May 2014

Promoting Generalization of Skills Acquired Through Behavioral Skills Training with Embedded Visual Prompts

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Promoting Generalization of Skills Acquired Through Behavioral Skills Training with Embedded Visual Prompts

by

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A thesis submitted in partial fulfillment of the requirements for the degree of Master’s of Arts
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Date of Approval: March 24, 2014

Keywords: teacher training, preschool, classroom, behavior tools, cues

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ACKNOWLEDGMENTS

I would like to show my deepest appreciation to my advisor, Rose Iovannone, for continuing to push and guide me to ensure that I would graduate. I would also like to thank my committee members, Kim Crosland and Norín Dollard for assisting me through the completion of my study. Thank you to Ray Miltenberger for your patience and understanding throughout the long journey to graduate. I respect all of you and your feedback, and without you all in my corner I probably would not be finishing my degree right now.
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ABSTRACT

Studies on the “Tools” for Positive Behavior Change were originally conducted with people involved in the foster care system. Few studies have conducted the trainings in classroom environments to increase the positive interactions between teachers and their students. Numerous studies have demonstrated the usefulness of behavioral skills training in teaching a wide variety of behavioral skills; however, relatively few of them have shown generalization to their natural environment and maintenance of appropriate responding following the training. Methods of prompting following the initial trainings that have been utilized are often quite intrusive especially when it interrupts the flow of the participants’ natural environment. For this study, a multiple-baseline ABC across participants design was utilized to assess the combination of behavioral skills training to teach “Tools” for responding to child behavior with a less intrusive method of prompting in the form of visual prompts that are embedded into the training to maintain the skills acquired following the training.
INTRODUCTION

Teachers and other professionals who work with children in educational settings often have the difficult task of knowing how and when to accurately and effectively implement behavior management strategies in order to reduce disruptive behavior and increase appropriate behavior in the classroom. Teachers strive to keep all students on-task while simultaneously implementing a teaching lesson or grading papers; so when a student engages in a disruptive behavior it may get unintentionally reinforced by providing attention to the student following off-task behaviors (Allday & Pakurar, 2007). Trainings are often conducted in order to assist teachers and professionals in education with correctly responding to appropriate and inappropriate behaviors in the classroom so as to maximize the time spent learning and minimize the time spent on behavioral disruptions (Jensen, Parsons, & Reid, 1998; Neef, 1995; Petscher & Bailey, 2006; Phillips, 1998). Schepis et al. (2000) utilized training with support staff at a preschool for children with disabilities to use basic behavioral skills such as prompting, providing reinforcement, and error correction, which resulted in an increase in the children’s level of independence in correctly responding to each step of the program. Although trainings provide the information necessary to implement a skill, they often fail at ensuring that the skills generalize to the trainee’s natural environment and maintain once the training is no longer in place (Jahr, 1998). There is a growing literature on generalization and maintenance observed in a wide variety of training methods.
The literature describes a variety of training methods that have been conducted with professionals, staff, and caregivers of children to provide them with the skills to respond to behaviors such as lectures, memos, task clarification, and performance feedback. Providing the correct consequence to a behavior will likely result in an increase in desired behaviors in the children and a decrease in the competing behaviors. Moore and Fisher (2007) evaluated the effects of a lecture only training, partial video modeling, and complete video modeling on staff’s acquisition of functional analysis methods, which focus on the specific variables that manipulate behavior. Complete video modeling contained a wide variety of exemplars and was a successful method of training. Roscoe et al. (2006) compared the individual effects of written instruction, feedback, and contingent money on therapist implementation of preference assessments with children with disabilities. Results indicated that feedback alone resulted in correct implementation and contingent money did not, even though money was rated the highest by the participants prior to implementation of the study. Schepis et al. (2000) implemented the Teaching Skills Training Program, originally developed for training staff to teach adults with disabilities, with teacher aides and substitute teachers in an inclusive preschool setting. The program successfully utilized classroom-based instruction plus on-the-job monitoring and feedback to teach preschool staff to implement discrete trial training, which is breaking a skill into smaller steps and training one step at a time, with the students on a skill listed in each child’s Individualized Education Plan. As demonstrated in the Schepis study, combining various training methods can result in successful and lasting results.

One of the most successful multi-component training methods recently described in behavioral literature is called behavioral skills training, or BST. BST is a treatment package that
consists of four distinct training elements: instructions, modeling, rehearsal (role-plays), and feedback (Dib & Sturmey, 2007; Miltenberger, 2008). BST begins with instructions, which typically involves a task-analyzed verbal explanation of a particular behavior, in which the behavior is broken up into smaller steps. From there, the trainer then models the behavior that has been described for the learner, which consists of the trainer physically displaying the target behavior correctly to the learner. Modeling may be conducted in vivo, which means that the trainer performs the behavior in the same setting as the learner, or it may be conducted via video playback, which consists of the learner watching someone displaying the behavior appropriately over a video monitor (Moore & Fisher, 2007). The third component, role-play, requires the learner to rehearse the skills being taught. During rehearsal, the learner engages in role-play scenarios with the trainer to simulate a situation that would occur in the learner’s natural environment and would be an appropriate time to display the behavior that is being taught. Role-play allows the learner to practice the target behavior and provides the trainer with the opportunity to deliver feedback to the learner contingent on their performance. This feedback is the fourth and final component of BST, in which the trainer provides the learner with reinforcement, commonly in the form of praise for correct responses and corrective feedback for any incorrect responses (Miltenberger, 2008). This method of training has been applied to a variety of socially significant skills such as training gun safety skills to parents and children (Gross, Miltenberger, Knudson, Bosch & Breitwieser, 2007; Miltenberger, 1988), improving children’s posture during instrument playing (Dib & Sturmey, 2007), and training positive behavior change procedures to caregivers and parents (Crosland et al., 2008; Eyberg, Edwards, Boggs, & Foote, 1998; Schepis, Ownbey, Parsons, & Reid, 2000; VanCamp, Montgomery,
Vollmer, Kosarek, Happe, Burgos, & Manzoillo, 2008). Much of the research on BST had been conducted with parents and caregivers (Crosland et al., 2008; Miltenberger, Flessner, Gatheridge, Satterlund, & Egemo, 2004; Van Camp et al., 2008).

