A Replication Comparing Two Teaching Approaches: Teaching Pre-service Teachers to Implement Evidence-Based Practices with Fidelity

THESIS

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Abstract

There is a wide range of interventions being used in today’s classrooms, and some of these interventions lack empirical evidence for effectiveness. It is the duty of teacher preparation programs to provide pre-service teachers with evidence based practices (EBPs), strategies which have been empirically validated, which could be used in classrooms. Behavioral skills training (BST) is an EBP that has been proven effective when teaching adults, however research is lacking with using BST in teacher preparation programs. The purpose of this replication study is to compare the effects of a traditional lecture followed by BST and a traditional lecture followed by a study session on four undergraduate pre-service teachers’ implementation fidelity of eight different EBPs and if these skills are maintained for two weeks. An alternating treatment design will be used to compare the effects of BST and study sessions on the pre-service teachers’ implementation fidelity of the EBPs during role play sessions. Results indicate that BST is an effective intervention when teacher per-service teachers to implement EBPs with fidelity.
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CHAPTER 1

INTRODUCTION

One concern with special education today is the research to practice gap. This gap from research to practice is not common in just the field of special education, but occurs in numerous fields such as medicine, engineering, and business (Greenwood & Abbott, 2001). In special education, this gap occurs when special education research has advanced practices/interventions that have positive outcomes on their participants, but these improved practices are not being used by special education teachers in the special education classrooms (Greenwood & Abbott, 2001).

What makes this research to practice gap most concerning is that there are federal mandates requiring special education teachers to use evidence-based practices (EBPs). For example, in 2002, George W. Bush signed into law the No Child Left Behind Act (NCLB) with the major goal being to improve student outcomes (Simpson, LaCava, & Graner, 2004). One component of NCLB requires teachers to use scientifically based research practices, also referred to as evidence-based practices, in their instruction (Simpson, LaCava, & Graner, 2004). For EBPs to have an impact on students’ outcomes, the evidence-based practice must be implemented (Cook & Odom, 2013). Furthermore, by teachers using EBPs in their classroom, this is not changing the role or function of special education, but rather changing the impact the special education teacher has on
their students’ outcomes (Cook, Tankersley, Cook, & Landrum, 2015). Since it is a federal mandate for teachers to be using EBPs in their classrooms, it is crucial that when individuals attend teacher preparation programs they learn about EBPs, in particular what they are, how to find them, and most importantly how to implement the evidence-based practice with fidelity in their classroom. This can be addressed in teacher preparation classrooms by providing opportunities for teacher candidates to learn about the EBP then practice implementing the EBP. One way this can be done is by using behavioral skills training (BST).

**Evidence Based Practices**

The use of evidence based practices in teaching is becoming more and more imperative. As mentioned earlier, it is a federal mandate by NCLB requiring teachers to use scientifically based research practices, also referred to as evidence-based practices (EBP), in their instruction (Simpson, LaCava, & Graner, 2004). EBPs are defined as “instructional techniques that have been shown by research to be most likely to improve student outcomes in a meaningful way” (Friend & Bursuck, 2012, pg. 412).

There are several databases online in which special education teachers can view and find different EBPs that can be used in their instruction of academic and adaptive skills. One of these databases is the U.S. Department of Education’s What Works Clearinghouse (http://ies.ed.gov/ncee/wwc/findwhatworks.aspx). At this website teachers can search by topic. When the teacher enters a topic, different evidence based practices that have been used to teach students of various ages and abilities on the topic that was
entered by the teacher will generate. Once teachers have searched by a topic, they can narrow the search by grade level, delivery type, extent of evidence, and much more.

Another website teachers can use when finding an EBP to teach a particular skill or reduce a problem behavior is the National Professional Development Center on Autism Spectrum Disorder (NPDC) website (http://autismpdc.fpg.unc.edu/evidence-based-practices). They could look under the “Evidence Based Practices” tab to find numerous EBPs that have been used to teach a variety of skills to students diagnosed with autism spectrum disorder (ASD). Many of these EBPs have shown positive effects for other developmental disabilities as well. For each EBP listed on this website, there is a practice brief which includes a description about the EBP, an implementation checklist, instructions describing each step, and a list of references which were included in determining that the EBP met the NPDC’s research criteria for the practice to be evidence based. Some of the EBPs that can be found on this website include: differential reinforcement of alternative, incompatible, and other behaviors, discrete trial teaching, extinction, prompting, social narratives, task analysis and 17 other practices, with six more practice briefs being developed.

Each of these websites have developed their own list of criteria in order to show the practice as being evidence based. The Council for Exceptional Children (CEC) in 2014 published an article detailing the standards that should be used in special education to consider a practice evidence based. In order for a practice to become an EBP the research design has to be a group design or single subject design that meets the eight quality indicators described by the CEC. These eight indicators are: (1) context and
setting, (2) participants, (3) intervention agent, (4) description of practice, (5) implementation fidelity, (6) internal validity, (7) outcome measures/dependent variables, and (8) data analysis. When this occurs, the practice is considered methodologically sound and with numerous replications the practice will be considered and EBP in the field of special education. Once the research has been reviewed for a particular practice to assess which of the eight quality indicators were met with different research studies, the practice then can be categorized as an EBP, potentially evidence based practice, mixed effects, insufficient evidence, or negative effects.

Finding an EBP that a special education teacher can use in their instruction is the first step, but accurately implementing the EBP and conforming to the sequential steps is crucial (Smith, Daunic, & Taylor, 2007). During research the process of implementing a potential EBP, in the way it was intended to be implemented, is called treatment fidelity. Smith, Daunic, and Taylor (2007) defined treatment integrity as “strategies that monitor and enhance the accuracy and consistency of an intervention to (a) ensure it is implemented as planned and (b) make certain each component is delivered in a comparable manner to all participants over time.” It is crucial once teachers and classroom staff members begin implementing the EBP, they implement the EBP in the same way in which research has determined its effectiveness. Without this accurate implementation the instruction is no longer considered evidence based. It is crucial for the teacher, therapist, or classroom staff to implement the EBP how it was found it to be effective. Only when this happens is the teacher abiding federal and state mandates and using practices that have had positive effects in research.
Behavioral Skills Training

In order for teachers to effectively implement the necessary components of a practice, it is crucial that they are provided more than a brief lecture in class about a particular EBP or attend a brief professional development seminar about an EBP in which the spokesperson just discusses the practice. It is crucial that all educators, including our pre-service educators, are provided the opportunity to practice EBPs that they will be using in classrooms and receive feedback from a professional in the field. One way in which we can provide all educators, including pre-service teachers, on how to properly implement EBPs is to use an EBP in the field of applied behavior analysis called behavioral skills training (BST).

According to Parsons, Rollyson, and Reid (2012), there are six steps to BST. First, describe the target skill. Second, provide succinct, written description of the skill. Third, demonstrate the skill. Fourth, require trainee practice of the target skill. Fifth, provide feedback during practice. Sixth, repeat steps 4 and 5 to mastery. BST can be used in a classroom setting where step one occurs with the professor lecturing about the EBP. Step two can be a handout with an overview of the implementation steps for the EBP. The professor can then demonstrate the EBP step by step (step three). Then students can get into small groups and practice the skill (step four) as the professor walks around and gives feedback to individual students and the small groups (step five). Lastly, the professor can have the students complete a performance assessment where the student is given a scenario and is asked to implement the specific EBP to see if the student has mastered the implementation steps of that EBP (step six).
Furthermore, BST has been proven an effective practice to teach adult learners numerous skills, such as installing rear-facing car seats (Himel & Wright, 2014), gun-play prevention skills (Gross, Miltenberger, Knudson, Bosch, & Breitwieser, 2008), functional analyses (Iwata et al., 2000; Wallace, Doney, Mintz-Resudek, & Tarbox, 2004), and guided compliance (Miles & Wilder, 2009). BST has been used to teach staff members who work with students with disabilities numerous skills, such as functional communication, and has been used to train staff members different components of students’ behavior intervention plans. In all, BST is a procedure that has shown positive effects on training adults how to implement numerous skills in different settings.

