

Effects of Behavioral Skills Training on Teachers' Implementation of Power Card Strategy

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Abstract

Behavioral Skills Training (BST) is an effective, well-designed package to train educators of individuals with autism spectrum disorder (ASD). In this study, BST was used to train three teachers on how to accurately implement the Power Card Strategy (PCS). Multiple probe design with probe conditions across participants was used for assessing effects of using BST to train teachers on PCS. Data indicated that all three teachers showed significant improvement in PCS practice. The mean score was 14% for all three teachers during the baseline session. After training, they achieved 100% accuracy in three consecutive sessions. Those results were maintained three weeks later. Social validity data also showed that BST was effective and acceptable.

Keywords: autism, behavioral skills training, power card strategy, teacher training

Introduction

Difficulties in social interaction and communication are the core characteristics of ASD (American Psychiatric Association [APA], 2013). Researchers have recently attempted to use children's special interests to teach social and communicative skills as well as other skills (Campbell & Tincani, 2011; Daubert, Hornstein, & Tincani, 2015; Keeling et al., 2003). The Power Card Strategy (PCS) is a technique to teach various skills by using individuals' special interests along with visual aids, and to increase pro-social behaviors (Elisa, 2001; Gagnon, 2001; Gagnon & Myles, 2016). This strategy is one of the story-based interventions (National Autism Center [NAC], 2015), also known as social narratives (Sam & AFIRM Team, 2015) (herein referred as story-based interventions), which is an evidence-based intervention. Although Social Stories™ (Gray, 1994b; Sam, A. & AFIRM Team, 2015) is the most well-known story-based intervention, other story-based interventions include cartooning (Smith Myles & Aspy, 2016), power card strategy (Gagnon, 2001; Gagnon & Myles,

2016); social scripts (Smith Myles & Aspy, **2016**), and Comic Strip Conversations™ (Gray, 1994a; Smith Myles & Aspy, **2016**).

In order to apply the Power Card Strategy, first of all, the individual's special interest character or hero and target skill are determined. Then, PCS materials including the script and the power card are prepared. The script depicts how the child's hero would behave in a similar situation. The power card resembles a business card in size and contains a summary of the script and visuals of the hero. The strategy is implemented by introducing the script and the card to the individual and discussing how and when to use this strategy (Daubert et al., 2015; Davis et al., 2010; Gagnon, 2001).

Several single-subject research studies have reported that PCS is an effective tool in increasing appropriate skills and reducing problem behaviors. Keeling et al. (2003) examined the strategy's effectiveness in teaching fair sports skills to a child with ASD, who exhibited inappropriate behaviors when she lost a game. They reported that the participant developed appropriate behaviors expected in winning and losing cases. Spencer et al. (2008) replicated Keeling et al. (2003) and used PCS teach a five-year-old boy in order to increase his social interactions and his time on the playground. The child's targeted social skills were then improved (Spencer et al., 2008). In a more recent study, Davis et al. (2010) examined the strategy's effectiveness in terms of conversation initiation skills of students with Asperger syndrome and observed that participants were able to improve the targeted conversational skills. Angel et al. (2011) also reported that the PCS was effective in developing transition behaviors with three students having developmental disabilities. Likewise, Campbell and Tincani (2011) showed that use of the PCS increased instruction-following ability among three students with ASD. Daubert et al. (2015) also replicated the study of Keeling et al., showing that the PCS increased turn-taking skills of two children with ASD. To this end, several studies have confirmed the PCS's effectiveness on individuals with ASD (Angel et al., 2011; Campbell & Tincani, 2011; Daubert et al., 2015; Davis et al., 2010; Keeling et al., 2003, Spencer et al., 2008).