As noted, BST has been shown to be an effective method of training with parents and caregivers in numerous studies. Similarly, studies have also examined its use with teachers and classroom staff (Cotnoir-Bichelman, Thompson, McKerchar, & Haremza, 2006; Schell, 1998; Schepis, Reid, Ownbey & Parsons, 2001). Schepis et al. (2001) implemented an embedded teaching-skills training program, which utilized BST with teachers and support staff for children in an inclusive preschool. The training was designed to increase embedded teaching, which is when BST instruction is incorporated into existing classroom activities, into the daily routines of children with disabilities. Following the training correct teaching increased for all the participants. The validity of instructional procedure training can be measured by the increase in the children’s or student’s behaviors, which occurred in the study through increases in correct student responses and decreases in no responses.

Although numerous studies have demonstrated the usefulness of BST in teaching a wide variety of behavioral skills, relatively few of them have shown sustained maintenance of appropriate responding over long periods of time. BST studies generally show significant improvements in responding during and shortly after training but a decrease in performance back to near baseline levels once the initial intervention has been faded out or removed (Burgio, Whitman, & Reid, 1983; Jahr, 1998). While teacher and support staff training is an important and necessary aspect of most educational settings, the key is maintaining the skills acquired in training even after the training or intervention is no longer in place (Cotnoir-Bichelman et al.,
A few studies have utilized booster training sessions as a way of improving performance levels back to what they were following the initial training. These booster trainings consisted of introducing a condensed version of the original training material several weeks or months after the initial training and were conducted with parents in the home and staff working in the child welfare system (Eyberg et al., 1998; McDonald & Budd, 1983; Van Camp et al., 2008). Miller (2009) conducted booster training sessions with teachers of students with disabilities, who had previously had BST on implementation of basic behavioral tools or procedures, which did not maintain long after the training was completed. Following the booster sessions and in-situ probes that were conducted during classroom teaching the average percentage of correct implementation increased back to the initial post-training levels.

In-situ training is another method researchers have found to increase maintenance and generalization of the skills acquired through BST (Himle, Miltenberger, Flessner, & Gatheridge, 2004). In their study, in-situ training was conducted by inconspicuously observing the learner in their natural environment when there were opportunities to engage in the previously taught behavior. During this observation the trainer would immediately intervene contingent on an incorrect response exhibited by the participant. The trainer would approach the participant and conduct a short training session during which correct responding is prompted and reinforced by the trainer. A brief role-play may also be conducted during this training session. In-situ training is complete once the participant has correctly demonstrated all appropriate responses (Miltenberger, 2008). Himle et al. (2004) explored the use of BST and in-situ training methods to increase maintenance and generalization of preventing gun-play of children. If the child failed to
perform all of the skills following BST then he or she received in-situ training. Following in-situ training, all of the children reached criterion level for skill acquisition. Generalization assessments were conducted two weeks to two months following the last training received by six of the eight children and all of them performed at criterion levels showing that combining in-situ training with BST enhances maintenance and generalization of skills taught in BST (Miltenberger et. al., 2004). However, in an educational classroom setting in-situ training may be too intrusive of a method and may disrupt instructional delivery to students (Miller, 2009).

A less intrusive method to increase generalization and maintenance of skills trained is the use of visual cues, which provides the trainee with a visual prompt (e.g., activity schedule, checklist, picture) alerting them to engage in a particular behavior. While there is a dearth of studies that have explored the use of visual cues after BST training, visual cues have been used as a method for increasing generalization and maintenance of skill acquisition. These include scripts (written or pictorial), visually organized tasks, and rule posting (Ganz & Flore, 2008). In the literature visual cues are often implemented with children with autism spectrum disorders (ASD) in the form of activity schedules (Dooley, Wilczenski, & Torem, 2001), work systems to increase independence in academic tasks (Hume, Loftin, & Lantz, 2009), scripts to promote appropriate interactions with peers through conversation (Charlop-Christy & Kelso, 2003; Sarokoff, Taylor, & Poulson, 2001), and in training sign language (Carr, Binkoff, Kologinsky, & Eddy, 1978). Ganz and Flores (2007) evaluated written scripts plus a corresponding picture to promote theme-related speech in children with ASD in a private school. Following implementation of the visual cues, script phases and context related comments increased to criterion levels and above for all three children and unscripted phrases greatly increased for one
child in the study and continued during generalization probes. Since visual prompts have been successful in generalizing and maintaining skills taught to children with ASD, it could be an effective training method to add to BST as a nonintrusive prompt for maintaining the behavior of teachers during classroom teaching. The combination of training on basic behavioral principles with visual prompts is likely to result in the acquisition and maintenance of skills for teachers to help their classrooms run more efficiently. Including teachers in the research on training behavioral tools using BST with the addition of visual prompts following training will help expand the literature on training, generalization, and maintenance.