Hogan, Knez, and Kahng (2015) used a concurrent multiple baseline design across staff. Two staff members were trained on one student’s behavior intervention plan (BIP) which included differential reinforcement of alternative behavior (DRA), noncontingent reinforcement (NCR), and extinction, and two different staff members were trained on another student’s BIP which included signaled availability and unavailability for a break, DRA, and extinction. Prior to the beginning of the study, each staff member was given a copy of the behavior intervention plan and was given a brief verbal explanation of the plan. During BST, instruction began by providing each participant with a written copy of the BIP and each component was reviewed with the staff member. If the staff member implemented the BIP with 80% or less accuracy for five consecutive observations, the staff member was then moved to the next phase.

The second phase consisted of modeling, rehearsal, and feedback. This observation began by the experimenter modeling the correct procedures of the BIP for
five minutes, highlighting the components of the BIP that the staff member implemented incorrectly. The staff member was then asked to “implement the BIP to the best of your ability” and the experimenter observed. At the conclusion of the observation, the experimenter provided feedback and modeled steps that were implemented incorrectly. This process of modeling, rehearsing, and providing feedback continued until the staff reached the mastery criteria, which was 90% or greater correct implementation of the BIP for three consecutive sessions. The results of this study show that BST can be used to teach classroom staff members’ implementation steps of different behavior analytic techniques and that the model, rehearsal, and feedback component of BST is when participants were able to reach the mastery criteria.

Nigro-Bruzzi and Sturmey (2010) used BST to train three special education teachers and three speech therapists how to use mand training with a child that was in the age range of two-years-old to six-years-old. The experimenters developed an eight-step task analysis for mand training and the teachers and therapists were scored on correct implementation of the eight steps. Due to when the child emitted a mand, the staff member may not have been able to complete all the steps listed in the task analysis. Therefore, only steps the staff members could perform were scored as correct or incorrect. A multiple baseline across participants design was used to show the positive effects of using BST to teach therapists and teachers the different components of mand training. During staff training, the experimenter provided instructions on the steps in the task analysis. From there the experimenter showed the staff a video that showed each step of the task analysis for mand training. Next, the staff member and experimenter role-
played where the staff member performed the steps in the task analysis and the experimenter role-played the student. Finally, the experimenter provided performance feedback for the role-play. Training session continued until staff reached 90% of steps correct across three consecutive sessions, which all staff members did in three sessions.

Therefore, this study shows that BST can be used to train staff to teach children with autism to correctly mand (Nigro-Bruzzi & Sturmey, 2010). One limitation of this study was that BST did not occur with all staff members receiving the BST instruction at the same time. This increases the amount of training time needed from the person teaching the mand training. Therefore, it is suggested to teach the skill of mand training using BST with a group of staff members to see if the same positive effects are found. Another limitation of the study was the task analysis. There were multiple components to each step of the task analysis, so it is unclear of which components on one step was missed while collecting data. It is recommended that in the future, the task analysis be broken down more so there is one discrete skill in each step of the task analysis.

Homlitas, Rosales, and Candel (2014) used BST to train teachers how to implement Phases 1, 2, and 3A of the picture exchange communication system (PECS). A multiple baseline across participants design was used, where the dependent variable was the percentage of correct responses on a checklist listing the steps of the different phases of PECS. If a step was not applicable, it was marked as such and was not included in the calculation. If the teacher deviated from any step, that step was marked as incorrect. The BST procedure of this study began by the teachers receiving a checklist of the Phase 1 of PECS, which was identical to what the experimenter used to score.
responses, and was given verbal instructions of the checklist. Next, the experimenter modeled the checklist steps in a five-trial block using a confederate as the student. Then, the teacher rehearsed the steps of Phase 1 of PECS with a confederate. The teachers were not allowed to ask questions during the five-trial block model, but were able to ask questions after the model was given or before another five-trial block model was shown. After the role-play, teachers were provided with corrective feedback and positive feedback by the experimenter. This procedure continued until the teacher reached mastery criterion for Phase 1, which was 90% correct responses across three consecutive trials.

The results of this study show that BST was an effective procedure for teaching teachers to implement Phase 1, 2, and 3A of PECS, where all teachers performed at or above the criterion levels when using the skills taught when students in their classrooms were the learners. The researchers believe that this could be attributed to the stringent mastery criteria during BST training. One limitation of this study was that treatment integrity data was not collected on the confederate’s behavior during BST training. By providing a script for the confederate to follow during BST training, this would allow for consistency in the level of difficulty across the training sessions and for teachers to practice all steps in the checklist provided for each phase of PECS.

Sawyer (2015) used BST to train undergraduate students the correct implementation of eight EBP. An alternating treatments design was used to compare the effects of a lecture followed by BST and a lecture followed by a study session. The dependent variable was percentage the percentage of steps implemented correctly using a
task analysis that was developed by the researchers of the study using the NPDC website’s practice briefs. It was shown that BST was an effective intervention to teach teacher candidates to correctly implement eight EBP.

The intervention of this study began by all participants receiving a short lecture, roughly five to ten minutes, reviewing the EBP. Then the participants were divided into two groups, where one group received BST and the other group received a study session. BST began by another experimenter reviewing the steps of implementation, modeling each step, then having the participants form small groups and rehearse the steps for the EBP. One participant role played the teacher and the other student role played the student, then roles were switched. The experimenter moved around the room and provided corrective feedback for steps implemented incorrectly and praise for steps implemented correctly. Once all participants had practiced implementing the EBP, a session checkout was conducted in which the experimenter role played the student and the participant of the study role played the teacher. The mastery criterion for this was 100% during one checkout assessment.

One limitation of this study was that all assessments were conducted via role play scenarios with a researcher acting as the student. It is unknown if the skills learned would generalize into a classroom with students. Another limitation was that maintenance data for the evidence-based practices were not collected at a specific interval of time. The first EBP taught was not reassessed for maintenance of skills until the conclusion of the study. Where the last evidence based practice taught, maintenance was assessed the same day.
Therefore, it is crucial to determine when skills begin to decline and what type of strategy can be used to maintain skill performance across time.

**Current Research**

The current study is a replication of Sawyer (2015) to extend the research on BST and undergraduate student performance of implementing EBPs with fidelity. An alternating treatments design will be used to compare the effects of a lecture followed by BST and a lecture followed by a study session on undergraduate student’s implementation fidelity of eight EBPs. Similar task analyses will be used for each EBP to measure undergraduate students’ performance. The percentage of correct steps completed will be used as the dependent measure.

The major differences between the two studies are this study will examine a two week maintenance assessment to determine if skills learned during BST were maintained during a two-week period. The posttests that were used in Sawyer et al. (2015) will be used as the maintenance assessment for the current study. Therefore, this study is extending the literature of BST to see if skills maintain during a two-week period.

In all, it is crucial to find a way to teach students enrolled in educational majors the importance of implementing EBPs with fidelity in their classrooms. With federal mandates requiring teachers to use research based practices in their instruction, the need for teachers to be confident implementing EBPs in their classrooms is crucial. One way in which college professors can better bridge this gap is to include time in class to role play the practice being taught and to provide corrective feedback and praise during this
time. Therefore, college professors can use the components of BST in their college classrooms to better prepare our future teachers.

**Research Questions**

1. What are the comparative effects of behavioral skills training (BST) and traditional study sessions on undergraduate students’ implementation fidelity of evidence-based practices during role play sessions?

2. What is the impact of behavioral skills training (BST) and traditional study sessions on undergraduate students’ implementation fidelity of evidence-based practices during role play sessions two weeks after intervention sessions?

3. Do undergraduate students prefer a traditional lecture, study session, or behavioral skills training (BST) when learning how to implement evidence-based practices with fidelity?
CHAPTER 2

METHOD

Participants

Four undergraduate students, ages 20-21, enrolled in special education courses at a Midwestern university were recruited to participate in the study. Participation in the study was voluntary. Table 1 shows demographic and education related information about each participant that was collected at the conclusion of the study using a demographic survey.

Prior to beginning sessions, participants were placed into two separate dyads. The participant’s names were put into a random name generator, and two dyads were created. The dyads are referred to as Dyad A and Dyad B. From here, the dyads (A and B) were put into a random name generator, then randomly put into the BST session or study session for each of the eight intervention sessions. Each group participated in each session the same number of times, three BST sessions and three study sessions, with a total of six intervention sessions being conducted.

Setting

All pretest, posttest, and intervention sessions (i.e., lectures, study sessions, BST sessions, and session assessments) were conducted in two conference rooms at a Midwestern university. One conference room contains a large table surrounded by eight
chairs, an LCD projector and screen, and internet access. The second conference room contains three medium sized tables placed in a U-shape surrounded by eight chairs and internet access. The lecture and study sessions were conducted in the former conference room and the BST sessions and all assessments were conducted in the latter conference room.