Educators must have ASD-specific professional competencies in order to achieve positive outcomes and to ensure quality-education when working on individuals with ASD. Accordingly, well-designed teacher training programs are just as important in increasing educator's ASD competencies (Scheuermann et al., 2003; Simpson, 2004; Stahmer et al., 2015). Behavioral skills training (BST) is an evidence-based training that employs applied behavior analysis (ABA). The BST method is effective in teaching many skills to a variety of populations (parent, teachers, etc.). These skills include stages of instruction, modeling, rehearsal, and feedback, (Miles & Wilder, 2009; Wallace et al., 2004; Ward-Horner & Sturmey, 2012). BST is also an effective,

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well-designed training package used to train educators who work on individuals with ASD (Miles & Wilder, 2009; Sarokoff & Sturmey, 2004; Ward-Horner & Sturmey, 2008). Sarokoff and Sturmey (2004) used BST to train teachers on how to practice discrete trial training (DTT). Use of BST produced rapid and substantial improvements in all three teachers' practices of DTT. In a later study, Sarokoff and Sturmey (2008) investigated effects of BST on the staff's DTT practice as well as on student performance. The BST was instrumental in acquisition and generalization of DTT by staff. Improving the DTT skills of the staff also improved student performance on given tasks. Furthermore, according to the findings, BST is a socially valid training procedure. Nigro-Bruzzi and Sturmey (2010) evaluated BST for training staff to conduct mand training, and found that staff' performances have increased after the training. Fetherston and Sturmey (2014) also demonstrated effectiveness of BST in staff training on DTT practice, incidental teaching, and activity schedules. The social validity data in their study also showed that BST was highly acceptable and effective. Another study demonstrated that BST was effective in instructing teachers on mastery of the Picture Exchange Communication System (PECS) practice (Homlitas et al., 2014). The study by Clayton and Headley (2018) showed that BST is effective for paraprofessionals in implementing DTT, and that results were maintained 30 days after training.

The objective of the current study is to evaluate effectiveness of BST in teaching the Power Card Strategy to three special education teachers. To this end, the study addressed the following questions: (a) Is the BST effective in training teachers on how to implement the PCS? (b) Are the outcomes of BST maintained? and (c) What are teacher's views related to the social validity of the BST and PCS?

Method

Participants

Three special-education teachers participated in this research. Teacher 1 began working as a research assistant in the Special Education Department of a university after working as a special education teacher for five years. This teacher was working towards a Ph.D. in the Education of the Mentally Disabled Program of the Special Education Department, and had 10 years of work experience. Teacher 2 had been working as a special education teacher for 11 years. Teacher 3 was in the first year of special education teaching. The teachers had never received training on the PCS. Details of the participants are presented in Table 1.

Table 1*Particulars of the Participants*

Participants	Teacher 1	Teacher 2	Teacher 3
Age/Gender	32/Female	33/Female	23/Female
Number of years worked in special education	15	11	In 1st year
The last education program completed by the participant	Special Education	Special Education	Special Education
Educational level	Ph.D.	Undergraduate	Undergraduate

The other participant was a seven-year-old child with ASD. The child was diagnosed with ASD at the age of three by a pediatric and adolescent psychiatrist. The diagnosis was reaffirmed through follow-up when he was five years old. This study used the Gilliam Autism Rating Scale-Second Edition-Turkish Version (GARS-2-TV; Diken et al., 2012) to determine the severity of the child's autism. The Gilliam Autism Rating Scale-Second Edition (GARS-2; Gilliam, 2006) is also used to identify and diagnose autism in individuals between the ages of 3 and 22. According to the GARS-2-TV (Diken et al., 2012), the Autism Index score of the child was 97, indicating that the child has very high probability of having ASD. The child had been attending a public kindergarten half a day on certain days of the week and receiving special education support since he was four years old. He is currently attending the first grade at a standard classroom of a state primary school together with his shadow teacher. The shadow teacher is present only during the morning classes; the child attends afternoon classes alone. The participant child also receives one hour of individual special education support each week at the Autism Practice and Research Center at the university where Teacher 1 works, and also at the special education center where teachers 2 and 3 work.