The purpose of this study was to extend the literature on maintaining behavior that is taught through BST and to introduce novel ways of promoting generalization after training has been completed. This study incorporated within stimulus prompts into the initial training, where a feature of the prompt was altered to make a correct response more likely. This prompt was later used as visual cues for correct responding during post-training sessions. These visual cues were used to prompt teacher correct responses in a way that is less intrusive than commonly used in-situ training and booster training strategies. These visual prompts were then systematically faded and ultimately removed entirely. Levels of correct responding were measured throughout the study.
Method

Participants and Setting

The current study was conducted in a general education classroom setting in a preschool in the Tampa Bay area. The training session for each teacher, which lasted approximately two and a half hours, took place outside of classroom teaching hours without the students present in a training room located at the school. The maintenance procedure was implemented in each teacher’s classroom while their students were present, in order to assess the teacher’s and students’ behaviors in their natural environment. Two general education preschool teachers who scored less than 65% on at least one tool during a pre-assessment on responding to student behaviors served as participants in the study. Both teachers were female and had earned their Child Development Associate (CDA) Credential, which was based on a set of competency standards for those working in early childhood education. Both teachers had also completed an initial forty hours of training prior to working at the preschool and are also required to complete an additional twenty hours of trainings relevant to early childhood education annually. One teacher was twenty-nine years old and was working on the completion of her Associate’s degree and has been working in early childhood education for ten years. The other teacher was thirty-seven years old and had completed her Associate’s degree, and she has been working in the field for thirteen years.

Although the students of the teachers did not receive any direct training during the study, their behaviors were still assessed to determine whether there is a correlation between changes in
teacher behavior and their student’s behaviors. In order to gain parental consent for participation in the study, the teachers handed out consent forms to each parent, along with a brief explanation of how the teachers were going to attend a training and that data were going to be collected on the students’ behaviors. Data were collected on the students whose parents provided signed consent for their child to participate. Each teacher identified three to four target behaviors to decrease and appropriate behaviors to increase, which served as opportunities to implement the trained procedures. Data were only collected on the behaviors provided by the teachers.

The researcher and research assistant were both trained on implementation of the Tools for positive behavior change, and therefore, were qualified to train the Tools. The director of the school was contacted, and during a face-to-face meeting, the research was explained and an informational flyer was provided (Appendix A). To show appreciation to the teachers for their participation and completion of the study, four ten dollar gift cards were provided to each teacher throughout the study.

Materials

A laptop, handout, printed slides, and data sheet checklists were used during the training sessions. Data sheets and a MotivAider were utilized throughout the study by the researcher and research assistant for data collection procedures, and two visual prompting cards were utilized during the Visual Cues phase. A MotivAider is a programmable device that sends a vibrating signal after a specified amount of time to prompt the user to engage in a particular behavior.

Experimental Design and Data Collection

A multiple baseline ABC across participants design was utilized to assess the effects of BST with feedback and in-situ visual prompts on teachers’ responses to student behaviors. The
study included three phases: baseline (A), post-training with feedback (B), and visual cues (C). Following training, observations were conducted in the classroom and the teachers were provided with feedback at the end of the observation period through specific verbal praise for correct implementation of the tools that were trained and corrective feedback on any missed opportunities to implement one of the tools and/or on incorrect implementation of a tool. Following the post-training with feedback phase, visual prompts were implemented for each tool-use opportunity. Data were collected on the number of intervals in which there was an opportunity to implement a tool, percentage of intervals where the teacher correctly responded to an opportunity, and the percentage of steps correctly implemented for each tool. Opportunity data were collected via thirty-second partial interval recording per each ten minute session. An opportunity for the teacher to respond was defined as any student in the teacher’s class’s engagement in one of the behaviors targeted for reduction or targeted for increase. For example, if a student engages in hitting another student, then the teacher had the opportunity to implement Redirect. If she attempts to implement the tool by redirecting the student away from the inappropriate behavior, then she will have correctly responded to the opportunity. An attempt for Use Reinforcement was defined as implementing step two of the checklist, which was providing a consequence for the behavior that matches the value of the behavior (appropriate touch, verbal praise, tangible item, privilege, or break from task). An attempt to implement Redirect was scored when the teacher stopped the behavior and prompted the student away from the inappropriate behavior. Teacher opportunity data were scored as percentage correct. For example, if the teacher correctly responded to two out of four opportunities to implement Use Reinforcement then they would score a 50% for responding to Use Reinforcement opportunities.
for that session. Data were also collected on the teacher's accuracy of implementation of each tool, which was scored based on the task analyzed steps for each tool. For example, Use Reinforcement had four steps so if the teacher correctly implemented three out of the four steps of the tool, she would score 75% correct for tool implementation accuracy. Data were collected on students’ engagement in the three to four behaviors targeted for reduction and the three to four behaviors targeted for increase, as identified by each teacher. Since it was partial interval recording, a behavior was marked as occurring in an interval if any of the target behaviors occurred during that interval. The total number of intervals in which a behavior occurred was scored per session. The students' engagement in the target behaviors served as opportunities for the teacher to implement the corresponding tool (Redirect for harmful and highly disruptive behaviors and Use Reinforcement for desirable behaviors). When there were zero opportunities to respond in a session, teacher data were not graphed for those sessions.

**Pre-assessment**

The pre-assessment condition served as a criterion measure and took place prior to baseline data collection. It consisted of a total of six different role-play scenarios (three for each tool), which are found in Appendix B, in which the researcher served as the student and the teacher was instructed to respond in the way they normally would in that given situation. Each scenario provided the teacher the opportunity to implement the appropriate procedure, such as Use Reinforcement or Redirect (see Appendix C). Feedback on the teacher’s performance was not provided at this time. The percentage of steps correctly displayed for each tool served as the teacher’s score for the pre-assessment. In order to qualify for participation in the study, each teacher had to score below an average of sixty-five percent correct on at least one out of the two
tools during the pre-assessment. Teacher 1 scored 58.3% on the Use Reinforcement role-plays and teacher 2 scored 33.3%, and teacher 1 scored 71.4% on Redirect and teacher 2 scored 23.8%.

