differentiated Discipline: Antecedent Strategies to Keep Kids in Your Room* [Conference session]. Kentucky Council for Exceptional Children Conference, Louisville, KY.

4. McClure, E. B. (2019 Nov. 25). *Project-based Learning in the Math Classroom* [Conference session]. Kentucky Council for Exceptional Children Conference, Louisville, KY.

5. McClure, E. B. (2017 Nov. 19). *The Co-Teaching Tango: Practical Components of Developing Effective Co-Teaching Partnerships & Practices* [Conference workshop]. Kentucky Council for Exceptional Children Conference, Louisville, KY.

6. McClure, E. B. (2017 Nov. 19). *The PBIS Classroom: Developing a Multi-Tiered Approach to Classroom Management* [Conference session]. Kentucky Council for Exceptional Children Conference., Louisville, KY.

7. McClure, E. B. (2017 Nov. 20). *Specially Designed Instruction: The Hows & Whys of Delivering SDI in Reading Comprehension and Written Expression* [Conference session]. Kentucky Council for Exceptional Children Conference, Louisville, KY.

8. Bewley, S. C., & McClure, E. M. (2017, Nov. 20). *Argumentative Writing and Secondary Students with Disabilities: Creating Real-World Habits and Successes* [Conference session]. Kentucky Council for Exceptional Children Conference, Louisville, KY.

9. McClure, E. M. (2017 Nov. 21). *Math Instruction for All Learners: Using Manipulatives & Technology to Build Mastery of Abstract Concepts* [Conference session]. Kentucky Council for Exceptional Children Conference, Louisville, KY.

PUBLICATION

Referred Publications (peer reviewed)

1. McClure, E. B., & Burt, J. L. (2023). Functional Communication Training: A comprehensive approach to success for educators. *Beyond Behavior.*

Manuscripts Under Review/In Preparation

1. McClure, E. B., Pennington, R. C., & Bewley, S. C. (under review). Evaluating the evidence-base supporting writing instruction strategies for students with Autism Spectrum Disorder: A systematic review of experimental research. *Focus on Autism and Developmental Disorders.*

2. Batley, P. N., McClure, E. B., Brewer, B., Contractor, A. A., Chin, S., Batley, N. J., & Hedges, L. V. (submitted). Evidence and Reporting Standards in N-of-1 Medical Studies: A Systematic Review. *Translational Psychiatry.*

3. McClure, E. B., Landrum, T. J., & Page, D. (under review). Disparities in Discipline: Regression Analysis of the Influence of Sociodemographics and School Level on Students' Risk of Suspension. *School Psychology Review.*

4. McClure, E. B. (submitted). A Review of the Current Research Base Supporting Specific Interventions for Students with Disabilities who Engage in Inappropriate Sexual Behaviors. *Research and Practice for Persons with Severe Disabilities.*

5. Whitney, T., Cooper, J. T., McClure, E. B., & Dubuque, E. (2023). Prompting Teacher Praise Using Covert Tactile Stimulation. Manuscript in preparation.

COURSES TAUGHT / TRAININGS

1. Positive Behavior Supports
   (PU EDPS 36201) – Undergraduate students

2. Systematic Instruction
   (PU EDPS 30900) – Undergraduate students

3. Applied Behavior Analysis
   (UL EDSP 644) – Graduate students

4. Applied Behavior Analysis – teaching internship with Terrance Scott
   (UL EDSP 644) – Graduate students

5. Behavior Analytic Approach to Communication - teaching internship with Jonathan Burt
   (UL EDSP 546) – Graduate students

6. Advanced Applied Behavior Analysis – guest lecturer
   (UL EDSP 650) – Graduate students

7. Practicum in Autism and Applied Behavior Analysis – guest lecturer
   (UL EDSP 653) – Graduate students

8. Introduction to Special Education – teaching internship with Scott Patton
   (UL EDSP 240) – Undergraduate students

9. Safe Crisis Management – District Trainer
   Bullitt County Public Schools

10. Co-teaching and Specially Designed Instruction – District Trainer
Bullitt County Public Schools

HONORS AND AWARDS

1. Favorite Faculty Award - Nominated by students at Purdue University for excellence in academics, research, and student engagement. 2023.
2. Teacher of the Year Award – Selected by staff at Buckner Alternative High School for excellence in teaching. 2008 and 2012.
3. ETS Recognition of Excellence Award – Recognizing outstanding individual performance on three Praxis exams. 2007 and 2008.

PROFESSIONAL AFFILIATIONS

Member

Honor Society of Phi Kappa Phi

KY Association for Behavior Analysis

Association for Behavior Analysis International

Council for Exceptional Children (CEC)

Divisions:

Division for Emotional and Behavioral Health

Division for Research

Teacher Educators