The child's typical characteristics were profiled through the researcher's observations, interviews with his teachers and the mother as well as examination of the Individualized Education Program (IEP). Accordingly, it was found out that the child (a) has year-one reading and writing skills, (b) has developed receptive language skills, (c) has limited eye contact, and (d) mostly uses two-word sentences to express his desires. He was crying and throwing objects at the windows when he did not get what he wanted or if he did a task wrong during writing or painting, which are obvious behavioral problems. He has poor social skills and does not communicate with peers. After the interviews with the mother and in line with the

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IEP, it was ascertained that he needed support in the following areas: following instructions given by the teacher, taking turns, asking for help, asking for permission, and engaging in social interactions and communication. Based on the interviews, it was also found out that the child had special interest in Squirrel Scrat, one of the characters in the Ice Age series.

Ethical Considerations

The child's mother and participating teachers provided informative written consent for volunteer participation in the study. They were informed about the research and their own personal rights (e.g., withdrawing from the research at any time) in writing and verbally. Apart from these participants, no community members were involved in this research. I also received an expert opinion on the assessment form I used on the participants. I asked the expert about both whether the items in these assessment tools are appropriate in terms of evaluating the teaching process, and whether the items in these assessment tools are ethical for the participants. The expert reported that these assessment tools were appropriate for both conditions. Furthermore, official permission is obtained from the Science and Advisory Board of the Autism Practice and Research Center of a state university. This board is not an ethical review committee, but a board constituted of field experts, who review scientific and ethical aspects of the practices and research conducted at this center and make decisions to that extent. The board members include a pediatric psychiatrist from Faculty of Medicine, Pediatric Psychiatry department, an adult psychiatrist, an assistant professor working in the field of psychology, an assistant professor working in the field of special education, and three specialists with post-graduate degree, working in special education, educational sciences, and preschool teaching fields.

Setting and Materials

The research was carried out in the autism research center and the special education center. These places were the places where the student received special education. These classrooms have desks, chairs, special education materials, and a Handycam video camera. Power card scripts and cards prepared by the teachers were used as class material. These materials are described in detail in the following sections.

Research Design

A multiple probe design with probe conditions across participants, which is a type of single-subject experimental research design, was used for assessing the effect of BST in teaching PCS. The study was composed of full probe sessions, BST training sessions, post-training, and follow-up sessions. The effectiveness of BST was

considered when (a) changes were observed in the performance of the first participant only after the post-training sessions, (b) no change was observed in the performances of the other participants to whom BST was not conducted, and (c) the same effect was subsequently repeated with the other participants.

Dependent Measure

The dependent measure was each participant's percentage for correct use of seven components of the PCS practice. The seven components were adapted from the previous studies (see, e.g., Angell et al., 2011; Gagnon, 2001; Keeling et al., 2003). A PCS Implementation Components Assessment Checklist that incorporates those components was designed for use in the evaluation process. The components were as follows: (a) Preparation of PCS materials or introduction of them into the setting; (b) Moving into a quiet place without any external disturbances for presentation of PCS materials; (c) Giving a prompt to engage the child's attention to the power card materials, and providing verbal reinforcement when the child expresses his readiness verbally or with gestures and/or mimics; (d) Looking through and reading the prepared script and power card together with the child to introduce these materials to them and explaining when to use them; (e) Moving into a setting where the target skill in the PCS material will be exhibited; (f) Giving appropriate instructions (e.g. check your activity schedule, playtime, etc.); and (g) Putting the power card on a desk within the practice setting or some place (e.g., an agenda) where the child can access to the card for review.