**Pre-Training Interview**

Prior to baseline, the researcher interviewed each teacher that was eligible to participate in the study. A total of five teachers were eligible for the study; however, two teachers left their positions at the preschool prior to baseline. The other teacher that was eligible began working in a classroom with one-year-olds, and due to the developmental level of a one-year-old, the teacher was ineligible to participate. Therefore, two teachers participated in the study. The teachers identified three to four target behaviors that occurred in their classroom that they would like to decrease, as well as appropriate behaviors that they wished to increase and specified times during which the behaviors were more likely to occur. All behaviors were operationally defined (Table 1 and Table 2).

**Table 1. Behaviors targeted for reduction and definitions.**

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biting</td>
<td>Placing teeth on another person’s body and applying pressure; may or may not result in indentations on the other person’s body.</td>
</tr>
<tr>
<td>Hitting</td>
<td>Using open or closed hand to strike another person.</td>
</tr>
<tr>
<td>Taking from Others</td>
<td>Removing an item from another person’s hand without their permission.</td>
</tr>
<tr>
<td>Climbing on Furniture</td>
<td>Standing or lying on furniture, including but not limited to, chairs, tables, book shelves, couches.</td>
</tr>
<tr>
<td>Verbal Aggression</td>
<td>Verbally stating a curse word or engagement in verbal threats toward others.</td>
</tr>
<tr>
<td>Screaming</td>
<td>Speaking above conversational volume level.</td>
</tr>
<tr>
<td>Pushing Others</td>
<td>Pushing another person away with open hands.</td>
</tr>
<tr>
<td>Kicking</td>
<td>Using foot with or without shoe and striking another person.</td>
</tr>
</tbody>
</table>
Table 2. *Behaviors targeted to increase and definitions.*

<table>
<thead>
<tr>
<th>Requesting Items</th>
<th>Verbally asking for an item in a conversational voice volume.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complying After First Prompt</td>
<td>Following request when requested to engage in a task after the first prompt to do so.</td>
</tr>
<tr>
<td>Accepting No</td>
<td>When denied access to an item or activity, engaging in another task or activity without any engagement in problem behaviors.</td>
</tr>
<tr>
<td>Sharing</td>
<td>When another student requests an item or activity from a student that is already using the item or activity and the student provides access to the student that requested it.</td>
</tr>
</tbody>
</table>

Identifying specific behaviors to target helped ensure that the trainings were individualized to each teacher and her environment. Engagement in these reported behaviors served as the opportunities for the teachers to respond appropriately based on the strategies taught during the training. The behaviors identified by the teachers were also utilized during the training sessions in examples and role-plays, so the teachers could more easily relate the training to their student’s behaviors and their classroom environment.

**Procedures**

**Baseline.** The researcher conducted baseline observations in the classrooms of the two teachers and their students for whom parental consent was obtained. The baseline observations occurred prior to implementation of training. Data were collected on each teacher’s correct implementation of the following tools (see Appendix C for tools checklist): Positive Reinforcement, in the form of providing the student with specific verbal praise for engagement in the identified behaviors to increase, as well as redirecting a student from a possibly harmful or highly disruptive behavior to an appropriate alternative behavior, which is known as Redirect. Data were also collected on the percentage of the teachers’ correct responses to opportunities provided based on engagement of the target behaviors in the class. No feedback was provided to the teacher during this phase, and data were collected on the number of intervals in which any of
the target behaviors identified by the teachers occurred. These behaviors served as opportunities for the teacher to exhibit the appropriate response.

**Behavioral Skills Training.** The curriculum for the training was derived from “The Tools for Positive Behavior Change,” which was originally developed to train caregivers of children in the foster care system in order to assist in reducing the number of placements of children in the system (Van Camp, Montgomery, Vollmer, Kosarek, Happe, Burgos, & Manzolillo, 2008). The caregivers were provided with “tools,” or behavior analytic procedures to appropriately reduce children’s engagement in problem behaviors and increase their replacement behaviors by creating a positive environment for the children. The following is a list of the “tools” that were taught in the training and the purpose of each one:

- **Stay Close:** To create a safe, positive environment for the child to show that you care (Van Camp et al., 2008).
  - Stay Close is a form of noncontingent reinforcement, which can be implemented at anytime as a way of building rapport with the child and establishing the caregiver or teacher as a trusting and positive person in the child’s life.
  - The tool was trained, as it is a prerequisite for the other tools, but it was not assessed during data collection.

- **Use Reinforcement:** To increase a desirable behavior through positive and motivating consequences for the appropriate behavior.

- **Pivot:** To withhold attention for junk behavior, which is behavior that is not harmful but is age-typical annoying behavior, and provide attention for desirable
behaviors. Pivot comes from the behavior analytic procedure of differential reinforcement, where reinforcement is provided for appropriate behaviors and other undesirable behaviors are put on extinction.

- The tool was trained but it was not assessed during data collection due to the young age of the students and the frequency of junk behaviors with that age group.

- Redirect: To stop harmful or highly disruptive behaviors, and replace the behavior with an appropriate positive alternative behavior.

- Redirect comes from the behavior analytic procedure called differential reinforcement of an alternative behavior, where an undesirable behavior is decreased by replacing it with an appropriate alternative behavior by providing reinforcement for the alternative behavior.