**Materials**

The materials were adapted from Sawyer et al. (2015) which were developed based on the following EBP chosen from the National Professional Development Center on Autism Spectrum Disorders website: naturalistic intervention (NI), differential reinforcement of other behavior (DRO), functional communication training (FCT), response interruption redirection (RIRD), least-to-most prompting (LTM), and constant time delay (CTD).

**Assessment Scenarios.** For each EBP, three scenarios were developed by Sawyer et al. (2015) (pretest/posttest, BST checkout, and session assessment) that matched appropriate situations in which the EBP could be used. The same scenarios used by Sawyer et al. (2015) were used as the assessment scenarios for the pretest and posttest, BST checkout, and session assessments for this study. For example, for least to most prompting this scenario was used: You have a 5-year-old student in kindergarten with a mild cognitive disability in your inclusive classroom. Timmy does not know how to put on his coat. Demonstrate how you would use least to most prompting to teach him to put on his coat. See Appendix A for the pretest/posttest, BST checkout, and session assessment scenarios that were developed by Sawyer et al. (2015) and used in this study.
The same scenario was presented to the participant for pretest and posttest measures. A different scenario was provided to the participants during the BST session, with this same scenario being used for the BST checkout. No scenario was used during the study sessions. Each intervention session concluded with a session assessment with all participants receiving a new scenario appropriate for the session’s evidence-based practice. Specific materials were provided to the participants that were needed to perform the evidence-based practice assessment scenario correctly. For example, for the least to most prompting scenario listed above, the specific materials needed are a coat and a picture of a student putting on his coat. A list of all specific materials used for each evidence-based practice is included in Appendix B.

**PowerPoint® Lectures.** Each experimental session began with a lecture that was developed by Sawyer et al. (2015), with wordings slightly modified. The lecture was presented in a Microsoft PowerPoint format which was projected on a large screen in a conference room. The first slide has the name of the EBP. The second slide was titled “What is it?” which gives an overview of the evidence-based practice. The third slide was titled “When to use it?” which reviews the population(s), settings, and domains the research shows the EBP to be effective. The fourth slide titled “Prior to Intervention” discusses what the teacher would need to do before implementing the EBP. The last slide(s) titled “Implementation Steps” contains the specific observable, measurable steps that the teacher would perform when using the EBP. These last slides are the steps in which the participants were tested. The same lecturer presented all PowerPoint lectures. All participants received a printed copy of the lecture containing all slides on one side of
the paper and a pen for individual note taking. Appendix C shows an example of a PowerPoint lecture handout used in this study.

**Definition and Measurement of Dependent Variables**

**Procedural steps completed correctly.** The task analyses used in Sawyer et al. (2015) were edited and compared to the National Professional Development Center on Autism Spectrum Disorders (NPDC) Evidence-Based Practice Brief for each evidence-based practice. Appendix D shows an example of a task analysis used to collect data for an EBP. Data was collected by having each participant perform all steps of the task analysis, while either the lecturer or BST instructor role-played the student. For all assessments, including pretest/posttest, BST checkout, and session assessments, data collectors marked each step completed correctly by the participant with a “+”, mark each step completed incorrectly on not at all by the participant with a “-”, and any step that the participant was not able to perform with an “n/a”. Steps marked with an “n/a” are because the individual role-playing the student did not perform a specific behavior requiring that step to occur (e.g., the individual only correctly responded to the teacher’s questions) resulting in the participant being unable to perform a step (e.g., therefore the teacher was unable to show what to do if the student were to respond incorrectly). The total number of procedural steps completed correctly divided by the total number of procedural steps multiplied by 100 yields the percentage of steps completed correctly. This percentage was then used to graph each participant’s individual performance and group performance rates.
**Pretest and posttest scores.** One week prior to beginning the intervention session and two weeks after completing intervention sessions for a specific EBP, the participant’s performance for each EBP was assessed using the pretest and posttest scenario created for the specific EBP. When participants were absent from an intervention session resulting in missing a posttest, the posttest was then conducted the next time the participant arrived to an intervention session. The pretest scenario being used is identical to the posttest scenario being used. The score of the pretest and posttest was calculated by the total number of procedural steps completed correctly in the evidence-based task analysis divided by the total number of procedural steps in the evidence-based task analysis multiplied by 100 yielding the percentage of steps completed correctly. The pretest percentage was then used in a table to show each participant’s individual performance rates. The posttest percentage was then used to graph each participant’s individual performance rates.

**BST session checkouts.** Participants assigned to the BST session were provided a new scenario. In order for the session assessments to begin, all BST participants had to reach 100% mastery for that session’s EBP. Once all participants tested out of the BST session by completing all steps with 100% fidelity, session assessments began.

**Session assessment scores.** At the conclusion of each session, participants were given a scenario appropriate for that session’s EBP and asked to perform the EBP taught during that session. All scenarios given at this time were novel to the participants. The score of the session assessment was calculated by the total number of procedural steps completed correctly in the evidence-based task analysis divided by the total number of procedural steps.
procedural steps in the evidence-based task analysis multiplied by 100 yielding the percentage of steps completed correctly. This percentage was then used to graph each participant’s individual performance rates.

**Experimental Design and Procedures**

An alternating treatments design was used to compare the effects of BST with study sessions. The experimental conditions will be as follows: baseline, intervention sessions including study sessions and BST, and maintenance.

**Baseline.** The pretest assessment score was used for baseline. One week prior to beginning the study, each participant’s performance was assessed on each EBP using the task analysis. The BST instructor, began the pretest by reading the scenario to the participant, asking the participant if they would like to read the scenario themselves, provided the participant with the necessary materials, and asked the participant to perform the EBP that was mentioned in the scenario to the best of his or her ability. The pretest for an individual EBP was terminated after the participant completed the EBP, the participant indicated that he or she does not know how to complete the skill, or 10 seconds elapsed without the participant performing a new step. If the participant indicated that s/he does not know how to complete the EBP or 10 seconds elapses, all remaining steps of the task analysis were scored as incorrect. If a participant begun implementing an EBP, then stated that s/he had done a step incorrectly and would like to start over (e.g., self-correction) the participant was allowed to begin the assessment again. The experimenter whom read the scenario to the participant also acted as the student during the scenario.
**Intervention Sessions.** Each session begun with all participants receiving a lecture about the session’s EBP. Lectures were approximately seven minutes in length. The lecturer, a graduate student enrolled in an applied behavior analysis program, presented each slide to the participants and discussed each bullet point on the slide. The lecturer did not model any of the steps for the session’s EBP, but included a scenario and discussed the steps of implementation. The scenario that was used during the lecture was not a scenario used for one of the assessment scenarios, and only the lecturer had access to viewing the scenario. Participants were allowed to ask questions throughout the lecture and at the conclusion of the lecture and the lecturer answered all questions.

Once the lecturer asked if there were any questions, and all questions were answered or no questions were asked, the lecture was terminated. The lecturer then told the participants who needed to go to the BST conference room and participants who need to stay in study session conference room. The lecturer was provided the information of which participants are in which condition prior to the beginning the intervention session. When a participant was absent from an intervention session, the participant made up that session the next time the participant was present at an intervention session. All make-up intervention sessions were conducted prior to the already scheduled intervention session.

**Study Sessions.** Treatment one was study sessions. During these sessions, participants remained in the conference room where the lecture was held. The study session begun once all BST participants for that day’s session left the room. Participants in the study session were allowed to review their handout of the PowerPoint lecture, review any notes taken during the lecture, and were able to ask questions. A member of
the research team was present during the study session, and was able to answer participant’s questions. No modeling of the session’s EBP was performed. If participants attempted to role play or model the session’s EBP, the lecturer blocked the role play and reminded the participants to not role play or model the EBP. Once the research member had been informed that the BST session was complete, the research member terminated the study session and recorded the duration. Session assessments begun immediately following the termination of the study session.