The Power Card strategy implementation performances of each participant were video recorded. The footages are scored after the sessions using PCS Implementation Components Assessment Checklist. A "+" score is given for each component that was fulfilled correctly. A "-" score is given when the skill was not performed correctly. The overall percentage of correct responses was calculated by dividing the total number of correct participant responses by the sum of all responses (both correct and incorrect) and multiplying the result by 100%. The first component in the PCS Implementation Components Assessment Checklist "preparation of the PCS materials or introduction of them into the setting" was assessed in line with the "Power Card Strategy Material Design Assessment Form." Components in the checklist were adapted from previous studies (see, e.g., Angell et al., 2011; Gagnon, 2001; Keeling et al., 2003). Components for the scenario were as follows: (a) Providing a topic; (b) Describing the target skill or the experienced difficulty in the words of the favorite hero on a card or a piece of paper; (c) Writing the importance of proper behavior in the words of the hero; (d) Describing proper behaviors in the words of the hero; (e) Itemizing the sentences used in the previous step (component); (f) Writing a few sentences about how the hero succeeds when he acts properly in

order to encourage the child; and (g) Placing visuals of the hero on the paper. The components for the power card were as follows: (a) Preparing a card in the size of a business card; (b) Writing a summary of the scenario on this card using 3-5 items; and (c) Placing the visual(s) of the hero on the front or back of the card. A "+" score was given when the components were performed correctly. A "-" score was given when the skill was not performed correctly. The overall percentage of correct responses was calculated by dividing the total number of correct participant responses by the total number of all responses (both correct and incorrect) and multiplying the result by 100%. When this step was not 100% accurate, a "-" score was also given to the other steps that require the use of Power Card materials in the PCS Implementation Components Assessment Checklist.

Procedure

The procedure was adapted from Sarokoff and Sturmey (2004, 2008).

Full Probe Sessions. These sessions were conducted before starting BST and after the participants met criteria in the post-training sessions until a minimum of three consecutive sessions were completed and stable data were collected. The probe sessions were videotaped and scored as described above.

The first full probe session was conducted to collect baseline data from participants. For the baseline session, the researcher gave the participants a form containing a list of the PCS implementation components. However, the form did not contain behavioral descriptions for those components. This form included skills where the child needs support. Teachers were asked to choose a skill from this form. Teacher 1 chose the skill of "remaining seated at the desk during activities." Teacher 2 chose the skill of "asking permission to take something he wanted." Teacher 3 chose the skill of "taking turns." Additionally, Squirrel Scrat's visuals, papers, scissors, and tapes were provided. During the baseline session, the researcher asked them: "Examine the form and practice a PCS session."

The other full probe sessions were held similar to the baseline session. After the first participant met the criterion in the post-training sessions, the second full probe session was conducted together with all other participants. Likewise, after the second participant met the criterion in the post-training sessions, the third full probe session was held together with all other participants. Finally, after the third participant met the criterion, the last full probe session was conducted together with all other participants.

In each full probe session, the PCS materials (script and power card) that the teachers prepared for the first session were evaluated in line with components in the "the

Power Card Strategy Material Design Assessment Form.” In cases where this material was prepared with one hundred percent accuracy, the teacher used the same material in the subsequent sessions. During practice, if the materials prepared by each teacher were not one hundred percent accurate, the teacher was asked to redesign the materials.

Training. The training was conducted similar to the other researches available in the literature (see, e.g., Miles & Wilder, 2009; Sarokoff & Sturmey, 2004, 2008). During the teaching of PCS using skills, BST was performed in line with the steps of verbal instruction, feedback, modeling, and rehearsal. The researcher first gave verbal instructions. During these instructions, preparation of the PCS materials and implementation of the strategy were explained using a PowerPoint presentation. After the presentation, participants were asked to look through the manual and provide feedback on their questions, if they had any to share. Feedback was also given on participants’ baseline performance. Accordingly, videos of participants’ performances during baseline sessions were observed in the presence of the participant. Participants were given feedback about their performance according to the presentation and handbook provided in the verbal instruction stage. Participants were also asked three questions, followed by a verbal evaluation. These questions are as follows: Briefly describe the Power Card Strategy and its objectives. Describe preparation components for PCS materials? Describe PCS implementation components? Correct responses were reinforced verbally. Corrective feedback was given for incorrect responses from the participants. Participants gave some incorrect or incomplete answers when answering the second and third questions. For example, the first participant was confused about the preparation stages of the scenario using PCS materials.