The Stay Close tool was trained during BST with Use Reinforcement as contingent and noncontingent reinforcement, but data were only collected on Use Reinforcement, which is contingent reinforcement. Since the experimental design was a multiple baseline ABC across participants design, each teacher was trained on all the tools individually and at different times based on stability in the data. The training sessions lasted approximately two and a half hours and taught each teacher about avoiding the use of coercives, how to stay close through the use of noncontingent reinforcement, how to use reinforcement, how to pivot away from junk behaviors, and the procedures for redirecting a problem behavior and replacing it with a positive alternative behavior. Each of the procedures for the tools listed above was first trained through didactic instruction, in which the teacher was provided with information verbally and via power point
presentation regarding the definition, purpose, and procedures to implement each tool. The researcher and research assistant then modeled the correct procedure, and then the teacher practiced the steps of the tool via role-play scenarios, during which they were provided with praise and corrective feedback. During the training, both tools were presented with a particular color, which was used during the maintenance and generalization condition. Use Reinforcement was paired with the color green and Redirect was paired with red. When each tool was presented during training, the power point slide was colored to match its corresponding tool. Use Reinforcement was the first tool that was being targeted in the study that was trained, followed by Redirect. Role-plays were conducted until the teacher displayed one hundred percent accuracy for the particular tool over two consecutive scenarios.

**Post-Training.** Following each teacher’s training session of the tools, each teacher was observed in her classroom, and data were collected on each teacher’s correct implementation of each tool and correct responses to opportunities, similar to the baseline condition. A frequency of the intervals in which a target behavior decreased and replacement behavior increased was also collected. Feedback was provided in the form of corrective feedback and verbal praise following each observation in the post-training phase.

**Visual Cue.** Once the teacher reached stable responding (i.e., with at least three stable data points) during the post-training observation sessions, a visual cue was added to the intervention for each tool. The researcher observed each teacher in her classroom, where the researcher sat in the back of the room to refrain from being a distraction to the students, but still remain in the teacher’s line of sight. Whenever an opportunity to respond with one of the tools occurred based upon the occurrence of students’ behaviors that were previously identified as
targets, the researcher held up a 6x10 inch card with the name of the specific tool printed on the card in the tool’s corresponding color. For example, if the teacher previously identified “hitting” as a behavior to decrease and a student hit another student, the researcher immediately held up a red card with “Redirect” printed on it. The card served as a prompt for the teacher to engage in the appropriate procedure at that time. After stable responding of three or more data points was attained, the visual cue was systematically faded. First, the name of the tool was faded to a blank colored card being held up contingent on an opportunity for the teacher to respond to a behavior. Then card was faded out completely. Feedback was not provided during this phase in order to assess the effectiveness of the visual cue alone following training.

**Interobserver Agreement.** A research assistant that was trained to implement and train the tools via BST was recruited to assist with role-plays and data collection throughout the study. The research assistant simultaneously and independently observed and collected data during 44% of observation sessions throughout the study for teacher 1 and during 30.23% of observation sessions for teacher 2. An interobserver agreement of 98.94% was calculated for identifying opportunities to utilize Redirect for teacher 1 and 96.97% for opportunities to utilize Use Reinforcement. For teacher 2, interobserver agreement for identifying opportunities to use Redirect was 98.8% and Reinforcement was 94.6% agreement. The data collected by the researcher and research assistant was compared in order to calculate interobserver agreement, which was achieved by adding the number of intervals with agreements between the observers, where both observers scored that an opportunity occurred, and dividing that by the total sum of agreements and disagreements, and then multiplied by 100. Interobserver agreement was also collected on teacher responses to opportunities, which was scored with the same formula.
Interobserver agreement for teacher 1 was 100% for responses to opportunities for Redirect and Reinforcement, and agreement for teacher 2 was 83.33% for Redirect and 82.35% for Use Reinforcement.

Interobserver agreement was collected on tool implementation accuracy for each tool, which was calculated by dividing the total number of agreement of steps by the total number of steps, multiplied by 100. Only the intervals in which both data collectors scored that the teacher responded correctly to an opportunity by implementing the correct tool based on the student’s behavior. For teacher 1, interobserver agreement for Redirect was 89.42% and 95.51% for Use Reinforcement. Interobserver agreement was 95.24% for teacher 2 for Redirect and was 85% for Use Reinforcement.
Results

Figure 1 displays the data for teacher 1 (top panel) and teacher 2 (bottom panel) for their use of the Reinforcement tool. During baseline, correct responses to opportunities to use the tool ranged from 0% to 100% for both teachers, indicating that they told the student what behavior they liked and/or provided a positive consequence following a desirable behavior variably and inconsistently. During post-training, the range for both teachers was 50% to 100% with only one session observed in which a 50% for correct responses to opportunities was recorded for each teacher. During the visual cues phase, correct responses to opportunities occurred at 100% for both teachers. For teacher 1, the average correct responses to opportunities to implement Use Reinforcement was 41.67% during baseline, increased to 90.63% during the post-training phase, and increased to 100% during the visual cues phase. Teacher 2 correctly responded to opportunities to implement Use Reinforcement on an average of 15% during baseline, increased to 93.33% during post-training, and at 100% during the visual cues phase.

For teacher 1, tool implementation accuracy during baseline was an average of 68.33% for Use Reinforcement and increased to an average of 93.02% during post-training and remained at that level during the visual cues phase. For teacher 2, tool implementation accuracy for Use Reinforcement was an average of 60.91% during baseline, increased to 90.8% in post-training, and remained high during the visual cues phase. The arrows in Figure 1 indicate fading of the visual cue, so the first arrow indicates the point in which the visual cue was faded from a green card with the words “Use Reinforcement” on it to just a green card and the second arrow
indicates the first session when the visual cue was faded out completely. Due to the director of the school moving some students around between groups throughout the study, the dynamics between certain students changed; therefore, the number of opportunities to implement the tools based on the target behaviors was reduced, as displayed by the dotted data series in the graphs in Figure 1 and Figure 2.