Behavioral Skills Training. Treatment two was BST. Upon the arrival of the participants for the BST session, the BST instructor, a graduate student enrolled in an applied behavior analysis program, immediately begun the session by reviewing the name of the session’s EBP, reading the BST scenario for the EBP, and begun modeling each step of the EBP with a confederate role playing the student. The BST instructor would first say the step, then model what the step says to do (e.g., step one, gain learner’s attention; model gaining learner’s attention by saying learner’s name). Once all steps had been read and modeled by the BST instructor, the BST instructor asked if the participants had any questions. The BST instructor answered all questions and provided modeling when appropriate when answering the question. Once all questions had been answered by the BST instructor, the instructor had the participants work together by making a dyad and provided the dyad with a copy of the BST scenario, the necessary materials to complete the scenario, and a copy of that EBP’s task analysis. Once each group received all the materials, the dyads were instructed to begin role-playing the scenario. During the role-play, the BST instructor monitored the participants by observing each participant
implement the EBP, provided praise for steps completed correctly, provided corrective feedback for steps completely incorrectly, and encouraged participants to praise and provide corrective feedback to their partner.

Once each participant had the opportunity to complete the steps role-playing the teacher, the BST instructor asked if any participant was ready to do a check-out. Once a participant was ready for the check-out, the BST instructor read the same scenario to the participant, provided the participant with the necessary materials, and role-played the student while the participant acted as the teacher. After the participant implemented the EBP, the BST instructor provided the participant with praise for steps completed correctly and corrective feedback for steps implemented incorrectly. If a participant skipped a step or performed a step incorrectly, the participant was instructed to resume role-playing the scenario with their partner. During the check-out, the partner not participating in the check-out either watched their partner check-out or continued to review their notes. Once all participants in the BST session completed the check-out with all steps completed correctly to 100% mastery, the BST session was terminated by the BST instructor, the BST session’s duration was recorded by the BST instructor, and a research member of the BST session informed the members of the study session the BST session had been completed. Session assessments begun immediately following the termination of the BST session.

Session assessments. Immediately following the termination of the study sessions and BST sessions, session assessments begun. One participant remained in the conference room where the BST session was conducted, while all other participants
moved to the conference room where the study session was conducted. The BST instructor began the session assessment by reading the scenario to the participant, asking the participant if they would like to read the scenario themselves, provided the participant with the necessary materials, and asked the participant to perform the EBP that is mentioned in the scenario to the best of his or her ability. The session assessment for an individual EBP was terminated after the participant completed the EBP, the participant indicated that he or she does not know how to complete the skill, or 10 seconds elapsed without the participant performing a new step. If the participant indicated that s/he does not know how to complete the evidence-based practice or 10 seconds elapsed, all remaining steps of the task analysis was scored as incorrect. If the participant begun implementing an EBP, then stated that s/he had done a step incorrectly and would like to start over (e.g., self-correction) the participant was allowed to begin the assessment again. The experimenter whom read the scenario to the participant also acted as the student during the scenario.

**Maintenance.** Two weeks after an EBP was introduced to the participants in an experimental condition, participant’s performance was assessed again with the same task analysis used during the pretest and experimental conditions. This posttest assessment, which is the same scenario used for the pretest score, was conducted before the intervention session began.

The BST instructor, began the posttest by reading the scenario to the participant, asking the participant if they would like to read the scenario themselves, provided the participant with the necessary materials, and asked the participant to perform the EBP
that was mentioned in the scenario to the best of his or her ability. The posttest for an individual EBP was terminated after the participant completed the EBP, the participant indicated that he or she does not know how to complete the skill, or 10 seconds elapsed without the participant performing a new step. If the participant indicated that s/he does not know how to complete the EBP or 10 seconds elapsed, all remaining steps of the task analysis were scored as incorrect. If the participant began implementing an EBP, then stated that s/he had done a step incorrectly and would like to start over (e.g., self-correction) the participant was allowed to begin the assessment again. The experimenter whom read the scenario to the participant also acted as the student during the scenario.

Interobserver Agreement and Procedural Fidelity

Before beginning the pretests, all data collectors participated in data collection training. The same scenarios used for the pretest/posttest, BST checkout, and session assessment were used during the training. During the training, all data collectors had to reach 100% agreement with the first author on all EBP. An agreement was considered both data collectors scoring a step in the task analysis the same (i.e., both data collectors have to score the same step correct or incorrect). A disagreement occurred when one data collector scored a step correct and the second data collector scored the same step as incorrect or vice versa. Once all data-collectors reached 100% agreement, pretests began.

Interobserver agreement was taken for pretests, BST checkouts, session assessments, and maintenance assessments (posttests). All interobserver agreement data was calculated by using interval (type 2) agreement method by taking the number of
agreements divided by the number of disagreements plus the number of agreements multiplied by 100.

Procedural fidelity was collected during the lecture, study session, and BST sessions to ensure the research team was carrying out the approved procedures. Checklists were developed for each component of the intervention (lecture, study session, and BST) and this checklist was used to determine procedural fidelity. Appendix E shows the procedural fidelity checklist used for the lectures. Appendix F shows the procedural fidelity checklist used for the study session. Appendix G shows the procedural fidelity checklist used for the BST session. When procedural fidelity data was being collected, one of the data collectors had the checklist for that component of the intervention and would check off when the research member performed the step on the checklist. The total number of steps completed correctly divided by the total number of steps multiplied by 100 yielded the percentage that was used to display procedural fidelity data.

Social Validity

At the conclusion of the study, a social validity survey was given to participants. The survey consisted of 16 questions on a five point Likert scale (strongly agree, agree, neutral, disagree, strongly disagree) and two open-ended questions that participants wrote their responses to assess the goals, procedures, and outcomes of the study. The completion of the survey was voluntary, and no participant had to complete the survey. No members of the research team were present when the participants were completing the social validity survey. Participants were asked to identify what dyad they were in, but all answers to the survey were anonymous. If the participant was unsure which dyad they
were in, a member of the research team provided the participant with that information. See Appendix H for a list of questions that were asked to the participants in the survey.
<table>
<thead>
<tr>
<th>Participant’s Group</th>
<th>Age</th>
<th>Ethnic Group</th>
<th>School Standing</th>
<th>Licensure Program Acceptance</th>
<th>Licensure Program Track</th>
<th>Current GPA</th>
<th>Years Implementing EBPs</th>
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</thead>
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<tr>
<td>Group A</td>
<td>21</td>
<td>Caucasian</td>
<td>Undergraduate Junior</td>
<td>Yes</td>
<td>Moderate Intensive</td>
<td>4.0</td>
<td>1</td>
</tr>
<tr>
<td>Group A</td>
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<td>Caucasian</td>
<td>Undergraduate Sophomore</td>
<td>Yes</td>
<td>Moderate Intensive</td>
<td>3.25</td>
<td>0</td>
</tr>
<tr>
<td>Group B</td>
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<td>Caucasian</td>
<td>Undergraduate Sophomore</td>
<td>Yes</td>
<td>Mild Moderate</td>
<td>3.3</td>
<td>0</td>
</tr>
<tr>
<td>Group B</td>
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<td>Caucasian</td>
<td>Undergraduate Junior</td>
<td>Yes</td>
<td>Mild Moderate</td>
<td>3.34</td>
<td>1.5</td>
</tr>
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</table>
CHAPTER 3
RESULTS

The results of this study show that a lecture supplemented with a BST session is a more effective intervention than a lecture supplemented with a study session. When in the BST condition, all four participants scored 100% of steps completed correctly during the session assessment. For two of the four participants, the lecture supplemented with a study session was effective, but only reached 100% steps completed correctly for one EBP with one participant. For the other two participants, there was a greater vertical difference between the two conditions showing that BST was a more effective intervention for these two participants.

During maintenance assessments, if the participant attended the BST session during the intervention session the maintenance assessment score was higher than maintenance assessment scores when the participant attended the study session. For all four participants, many of the maintenance assessments scores were similar to their intervention session assessment score.

Table 2 shows all participants pretest scores. Figures 1 and 2 represent Sarah’s and Amanda’s scores during intervention and maintenance respectively. Sarah and Amanda were assigned to Dyad A throughout the study. Figures 3 and 4 represent
Dylan’s and Jeff’s scores during intervention and maintenance respectively. Dylan and Jeff were assigned to Dyad B throughout the study.

**Sarah**

When in the BST session, she scored 100% of steps completed correctly for each EBP. There is only one overlapping data point with the study session condition, when the EBP being taught was response interruption redirection. During the study session condition, the level of the data is around 70% with variability ranging from slightly above 40% to 100%. When comparing the intervention graph to the maintenance graph, the previous mastered EBP when in the BST condition did not maintain for two of the three EBP. Functional communication training, which had the most significant decrease in percentage of steps completed correctly, was a four week difference between interventions to maintenance due to participant absences and a university holiday. This was the only participant in which the percentage of steps completed correctly remained higher for the study session condition than the percentage of steps completed correctly for the BST condition.