After participants responded correctly to all questions in the verbal evaluation, the next step was modeling preparation of PCS materials. The researcher modeled how to prepare PCS materials by explaining the content of the Power Card Strategy Material Design Assessment Form, by using verbal and visual examples and showing video examples. The participants’ understanding of how to prepare the materials was evaluated based on their performance during the trial phase for preparation of PCS materials. At this stage, the participant was asked to prepare PCS material about the target behavior they chose for the baseline. The materials were evaluated in accordance with the PCS Material Design Assessment Form. The modeling phase was repeated, and corrective feedback was given until all steps in the form were performed 100% correctly.

At this stage, all participants prepared PCS materials with 100% accuracy on their first trial. Some material examples were prepared by each participant are provided

in Supporting Information (See Supporting information 1, 2, 3, and 4). Participants were given positive verbal feedback when they met the criterion. Then, in the next step, a PCS implementation session was held using relevant material designed by the participants. Accordingly, they performed role-playing, where the researcher acted out the roles of the teacher and participant student. The researcher also provided several video examples. Participants were then asked about their practices (e.g., how are the script and power card presented to the student?), followed by corrective feedbacks given for their incorrect answers and positive verbal reinforcement for their correct answers. Finally, during the rehearsal phase, the researcher acted out the role of the student, and the participants conducted a session using the PCS. Feedback was provided to participants. Once all participants met the criterion described above with 100% accuracy, BST was ended, and the post-training phase was initiated.

Post-training. The post-training was conducted in a similar manner to the research (see, e.g., Miles & Wilder, 2009; Sarokoff & Sturmey, 2004; 2008). After BST, post-training sessions were conducted as full probe sessions using Power Card materials designed during the training. These sessions are video-recorded and scored as described above. No further training procedures were conducted. The criterion for completion of post-training was 100% correctly completed components across three consecutive sessions.

Follow-up sessions. Follow-up sessions were held three weeks after completion of the post-training sessions. The purpose of these sessions was to examine whether the participants maintained the skills they acquired during training sessions. These sessions were conducted and scored just like full-probe sessions.

Interobserver reliability. Interobserver reliability data were collected by early childhood special education master's degree students. Data collection took place throughout 30% of all probe and post-training sessions for all three participants. Interobserver agreement was calculated using following formula: $(\text{number of agreements} / [\text{number of agreements} + \text{disagreements}]) \times 100$ (Alberto & Troutman, 2009). There was 100%, 96% (range, 85% to 100%), and 96% (range, 85% to 100%), agreement for Teachers 1, 2, and 3, respectively during full probe sessions. Reliability was 100% for all teachers during post-training sessions.

Procedural Reliability. Procedural reliability data were collected by early childhood special education master's degree students. To assess procedural reliability of the BST the following components of researcher behavior were recorded (Miles & Wilder, 2009; Sarokoff & Sturmey, 2004): (a) Verbal instructions and PowerPoint presentations, (b) Review of the manual by participants and feedbacks given on participant questions, (c) Modeling for the PCS material design,

(d) Rehearsal study for the PCS material design, (e) Delivery of feedback based on PCS material design rehearsal, (f) Modeling for the PCS implementation, (g) Rehearsal for the PCS practice, and (h) Delivery of feedback based on PCS practice rehearsal. Procedural reliability was calculated using the following formula: (number of observed researcher behaviors/ [number of planned researcher behaviors]) x 100 (Kazdin, 1982). Procedural integrity was 100% during BST for all teachers.