**Figure 1.** Percentage of tool implementation accuracy (circles), correct responses to opportunities (triangles), and number of opportunities (crosses) per session across two participants for the Reinforcement tool. The graph displays baseline, post-training, and visual cue results for teacher 1 and 2. Arrows indicate each time the visual cue was faded.
Figure 2 displays results for the Redirect tool for teacher 1 and teacher 2. During baseline, both teachers responded to opportunities to use Redirect, by redirecting the student away from a potentially harmful or highly disruptive behavior, variably and inconsistently. During post-training, both teachers responded more consistently to opportunities to implement Redirect. During the few sessions where the teachers scored a 0% for correctly responding to an opportunity during post-training, there was only one opportunity for them to implement the tool; therefore, they only missed the only opportunity to use Redirect. The range of correct responses to opportunities was reduced during the visual cues phase, which indicates more stability in the teachers’ responses to opportunities to implement Redirect. Teacher 1 only scored below 100% in three sessions in the visual cues phase. This was attributed to the teacher not looking at the researcher when the visual prompt was displayed and not looking in the direction of the behavior because she was tending to other students. Teacher 1 usually had a teaching assistant in her classroom, but did not during that particular session. Teacher 2 consistently responded at 100% during visual cues.

During baseline, teacher 1 had an average of 50.65% for Redirect tool implementation accuracy, which increased to 85.59% during post-training, and remained at that level during visual cues. Teacher 2 scored 40.48% tool implementation accuracy during baseline for Redirect, which increased to 89.68% during post-training, and remained high during visual cues. The arrows in Figure 2 indicate fading of the visual cue, so the first arrow indicates the point in which the visual cue was faded from a red card with the word “Redirect” on it to just a red card, and the second arrow indicates the first session where the visual cue was completely faded out.
Figure 2. Percentage of tool implementation accuracy (circles), correct responses to opportunities (triangles), and number of opportunities (crosses) per session across two participants for the Redirect tool. The graph displays baseline, post-training, and visual cue results for teacher 1 and 2. Arrows indicate each time the visual cue was faded.
Figure 3 displays the rate of student behavior. Due to the director of the school moving students in teacher 2’s classroom to different classes in order to prevent problem behaviors, the number of opportunities and number of behaviors displayed by the target students were reduced. Teacher 1 also had about four students, who were consented to participate in the study, move to another classroom due to their age, which also resulted in fewer behaviors to track because there were less students in the classroom in which data were collected. There were behaviors exhibited in the classroom that were not able to be tracked due to consent not being provided by those students’ parents. The graphs below are not an accurate depiction of the behaviors that occurred in the classroom.

According to the social validity questionnaire, both teachers expressed that they enjoyed in participating in the study, were happy with the training and the material they learned and felt like the procedures trained were feasible to implement in a classroom environment. The teachers also reported that the visual cues helped prompt them to implement the particular tools without being too disruptive to the class. They also reported that the procedures learned were effective in addressing a variety of behaviors that occur in the classroom and stated they would recommend the training and intervention to their coworkers and other teachers.
Figure 3. Rate of student behavior during baseline, post-training, and visual cues. Circles represent target behaviors to increase and triangles represent target behaviors to decrease.
Table 3. *Results of social validity questionnaire.*

<table>
<thead>
<tr>
<th></th>
<th>(1) Strongly Disagree</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6) Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The training helped me understand how to use the particular procedures in my classroom.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>The procedures trained are easy to implement in the classroom without taking too much time away from teaching.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>The visual cues helped prompt me to implement particular procedures without being disruptive to the rest of the class.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>The procedures learned are effective in addressing a variety of students' behaviors in the classroom.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>I would recommend this training and intervention to other teachers.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>
DISCUSSION

This study extended the limited research on training teachers to use the Tools in a classroom setting and added the novel in-situ prompting in the form of visual cue cards in the classroom. The results of the study showed that following behavioral skills training and with feedback the teachers in the study increased their usage and implementation accuracy of the behavioral tools Reinforcement and Redirect. Implementation accuracy for Reinforcement increased by 25% from baseline to post-training for teacher 1 and increased by 30% for teacher 2. Correct responses to opportunities to use the Reinforcement tool increased by 49% from baseline to post-training for teacher 1 and by 78% for teacher 2. For Redirect, implementation accuracy increased by 35% and 49% from baseline to post-training, and correct responses to opportunities to utilize Redirect increased by 37% and 31% from baseline to post-training. Following visual cues, the teachers’ correct responses to opportunities to use each tool increased slightly.

Each time the teachers saw the visual cue, they implemented that corresponding tool. The only time they missed opportunities during the visual cues phase was when the teacher had her back to the researcher and did not observe the target behavior. The visual cues continued the stability, and improved slightly, over post-training. The use of visual cues in an environment where there is a need for non-intrusive methods of coaching individuals to implement strategies taught in a didactic training shows promise as an efficient method of in-situ training. The visual
cues assisted in helping the teachers recognize opportunities to implement each of the tools. This study provides promise in training teachers to use Tools developed for different audiences and utilized a less intrusive method of in-situ prompting.

The post-training results related to students’ behavior did not show a definitive change from baseline. There are several possible reasons for these results. First, the data collected only reflects that of the students whose parents provided consent for them to be part of data collection throughout the study. There were other students in the classes that provided the teachers with more opportunities to implement the tools, but since they did not have parental consent they were not included in the study. The students in the study were not necessarily students who exhibited more problem behaviors than others. All parents were provided with consent forms and only the ones that signed and turned it in were included. In teacher 1’s class, four students who were enrolled in the study ended up moving to a classroom with a different teacher; therefore, data were no longer collected on them. About halfway through the study, teacher 1 only had three to four students in her class at a time that had consented to participate in the study, which resulted in fewer behaviors and fewer opportunities for the teacher to implement the tools based on the behaviors she provided as targets when the study started. If data were able to be collected on more than just the few behaviors identified by the teachers, there would have been more opportunities to utilize the tools that could be included in the study’s data collection. Future research would benefit from collecting data on each specific step of the tools that the teachers implemented correctly in order to determine the steps in which they were having difficulty implementing. Focusing on settings where more problem behaviors occur would be more helpful in determining whether the implementation of the tools has an effect on the student’s behaviors.
in the classroom. Future studies should also collect follow up data to determine whether or not the skills acquired maintained following the removal of all interventions and prompts.