**Amanda**

When in the BST condition, she scored 100% of steps completed correctly for each EBP. During the study session condition, the level of the data remained around 90% with no variability. There are no overlapping data points between the two conditions. Amanda’s maintenance graph remained almost identical to the intervention graph, with BST remaining at 100% of steps implemented correctly for each EBP and a slight increase in number of correct steps implemented correctly for least-to-most prompting.
Dylan

When in the BST condition, he scored 100% of steps completed correctly for each EBP. When in the study session condition, the level of the data remained low at around 10% with some variability. During maintenance, the percentage of steps completed correctly for EBPs when attending the BST condition remained higher than when attending the study session. The level of the data for the BST condition is around 80% with variability. For the last data point for the BST condition on the maintenance graph there is a drop down to 70% of steps implemented correctly and this also indicates a three week maintenance instead of a two week maintenance. The level of the data for the study session condition is around 10% with some variability. The last data point for the study session shows an increase in steps completed correctly from the intervention session.

Jeff

When in the BST condition, he scored 100% of steps completed correctly for each EBP. When in the study session condition, the level of the data remained low at around 5% with no variability in the data. During maintenance, the percentage of steps completed correctly remained higher for two of the three EBPs taught during the BST condition. For the EBPs taught during the study session condition, no steps were implemented correctly during maintenance. There is one overlapping data point between the two conditions during maintenance.

Interobserver Agreement

Interobserver agreement (IOA) was calculated by dividing the number of agreements by the number of disagreements plus agreements then multiplying by 100 to
yield a percentage. IOA data were collected for 33% of pretest assessments with an average agreement of 99% across participants. IOA data were collected for 50% of session assessments with an average agreement of 99% across participants. IOA data were collected for 33% of maintenance assessments with an average agreement of 98% across participants. IOA data were collected for 33% of BST checkouts with an average agreement of 100% across participants.

**Procedural Fidelity**

Procedural fidelity data were collected for 33% of lectures, study sessions, BST sessions. Lectures and study sessions were implemented with 100% fidelity and BST sessions were implemented with 97% fidelity.

**Social Validity**

All participants “disagreed” or “strongly disagreed” when asked if lectures alone would have been enough for them to learn how to implement an EBP. All participants “disagreed” or “strongly disagreed” that the study sessions were more helpful than the BST sessions and all participants “strongly agreed” that the BST sessions were more helpful than the study sessions. Also, all participants “strongly agreed” that it is important to learn how to implement EBPs and indicated that they “strongly agreed” or “agreed” that they would volunteer or encourage peers to participate in similar professional development opportunities.

Participants in Dyad A received the BST session for constant time delay (CTD), naturalistic intervention (NI), and functional communication training (FCT). When asked if they felt adequately prepared to perform the specific EBP in their future classroom,
both participants “strongly agreed” for constant time delay and one participant indicated “neutral” while the other participant indicated “strongly agree” for naturalistic intervention and functional communication training.

Participants in Dyad B received the BST session for least-to-most prompting (LTM), differential reinforcement of other behavior (DRO), and response interruption redirection (RIRD). When asked if they felt adequately prepared to perform the specific EBP in their future classroom, one participant indicated “strongly agree” and the other participant marked “agree” for least-to-most prompting, one participant marked “neutral” and the other participant marked “strongly agree” for differential reinforcement of other behavior, and one participant indicate “neutral” and the other participant marked “disagree” for response interruption redirection.

Participants in Dyad A received the study session condition for least-to-most prompting (LTM), differential reinforcement of other behavior (DRO), and response interruption redirection (RIRD). When asked if they felt adequately prepared to perform the specific EBP in their future classroom both participants indicated “agree” for least-to-most prompting and differential reinforcement of other behavior and one participant marked “agree” while the other participant marked “strongly agree” for response interruption redirection.

Participants in Dyad B received the study session condition for constant time delay (CTD), naturalistic intervention (NI), and functional communication training (FCT). When asked if they felt adequately prepared to perform the specific EBP in their future classroom one participant marked “disagree” and the other participant marked
“strongly disagree” for constant time delay, one participant indicated “disagree” and the other participant indicated “agree” for naturalistic intervention, and one participant marked “neutral” and the other participant marked “strong disagree” for functional communication training.

Overall, Dyad A indicated that they felt adequately prepared to implement all the EBPs taught whether they attended the BST or study session after attending the lecture. Dyad B felt more prepared to implement the EBPs taught while attending the BST sessions and less prepared to implement the EBPs taught during the study session. There were only two instances where the previous statement does not hold true. One participant from Dyad B did feel adequately prepared to implement naturalistic intervention, when the participant attended the study session. One participant from Dyad B did not feel adequately prepared to implement response interruption redirection, when the participant attended the BST session.

When participants were asked if lectures should be included in future learning opportunities, responses varied across all participants from “strongly agree” to “strongly disagree”. When participants were asked if study sessions should be included in future learning opportunities, responses varied across participants from two participants indicating “neutral”, one participant indicating “disagree”, and one participant indicating “strongly disagree”. All participants strongly agreed that BST should be included in future learning opportunities.

When asked if the participant preferred BST sessions or study sessions, all participants indicated BST. One participant wrote, “I preferred the BST sessions because
we were shown exactly how to do it and then did it ourselves. I really felt like it was the best way to learn exactly how to implement each practice.” Another participant wrote, “I preferred the BST sessions much more than the study sessions because it was a hands on experience, learning to appropriately apply an EBP to a situation.”

When asked to include any other comments, questions, or concerns regarding the goals, procedures, and outcomes of the study, two participants marked N/A. One participant discussed that the time of the day and day of the week made it difficult to want to continue to the end of the study. While another participant discussed the fear of implementing some of the EBPs incorrectly and that she would not know that the EBP was done incorrectly and therefore would incorrectly implement the EBP in the classroom.
Table 2. Pretest Scores

<table>
<thead>
<tr>
<th>EBP</th>
<th>Sarah</th>
<th>Amanda</th>
<th>Dylan</th>
<th>Jeff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naturalistic Intervention</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Differential Reinforcement of Other Behavior</td>
<td>25</td>
<td>0</td>
<td>13</td>
<td>31</td>
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<tr>
<td>Functional Communication Training</td>
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<td>0</td>
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<td>0</td>
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<tr>
<td>Response Interruption Redirection</td>
<td>0</td>
<td>0</td>
<td>33</td>
<td>0</td>
</tr>
<tr>
<td>Least-to-Most Prompting</td>
<td>32</td>
<td>42</td>
<td>16</td>
<td>11</td>
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<tr>
<td>Constant Time Delay</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</table>
Figure 1. Sarah's percentage of steps completed correctly.
Figure 2. Amanda’s percentage of steps completed correctly.
Figure 3. Dylan’s percentage of steps completed correctly.
Figure 4. Jeff's percentage of steps completed correctly.
CHAPTER 4

DISCUSSION

The results of this study indicate that BST is an effective intervention for teaching undergraduate pre-service teachers to implement EBPs with high fidelity. When participants were in the BST condition, all participants scored 100% of steps completed for each EBP. When participants were in the lecture followed by a study session condition, there were dramatic variances in the percentage of steps completed correctly for each EBP. Therefore, the results of this study suggest that BST is an effective intervention when teaching pre-service teachers to implement EBPs.

The current study furthers the research on using BST to teach adult learners new skills. Only one previous study, Sawyer et al. (2015), had used undergraduate pre-service teachers as a target population for seeing if BST was an effective intervention on implementation fidelity of EBP. Furthermore, Sawyer et al. (2015) found similar results when comparing lecture followed by BST and lecture followed by study session on participant’s implementation fidelity of an EBP. This study also extended the current research of using BST to teach undergraduates implementation fidelity by including a two week maintenance measure. The results of this maintenance measure indicate that EBP taught with the BST condition remained higher than EBP taught under the study session condition.
Research Question 1: Comparative Effects of BST and Study Sessions

When comparing the effects of a traditional lecture followed by BST and a traditional lecture followed by a study session on undergraduate students’ implementation fidelity of EBP during role play sessions, BST is the more effective intervention. All participants scored 100% of steps completed correctly when they attended the BST condition.