Social Validity. Social validity of both PCS and BST were examined based on the views of the teachers, using social validity survey. Teachers' opinions were evaluated via 5-point Likert-type surveys scored on a scale ranging from 1 = strongly disagree to 5 = strongly agree to assess social validity of the BST (see Supporting Information 5) and social validity of the PCS (see Supporting Information 6). Each participant anonymously filled out 10 items in BST social validity survey and 9 items in PCS social validity survey. The two surveys were adapted from the Treatment Evaluation Inventory-Short Form (TEI-SF) (Kelley et al., 1989), Treatment Acceptability Rating Form-Revised (Reimers & Wacker, 1988), and Social Validity Survey (Campbell & Tincani, 2011). Higher scores in these surveys represent greater acceptance of a given treatment. A "moderate" acceptability rating on these surveys would result from a midpoint score of 3 on each item. Therefore, a total BST social validity survey score of moderate acceptability for the ten items would be 30. Total PCS social validity survey score of moderate acceptability for the ten items would be 27 (Kelley et al., 1989; Reimers & Wacker, 1988).

Results

Figure 1 shows the percentage of correct implementations of PCS for each participant. During the baseline session, each participant demonstrated deficient performance. The mean scores for teachers were 14% during the baseline. In the training, the first participant performed the PCS practice with 100% accuracy in the first session. The second and third participants performed 71% in their first sessions. The second participant missed the following elements in the PCS Implementation Components Assessment Checklist: "Giving appropriate instructions (e.g., check your activity schedule, playtime, etc.)" and "putting the power card on a desk in the implementation setting or some place (e.g., an agenda) where the child could access the card for review." The third participant made mistakes in the following elements of PCS Implementation Components Assessment Checklist: "Looking through and reading the prepared script and power card together with the child to introduce them and explain when to use these materials" and "giving appropriate instructions (e.g., check your activity schedule, playtime, etc.)" Participants received feedback on

these issues within the scope of BST. The two participants performed with 100% accuracy in their second session after feedback. After the training, each teacher met the post-training completion criterion (100% accuracy during three consecutive sessions). Each teacher made significant improvement in PCS practice. Furthermore, as can be seen from follow-up data in Figure 1, the teachers applied the strategy correctly three weeks after completing post-training sessions. In other words, they maintained practice skills for PCS acquired during training sessions.

Social validity findings of this research demonstrated that BST is an acceptable, effective program. Teachers stated that they learned to use PCS through BST. In addition, the findings show that the participants were satisfied with the content and execution of the training and enjoyed the training. The mean scores of Teachers 1, 2 and 3 were 5, 5, and 4.9, respectively in the range of 1-5 on a 5-point Likert. Also, social validity ratings for the PCS strategy taught in the present research showed that the strategy is acceptable, inexpensive, and effective. The teachers stated that the PCS was easy to use and that they would use this strategy in their future practices. They were highly satisfied with the strategy. Mean ratings of participants for the Power Card Strategy were 4.4 (Teacher 1), 4.5 (Teacher 2), and 4.4 (Teacher 3) in the range of 1-5 on a 5-point Likert.