Second, the ages of the students in the two classrooms may be another reason for the lack of change in behavior during post-training. Toddler and preschool-aged children developmentally have difficulty with impulse control and self-regulation, which Raffaelli, Crockett, and Shen (2005) defined as, “the internally-directed capacity to regulate affect, attention, and behavior to respond effectively to both internal and environmental demands.” Using appropriate social skills to manage problematic play situations that occur naturally between children is a more developmentally advanced skill. Some of the early three-year-olds are still lacking clear communication skills, which makes it difficult for the children to implement the behaviors identified by the teachers as target behaviors.

Third, the classroom structure and management may account for some of the lack of student behavior change. Since the preschool was a small privately owned establishment, there was a lack of sufficient staff; therefore, the teachers were often required to take on administrative tasks during classroom time, such as answering the phone. During a few observations the teacher would have the students sitting at the table ready for breakfast, but it would arrive ten to twenty minutes late, which resulted in more problematic behaviors from the students because they had to wait. When breakfast did arrive, the teacher was often missing some items, such as not having enough milk for the entire class. During classroom teaching time, there were typically other staff that works at the school going in and out of the classroom, which creates a distraction for the students, often leading to engagement in off task problem behaviors.
There are some limitations to the study that need to be mentioned. First, having only two teachers in the study does not show generalization of the results across enough participants, even though the results were promising for the two. Due to the typical social-emotional competency level of preschool-aged children, future studies should explore extending this method to classrooms of older students. Conducting the study in a public school or more organized school environment instead of a smaller less organized private school, could result in fewer difficulties with environmental variables, such as scheduling and having unstructured classroom activities. The research could also be extended by collecting data on more of the Tools, instead of just Use Reinforcement and Redirect, which were designed to manage only two different types of behaviors. Another limitation to the current study was the inability to collect follow-up data, which would be very helpful for extending the research on visual cues and its effects on maintaining procedures that were trained after the cues have been removed for some time. Future research would also benefit from collecting data on a wider variety of student behaviors, rather than just three or four target behaviors. Even though the teachers identified those specific behaviors, there were a wider range of behaviors that occurred that would also serve as opportunities to implement the Tools, but they were not scored since they were previously identified by the teachers as targets. Since the data collection method was partial interval recording for the teachers’ behaviors, that method was also utilized in collecting student behavior, which resulted in underreporting of the students’ target behaviors. Future research should collect student behavior data using a more accurate data collection method, such as frequency recording.
Despite the limitations of the current study, the results indicated that the teachers engaged in Use Reinforcement and Redirect more consistently and accurately following training and with feedback. The teachers’ implementation of the correct Tool based on the student’s behaviors increased during post-training and increased slightly more during the visual cues phase. The teachers reported that they learned new and helpful skills that are feasible to implement in the classroom without taking away teaching time. Despite the student data failing to show a clear correlation between the teacher’s implementation of the procedures and the student behavior, the teachers reported in the social validity survey that they felt like the procedures learned in the training were effective in addressing a variety of students’ problem behaviors in the classroom; therefore, there could have been improvements in the behaviors of student’s that were not participants in the study since the teachers still implemented the tools with the whole class, which would not have been reflected in the data. We may have not shown visual cues change responses to opportunities but it is less intrusive than performance feedback, and possibly, more efficient. The results of the study extended the research on training teachers to implement the Tools in a classroom setting and on the implementation of a minimally intrusive in-situ prompting method in the form of visual cues.
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Appendix A: Informational Flyer

**TITLE:** Promoting Generalization of Skills Acquired Through Behavioral Skills Training with Embedded Visual Prompts

**IRB#:** 10477

**RESEARCHER:** Andrea Perdomo  
(813)767-5367  
anperdom@mail.usf.edu

**PURPOSE:** The purpose of the study is to train skills for positive behavior change to teachers through instructions, modeling, rehearsal, and feedback. Following each training, the teachers will be provided with visual cues in the classroom when the teacher should implement one of the tools taught during the training. These visual prompts will then be faded and ultimately removed entirely and levels of correct responding will be measured throughout the study. The tools that will be trained promote positive methods of achieving desired behaviors.

**COMMITMENT:**
- At least four teachers to participate in the study (participation in the entire study is highly preferred).
- A short pretest will be conducted to determine eligibility in the study, which will involve role-playing scenarios that are likely to occur in a classroom.
- If the teacher meets the eligibility requirements, they will have a short interview session with the researcher about students in their class that engage in disruptive behaviors.
- Each teacher will be trained individually in a training session.
- The session will last approximately two hours.
- Observations will be conducted in each participant’s classroom before and after each training session, where the researcher will be as discrete as possible in the back of the room.
Appendix B: Pre-assessment Role-plays

**Use Reinforcement:** 1) Tell the student what behavior you liked. 2) Provide a consequence for the behavior that matches the value of the behavior (appropriate touch, verbal praise, tangible item, privilege, or break from task). 3) Avoid reacting to junk behavior. 4) Avoid coercion.

- **Scenario 1:** One of your students walks into class on time, sits at their desk, and takes their planner out, which they are supposed to do in the morning.
  - Example of correct teacher response:
    - Great job going right to your seat and taking your planner out! You get a bonus point!

- **Scenario 2:** One of your students raising their hand after you ask a question to answer it.
  - Example of correct teacher response:
    - I love how you raised your hand Sally! Nice job!