Participants in Dyad A still performed well when in the study session condition, but only Sarah reached 100% of steps completed correctly for one EBP (response interruption redirection). The research member in charge of the study session noted that the participants in Dyad A tended to review the PowerPoint lecture slides provided to them, their notes taken during the lecture, and on averaged asked more questions when compared to participants in Dyad B. Also, it was noted that when participants in Dyad B attended the study session, they spent the majority of the time looking on their phones/computers or working on other projects. This could be why there was an increase in Dyad A’s study session scores when comparing them to Dyad B’s study session scores, because participants in Dyad A spent more time reviewing the material before their session assessment.

Research Question 2: Maintenance of EBPs Taught

On average, when a participant was in a BST session for an EBP the maintenance assessment conducted two weeks after the intervention was higher than if the participate attended the study session for an EBP. Due to individual participant absences, a university schedule break, and taking a week off for finals not all maintenance
assessments were conducted exactly two weeks after the intervention session. For the university schedule holiday and taking a week off for final projects, there were three weeks between the intervention session and the maintenance assessment affecting the two week maintenance period for functional communication training and least-to-most prompting. All other three week maintenance assessment scores and all four week maintenance assessment scores were due to participant absences.

Sarah and Jeff were the exceptions to their BST maintenance scores remaining higher than the study session maintenance scores. For Sarah, two of the three BST scores for the maintenance assessments were lower when compared to her scores on EBPs when she attended the study session. She only maintained 100% mastery for naturalistic intervention two weeks after the intervention session, where she attended the BST session. Sarah also attended the BST session for functional communication training, but did not take the maintenance assessment until four weeks after the intervention session. This could have resulted in a lower score on the maintenance assessment since it was not two weeks after the intervention session. As for Jeff, there is one overlapping data point. When Jeff had attended the study session for an EBP, no steps of the EBP’s task analysis were maintained (he scored below 10% of steps completed correctly for all EBP taught when attending the study session). For response interruption redirection, Jeff attended the BST session but two weeks later could not recall any steps of the intervention resulting in 0% of steps completed correctly. The maintenance assessment was terminated because he told the researchers that he could not remember how to begin the intervention.
Research Question 3: Participant Preference when Learning to Implement EBPs

At the conclusion of the study each participant received a social validity survey. When asked about which condition of the intervention was most helpful, either the BST session or the study session, all participants preferred the BST session. Furthermore, when the participants were asked if the lecture alone would have been enough to implement the EBP, all participants indicated that it would not have been enough. When provided the opportunity to write a response to a question asking which condition was preferred, all participants wrote that they would prefer the BST condition over the study session condition.

Throughout the study, one participant stated on numerous occasions that he preferred the BST sessions more than the study sessions. Each week when he was assigned to the study session condition and arrived to complete the session assessment, he stated how much he did not enjoy the study session and wished that he could be in the BST session every week. At the conclusion of the study, two other participants stated that they were worried that they did not learn the EBPs properly when in the study session condition and were afraid to implement these practices in their future placements due to implementing the EBP incorrectly. In order to make the participants feel more comfortable with all the EBP taught, after all the maintenance assessments and surveys were completed, the lead researcher allowed the participants to see their scores and ask questions for clarifications. Modeling occurred for numerous of the steps that participants had questions about. This additional teaching was completely voluntary and participants
were not expected or asked to stay for this additional teaching opportunity, but three of the four participants attended.

One interesting aspect that was discovered with the survey was even though all participants preferred BST sessions over the study session and lectures when directly asked, when it came to asking if they felt adequately prepared to implement each EBP there was inconsistent responding when comparing the EBP to the condition in which the participant received instruction on the EBP. The survey did not indicate to the participant which condition they were in when they received instruction on the EBP, but at the beginning of the survey indicated which group they were in so at a later time researchers could then determine the condition for each EBP. When looking at the questions in regards to the BST condition, only six out of 12 total opportunities across participants did the participants indicate they “strongly agreed” they felt adequately prepared to teach the EBP, and just one out of 12 total opportunities across participants did the participant indicated they “agreed” they felt adequately prepared to teach the EBP that was taught during the BST condition. One other response was “disagree” and all other responses were neutral. This shows that even though the participants preferred the BST conditions over the study session condition, they still do not feel adequately prepared to use an EBP taught through the BST process 42% of the time. This could suggest that more than just one BST session could be needed in order for pre-service teachers to feel adequately prepared to implement EBP in the classroom, or they may prefer to receive feedback when directly working with their students. This would be a question to address in future
social validity questionnaires regarding using BST as a training tool to teach pre-service teachers to implement EBPs with fidelity.

**Limitations and Future Research**

There were numerous limitations to the current study and many more directions for future research in regards to using BST in a college classroom environment. The first limitation was time constraints. This study was developed to teach eight EBPs but only six EBPs were taught. The two EBPs that were removed from the study were discrete trial training and a multiple stimulus without replacement preference assessment (not an EBP, but crucial in the field of special education). These EBPs were removed because they were the last two EBPs in the list when all the EBPs were placed into a random name generator to determine the order. Therefore, it would be necessary for future research to use the same methods outlined in this study but include the EBPs removed from this study during intervention sessions.

Another limitation was the number of EBPs taught. There are many more EBPs in the field of special education and applied behavior analysis in addition to the six EBPs that were taught to the participants during this study. On the National Professional Development Center’s website, there is a total of 26 EBPs listed. Future research should consider using different EBPs than the ones taught in the study to pre-service teachers to see if the effects of BST can be generalized to other EBPs in the field of special education and applied behavior analysis.

Furthermore, each EBP was only assessed one time during intervention sessions when the participant attended the study session (session assessment) and assessed twice
during the intervention sessions when the participant attended the BST session (the BST checkout and the session assessment). An EBP can also be used to teach numerous skills such as social skills, adaptive skills, communication skills, or academic skills. By providing numerous scenarios covering the range of skills in which a particular EBP could be used would help to promote generalization of the skill for the participant. Therefore, it is important for future research to provide multiple scenarios and examples then provide opportunities for the participants to practice the EBP with each type of skill in which the EBP could be used.

Another limitation of the current study was possible carry over effects. After the second session, all participants had been exposed to both conditions and where becoming familiar with the assessment process. Although role playing during the study session did not occur, the research member in charge of the study session noted that participants in Group A began to ask more specific questions in regards to each specific step of the task analysis that was provided to them during the lecture. Also, as the study continued two of the four participants scored slightly better on their maintenance assessments than their session assessment. This could be due to numerous of the EBPs taught having very similar steps (e.g., gain learner’s attention, presenting an S\text{D}, data collection) and after several times hearing a step and practicing a step during BST sessions remembering these during future assessments.

Also, generalization measures were not included in this study. The entire purpose of becoming a special education teacher is to work with students. The current study did not have any generalization measure to determine if the EBPs taught during intervention
sessions would then generalize into the classroom setting working with students. Future research should include a generalization measure to determine if EBPs taught using the BST method will generalize into a classroom environment.

In regards to maintenance, it is important that once a skill is taught that it maintains overtime. In some instances in this study, when a participant reached 100% of steps completed correctly on an EBP during the intervention session, they did not maintain the skills for two weeks. Therefore, future research should develop a protocol for booster sessions and provide this booster session to return the participant’s responding back to 100% mastery. Furthermore, due to absences, the university schedule, and participants class schedule the maintenance period for all EBPs were different which showed varying maintenance scores for different EBPs. Future research should look into varying lengths of maintenance to determine if there is a specific time period that goes by when previous mastered skills begin to drop below mastery and additional instruction may need to be provided.

Finally, the purpose of this study was to determine if BST or study sessions were a more effective intervention when teaching pre-service teachers to implement EBPs with fidelity. Although the population of this study fits this research question the environment in which the research was held does not fit the research question perfectly. Therefore, future research should look into including BST into the college teaching classroom and have BST a part of the coursework. This research would then determine if it was feasible for college professors to use BST in their classrooms and if students prefer this method in college courses.
Implications for Practitioners

As practitioners, we should be using EBPs in our college classrooms when teaching pre-service teachers how to use EBPs in their classrooms. In numerous courses, college professors discuss the importance of using EBPs in K-12 classrooms and the law even mandates teachers to be using scientifically validated instruction practices. Therefore, college professors need to follow these same guidelines. There is numerous research stating that BST is an effective teaching approach when teaching adult learners new skills. The current study furthers this research and shows that BST can be used to teach pre-service teachers to effectively implement EBPs. Therefore, it is encouraged for practitioners, especially college professors, to begin to use EBPs in their college courses, especially when their course falls under a required course for teacher preparation.

Furthermore, this research indicates a greater need for collaboration among all parties involved in the field of special education. As behavior analysts, it is crucial to find a way to become part of the training process of preservice teachers while they are attending coursework in their teacher preparation programs. It is the duty as a behavior analyst to keep up to date with the latest research developments and scientifically validated instructions that are crucial for pre-service teachers and educators to be aware about. Therefore, behavior analysts need to become part of the process of disseminating the information found in research to the people instructing students. As for pre-service teachers and special educators, it is crucial to be open to behavior analysts coming in to teach you about the latest scientifically validated instruction practices and to attend classes and professional development opportunities conducted by behavior analysts who
use BST as their primary form of teaching new skills. In all, there is a greater need for behavior analysts, college professors, pre-service teachers, and educators to open the doors and begin to collaborate more with one another.
REFERENCES


Appendix A: Assessment Scenarios

Naturalistic Intervention

Pretest/Posttest
You have a second grade student with autism in your classroom. Jenny does not use any language to ask for the bubbles while on the playground but points to the item instead. Demonstrate how you would use naturalistic intervention to teach this skill.

BST Checkout
You have a first grade student with autism in your classroom. Ben cries when he wants more water in his cup. Demonstrate how you would use naturalistic intervention to teach this skill.

Session Assessment (DV)
You have a fifth grade student with autism in your classroom. Mike pulls the teacher over to this desk when he wants the teacher to help with his homework. Demonstrate how you would use naturalistic intervention to teach this skill.

Differential Reinforcement of Zero Rates of Behavior

Pretest/Posttest
You have a 2nd grade student with ADHD in your classroom. Jimmy interrupts his teacher by calling out every 12 seconds during whole group instruction in core content areas such as reading and math. Demonstrate how you would use differential reinforcement of zero rates of behavior to address this issue.

BST Checkout
You have a kindergarten-age student with autism in your classroom. Sarah runs around the room every 13 seconds during small group instruction. Demonstrate how you would use differential reinforcement of other behavior to address this issue.

Session Assessment (DV)
You have a 14 year old student with an emotional/behavioral disorder in your classroom. Tammy makes inappropriate comments every 20 seconds during 4th period science lecture delivery. Demonstrate how you would use differential reinforcement of other behavior to address this issue.
Functional Communication Training

Pretest/Posttest
You have a kindergarten student with autism in your inclusion classroom. Sally rips up her worksheet during discrete trial teaching sessions. As a result, you stop delivering demands. You have identified escape from demands as the function of Sally’s interfering behavior. Demonstrate how you would use physically prompted functional communication training to teach Sally to ask for a break using sign language.

BST Checkout
You have a high school student with an intellectual disability in your self-contained classroom during math, Ezekial screams, flaps his hands, and stabs his hand with a pencil when given independent practice. As a result, you remove the worksheet/independent work and allow him to take a break. You have identified escape from demands as the function of Ezekial’s interfering behavior. Demonstrate how you would use physically prompted functional communication training to teach Ezekial to ask for a break using sign language.

Session Assessment (DV)
You have a 6th grade student with autism in your self-contained classroom. During reading lessons, Rhianna bangs her head on the table, screams, and cries. As a result, you send her to the principal’s office. You have identified escape as the function of Rhianna’s interfering behavior. Demonstrate how you would use physically prompted functional communication training to teach Rhianna to ask for a break using sign language.

Response Interruption Redirection

Pretest/Posttest
You have a 1st grade student with autism in your classroom. Joe engages in vocal stereotypy by saying “oooooaaaaaaaooooooaaaaaa” over and over again when presented with a paper/pencil task. Demonstrate how you would use response interruption redirection to replace the vocal stereotypy with an appropriate response.

BST Checkout
You have a middle school-age student with Down syndrome in your classroom. From about 2:00-2:30 every day Sally begins chanting, “I go home at 2:30, I go home at 2:30, I go home at 2:30.” Demonstrate how you would use response interruption redirection to replace the vocal stereotypy with an appropriate response.

Session Assessment (DV)
You have a 14-year-old student with autism in your classroom. Throughout the day, Leah makes inappropriate vocal sounds that mimic a cartoon move she saw the week prior. Demonstrate how you would use response interruption redirection to replace the vocal stereotypy with an appropriate response.
Least to Most Prompting

Pretest/Posttest
You have a 5-year-old student in a kindergarten with a mild cognitive disability in your inclusive classroom. Timmy does not know how to put on his coat. Demonstrate how you would use least to most prompting to teach him to put on his coat.

BST Checkout
You have a 16 year old student with autism in your self-contained high school classroom. Susie does not know how to put on her pants. Demonstrate how you would use least to most prompt to teach this issue.

Session Assessment (DV)
You have a 12 year old student with an intellectual disability in your 7th grade self-contained classroom. Betty does not know how to put on her scarf. Demonstrate how you would use least to most prompting to teach this skill.

Constant Time Delay

Pretest/Posttest
You have a 2nd grade student with autism in your self-contained classroom for students with moderate disabilities. She is having difficulty mastering the sight word “the”. Demonstrate how you would use constant time delay to teach her this sight word.

BST Checkout
You have a preschool student with an intellectual disability in your inclusion classroom. He is having difficulty asking for the car from peers. Demonstrate how you would use constant time delay to teach him to ask for the car appropriately using a picture icon.

Session Assessment (DV)
You have a fourth grade student with autism in your inclusion classroom. He is having difficulty using nouns and verbs to describe pictures. Demonstrate how you would use constant time delay to teach him to use the noun “dog” and the verb “jump” when describing a picture of a dog jumping.
Appendix B: Materials

<table>
<thead>
<tr>
<th><strong>Naturalistic Intervention</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest/Posttest</td>
<td>BST Checkout</td>
<td>Session Assessment</td>
</tr>
<tr>
<td>• bubbles</td>
<td>• cup</td>
<td>• homework sheet</td>
</tr>
<tr>
<td></td>
<td>• water</td>
<td>• pencil/pen</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Differential Reinforcement of Zero Rates of Behavior</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest/Posttest</td>
<td>BST Checkout</td>
<td>Session Assessment</td>
</tr>
<tr>
<td>• timer</td>
<td>• timer</td>
<td>• timer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Functional Communication Training</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest/Posttest</td>
<td>BST Checkout</td>
<td>Session Assessment</td>
</tr>
<tr>
<td>• worksheets/paper that can be ripped</td>
<td>• math worksheet</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• pencil</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Response Interruption Redirection</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest/Posttest</td>
<td>BST Checkout</td>
<td>Session Assessment</td>
</tr>
<tr>
<td>• paper/pencil task</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Least-to-Most Prompting</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest/Posttest</td>
<td>BST Checkout</td>
<td>Session Assessment</td>
</tr>
<tr>
<td>• coat</td>
<td>• very large sweatpants</td>
<td>• scarf</td>
</tr>
<tr>
<td>• picture of someone putting left arm into a coat</td>
<td>• picture of someone putting left leg into pants</td>
<td>• picture of someone putting scarf around neck</td>
</tr>
<tr>
<td>• picture of someone putting right arm into a coat</td>
<td>• picture of someone putting right leg into pants</td>
<td>• picture of someone putting left side of scarf over right shoulder</td>
</tr>
<tr>
<td>• picture of someone zipping up a coat</td>
<td>• picture of someone pulling up their pants</td>
<td>• picture of someone putting right side of scarf over left shoulder</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Constant Time Delay</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest/Posttest</td>
<td>BST Checkout</td>
<td>Session Assessment</td>
</tr>
<tr>
<td>• index card with “the” written on it</td>
<td>• toy car</td>
<td>• picture of a dog jumping</td>
</tr>
</tbody>
</table>
Appendix C: PowerPoint Lecture Handout Example

3/23/2016

Least to Most Prompting

What is it?
- Prompting procedure to teach a new skill
- Begins with the least intrusive prompt
- Prompts become more intrusive when child responds incorrectly to current prompt level or doesn't respond
- Prompting types
  - Verbal, visual, gestural, model, partial physical, full physical