- **Scenario 3:** One of your students is working quietly at their desk on a worksheet you assigned.
  - Example of correct teacher response:
    - (You walk by the student and pat him on the back). Thanks for working quietly Joe. Keep it up!

**Redirect:** 1) Get within arm’s reach of the student before saying anything. 2) Make sure the student stops the inappropriate behavior. (Use gentle physical guidance if necessary). 3) Calmly state, “(student’s name), I want you to (state positive alternative behavior). 4) If the student does not begin to do the suggested activity within 3 seconds, model, or gently guide him/her to do the activity. 5) Use reinforcement when the child does the appropriate behavior (praise, appropriate touch). 6) Say nothing and do nothing about junk behavior throughout the process. 7) Avoid coercion.

- **Scenario 1:** You see a student drawing on the wall with a crayon.
  - Example of correct teacher response:
    - (Quietly and quickly go to the student). Kayla stop. I want you to color on the paper. (If Kayla does not engage in the alternative behavior, model the behavior). Look, color on the paper like this. (When she begins the activity). Nice job coloring on the paper Kayla! That looks very pretty.

- **Scenario 2:** Two of your students are in the home/kitchen center. They start using oven mits as boxing gloves and are play fighting.
  - Example of correct teacher response:
    - (Quietly and quickly go to the student). David and Caden, how about you boys use the mits to pretend to take hot food out of the oven. (When the...
boys engage in the alternative behavior). There you go! That’s the way to use oven mits!

- Scenario 3: You see your student standing on the chair trying to reach a ball on a high shelf.
  - Example of correct teacher response:
    - (Quietly and quickly go to the student and help her down). Amy, if you need something you ask me for help. (If she asks for help). Nice asking Amy, yes I will get it for you. (Get the ball for her).
Appendix C: Tools Checklists

Checklist 1: Use Reinforcement (Trainer or co-trainer will mark “yes,” “no,” or “N/A” for each step based on the responses provided by the teacher).

<table>
<thead>
<tr>
<th>Step</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td><strong>Tell the student what behavior you liked.</strong></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td><strong>Provide a consequence for the behavior that matches the value of the behavior (appropriate touch, verbal praise, tangible item, privilege, or break from task).</strong></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td><strong>Avoid reacting to junk behavior.</strong></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td><strong>Avoid coercion.</strong></td>
</tr>
</tbody>
</table>

**Trainer’s Notes:** If the student does not display any junk behavior, check N/A for step 3 since no opportunity to avoid junk was provided.

**Coercives (circle any used & if any are circled check No for step 4):** threats; arguing; questioning; logic; despair; pleading; hopelessness; force; taking away privileges/items/allowance; one-up-man-ship; silent treatment; telling on them to others.
Checklist 2: Redirect (Trainer or co-trainer will mark “yes,” “no,” or “N/A” for each step based on the responses provided by the teacher).

<table>
<thead>
<tr>
<th>Step</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Get within arm’s reach of the student before saying anything.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Make sure the student stops the inappropriate behavior. (Use gentle physical guidance if necessary).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Calmly state, “(student’s name), I want you to (state positive alternative behavior).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. If the student does not begin to do the suggested activity within 3 seconds, model, or gently guide him/her to do the activity.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Use reinforcement when the child does the appropriate behavior (praise, appropriate touch).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Say nothing and do nothing about junk behavior throughout the process.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Avoid coercion.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Coercives (circle any used & if any are circled check No for step 5): threats; arguing; questioning; logic; despair; pleading; hopelessness; force; taking away privileges/items/allowance; one-up-man-ship; silent treatment; telling on them to others.
Appendix D: Social Validity Questionnaire

Social Validity Questionnaire

Participant Name: ______________________________________

For each statement, circle one number that best describes how you feel about the tools training you received.

1. The training helped me understand how to use the particular procedures in my classroom.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
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<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

2. The procedures trained are easy to implement in the classroom without taking too much time away from teaching.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td></td>
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<tr>
<td>3</td>
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<tr>
<td>4</td>
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<td>5</td>
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</tr>
</tbody>
</table>

3. The visual cues helped prompt me to implement particular procedures without being disruptive to the rest of the class.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td></td>
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<td>3</td>
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<tr>
<td>4</td>
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<td>5</td>
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</tbody>
</table>

4. The procedures learned are effective in addressing a variety of students' behaviors in the classroom.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td></td>
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<td>3</td>
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<td>4</td>
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<td>5</td>
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</tbody>
</table>

5. I would recommend this training and intervention to other teachers.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td></td>
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<td>3</td>
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<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

6. Please list any other comments or concerns.
Appendix E: IRB Approval

2/11/2014

Andrea Perdomo, B.S.
ABA-Applied Behavior Analysis
13301 Bruce B Downs Blvd
MHC 2113A
Tampa, FL 33612

RE: Expedited Approval for Continuing Review
IRB#: CR1_Pro00010477
Title: Promoting Generalization of Skills Acquired Through Behavioral Skills Training with Embedded Visual Prompts

Study Approval Period: 2/11/2014 to 2/11/2015

Dear Ms. Perdomo:

On 2/6/2014, the Institutional Review Board (IRB) reviewed and APPROVED the above application and all documents outlined below.

Approved Item(s):
Protocol Document(s):
Proposal (5.10.13) v.3

Per CFR 45 Part 46, Subpart D, this research involving children was approved under the minimal risk category 45 CFR 46.404: Research not involving greater than minimal risk.

The IRB determined that your study qualified for expedited review based on federal expedited category number(s):

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the
approved research must be submitted to the IRB for review and approval by an amendment.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

John Schinka, Ph.D., Chairperson
USF Institutional Review Board