When to use?
- Use with students of all ages and skill levels
- Variety of skills
  - Seeking information
  - Pointing to objects
  - Identifying objects
  - Remaining on task
  - Motor skills
  - Social skills
  - Chained skills

Prior to Intervention
- Identify the target skill
- Select the type of prompts and organize by level of intrusiveness (create a hierarchy)
- Sequence the prompts from least-to-most assistance (the last prompts should result in success for the individual)
- Determine amount of time to wait for student response after instruction before using prompt

Implementation Steps

Questions?
Appendix D: Example Data Collection Sheet

Participant Name:______________________       Data Collector
Name:________________ IOA

Least-to-Most Prompting: Implementation Fidelity Checklist

<table>
<thead>
<tr>
<th>Least-to-Most Prompting</th>
<th>Trials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1*</td>
</tr>
<tr>
<td>1. Gain learner’s attention by:</td>
<td></td>
</tr>
<tr>
<td>a. Using an attention getting strategy and</td>
<td></td>
</tr>
<tr>
<td>b. Present the cue/instruction</td>
<td></td>
</tr>
<tr>
<td>2. Wait for the learner to respond.</td>
<td></td>
</tr>
<tr>
<td>3. Respond to the learner’s attempts:</td>
<td></td>
</tr>
<tr>
<td>a. If correct response occurs:</td>
<td></td>
</tr>
<tr>
<td>i. provide reinforcement</td>
<td></td>
</tr>
<tr>
<td>ii. record independent response</td>
<td></td>
</tr>
<tr>
<td>b. If not responding, having difficulty responding, or response is incorrect:</td>
<td></td>
</tr>
<tr>
<td>i. repeat the cue/instruction with a verbal prompt.</td>
<td></td>
</tr>
<tr>
<td>ii. repeat the cue/instruction with a visual prompt.</td>
<td></td>
</tr>
<tr>
<td>iii. repeat the cue/instruction with a model prompt.</td>
<td></td>
</tr>
<tr>
<td>iv. repeat the cue/instruction with a physical prompt.</td>
<td></td>
</tr>
<tr>
<td>4. When correct response occurs:</td>
<td></td>
</tr>
<tr>
<td>a. provide reinforcement</td>
<td></td>
</tr>
<tr>
<td>b. record level of prompting</td>
<td></td>
</tr>
</tbody>
</table>

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

Score: _____ / 19 = _____%
Appendix E: Procedural Fidelity Checklist – Lecture

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.</strong></td>
<td>Instructor projects and covers the information on slide 1.</td>
</tr>
<tr>
<td><strong>2.</strong></td>
<td>Instructor projects and covers the information on slide 2.</td>
</tr>
<tr>
<td><strong>3.</strong></td>
<td>Instructor projects and covers the information on slide 3.</td>
</tr>
<tr>
<td><strong>4.</strong></td>
<td>Instructor projects and covers the information on slide 4.</td>
</tr>
<tr>
<td><strong>5.</strong></td>
<td>Instructor projects and covers the information on slide 5.</td>
</tr>
<tr>
<td><strong>6.</strong></td>
<td>Instructor projects and covers the information on slide 6.</td>
</tr>
<tr>
<td><strong>7.</strong></td>
<td>After reviewing the EBP steps, instructor describes an example.</td>
</tr>
<tr>
<td><strong>8.</strong></td>
<td>Instructor does not model the EBP.</td>
</tr>
<tr>
<td><strong>9.</strong></td>
<td>Instructor answers all questions asked during the presentation.</td>
</tr>
<tr>
<td><strong>10.</strong></td>
<td>Instructor answers all questions asked at the end of the presentation.</td>
</tr>
</tbody>
</table>
Appendix F: Procedural Fidelity Checklist – Study Session

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>+/-</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Instructor says, “Please use this time to study your notes from today’s lecture and to ask me any questions you may have.”</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Instructor does not model EBP.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Instructor blocks participants’ attempts to role-play or practice the EBP.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Upon being informed the BST session has been terminated, instructor terminates study session and records duration.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix G: Procedural Fidelity Checklist – BST

<table>
<thead>
<tr>
<th>Instructions &amp; Modeling</th>
<th>+/-</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Instructor provides instructions for each step while modeling with a confederate.</td>
<td></td>
</tr>
</tbody>
</table>

**INSERTED EBP IMPLEMENTATION FIDELITY CHECKLIST HERE**

<table>
<thead>
<tr>
<th>Participant Role-Play/Guided Practice</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Instructor asks participants if they have any questions.</td>
<td></td>
</tr>
<tr>
<td>3. Instructor answers all questions asked by the participants.</td>
<td></td>
</tr>
<tr>
<td>4. Instructor has student form groups of two or three.</td>
<td></td>
</tr>
<tr>
<td>5. Instructor distributes materials necessary for participants to engage in the role-play practice along with copies of the scenarios and learner/teacher behavior (EBP fidelity) checklists.</td>
<td></td>
</tr>
<tr>
<td>6. Instructor monitors participants engaging in role-plays and observes each group at least once.</td>
<td></td>
</tr>
<tr>
<td>7. Instructor provides praise for steps implemented correctly and corrective feedback for steps implemented incorrectly.</td>
<td></td>
</tr>
<tr>
<td>8. Instructor encourages participants to praise and provide corrective feedback for steps implemented incorrectly.</td>
<td></td>
</tr>
<tr>
<td>9. After the instructor has observed each group at least once, s/he begins BST check-outs with the first volunteers.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mastery Check-out with Instructor</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Instructor acts as the learner, and the participant implement the EBP. (Score on a separate sheet for each participant.)</td>
<td></td>
</tr>
<tr>
<td>11. Instructor provides praise for steps implemented correctly and corrective feedback for steps implemented incorrectly.</td>
<td></td>
</tr>
<tr>
<td>12. If participant does not reach 100% mastery, s/he is instructed to resume practicing role-play scenario with group members.</td>
<td></td>
</tr>
<tr>
<td>13. Once all participants have reached 100% mastery criterion, instructor terminates BST session and record session duration.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix H: Social Validity Survey

1. Which group were you in?

Group A

Group B
For questions 2-6, please rate the extent to which you agree or disagree with each statement.

2. The lectures alone would have been enough for me to learn how to implement the evidence-based practices.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
</tbody>
</table>

3. The study sessions were more helpful than the BST sessions.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
</tbody>
</table>

4. The BST sessions were more helpful than the study sessions.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
</tbody>
</table>

5. As a preservice teacher, I think it is important to learn how to implement evidence-based practices.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
</tbody>
</table>

6. I would volunteer or encourage peers to participate in a similar professional development opportunity.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
</tbody>
</table>
For questions 7-14, please rate the extent to which you agree or disagree with each statement.

7. I feel adequately prepared to use **Least-to-Most Prompting** in my future classroom.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. I feel adequately prepared to use **Differential Reinforcement of Other Behavior** in my future classroom.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. I feel adequately prepared to use **Constant Time Delay** in my future classroom.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. I feel adequately prepared to use **Naturalistic Intervention** in my future classroom.

    | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
    |----------------|-------|---------|----------|-------------------|
    |                |       |         |          |                   |

11. I feel adequately prepared to use **Multiple Stimulus without Replacement Preference Assessment** in my future classroom.

    | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
    |----------------|-------|---------|----------|-------------------|
    |                |       |         |          |                   |
12. I feel adequately prepared to use **Discrete Trial Training** in my future classroom.

   Strongly Agree  Agree  Neutral  Disagree  Strongly Disagree
   [ ]          [ ]        [ ]         [ ]              [ ]

13. I feel adequately prepared to use **Functional Communication Training** in my future classroom.

   Strongly Agree  Agree  Neutral  Disagree  Strongly Disagree
   [ ]          [ ]        [ ]         [ ]              [ ]


   Strongly Agree  Agree  Neutral  Disagree  Strongly Disagree
   [ ]          [ ]        [ ]         [ ]              [ ]
For questions 15-17, please rate the extent to which you agree or disagree with each statement.

15. In future professional development opportunities, **lectures** should be included.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16. In future professional development opportunities, **study sessions** should be included.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17. In future professional development opportunities, **Behavioral Skills Training (BST) sessions** should be included.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
For questions 18 and 19, please write a brief answer.

18. Did you prefer Behavioral Skills Training (BST) sessions or study sessions? Why?

19. Please include any other comments, questions, or concerns regarding the goals, procedures, and outcomes of this study.