Discussion

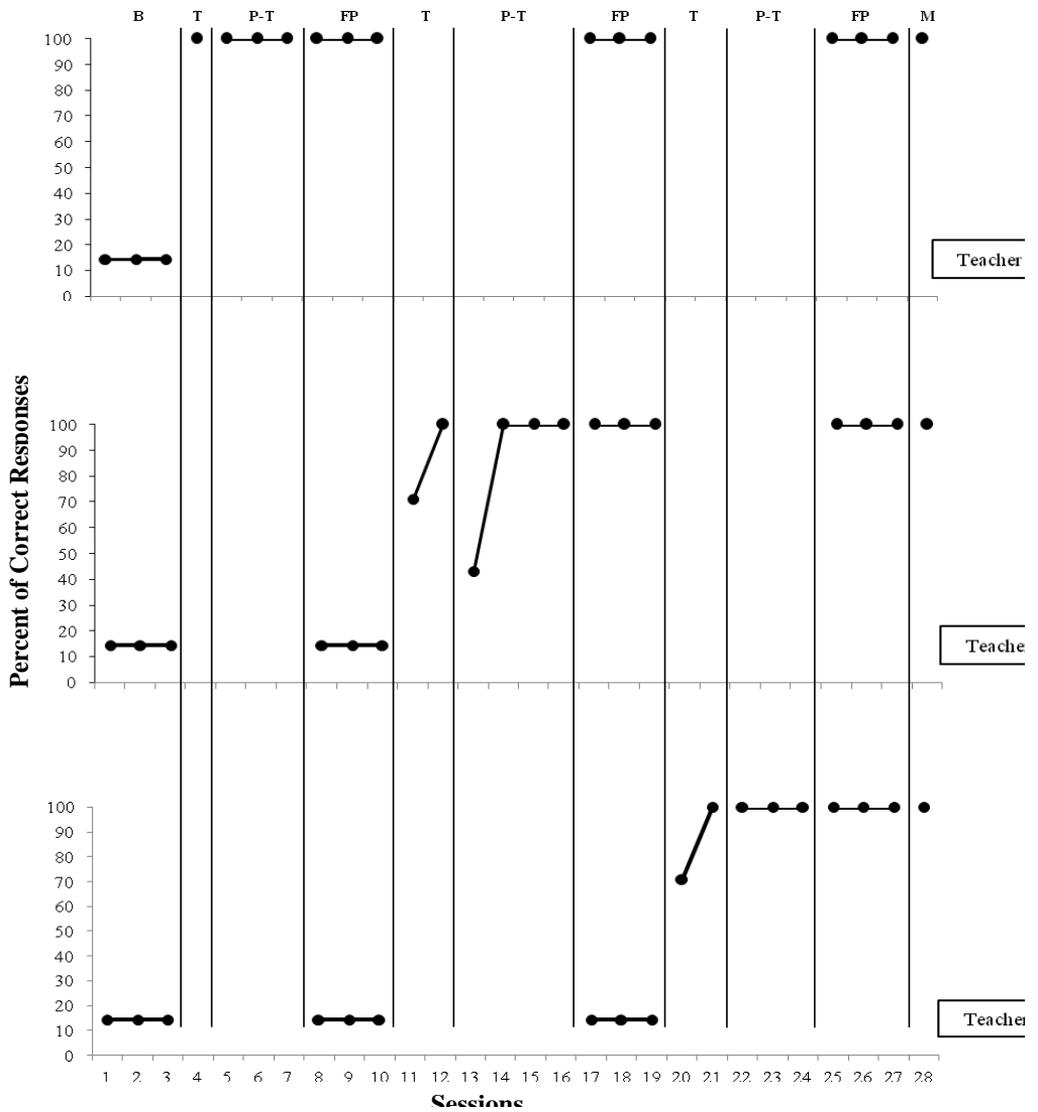
This study provided evidence that BST was effective in teaching three teachers how to implement the PCS properly. The results show that BST, which includes the use of instructions, modeling, rehearsal, and feedback, is effective in teaching the PCS to teachers. In addition, participating teachers learned the method quickly. These findings are consistent with earlier studies showing BST is an effective, well-designed training package for training educators about various evidence-based educational practice (for example, PECS, DTT, and incidental teaching). Consistent with previous studies (Clayton & Headley, 2018; Miles & Wilder, 2009), follow-up data show that the teachers maintained the target skills.

Social validity findings of current research demonstrated that all participating teachers found BST as an acceptable and effective teacher training program. They were overall satisfied with BST. These findings on the social validity of BST point out that this training package can be used effectively in teacher training. Results of this study in consistence with similar studies demonstrate social validity of BST (Fetherston & Sturmey, 2014; Sarokoff & Sturmey, 2008). Also, social validity ratings for the PCS strategy taught in the current research show that this strategy is

acceptable, effective, and easy like earlier findings. (See, e.g., Angell et al., 2011; Campbell & Tincani, 2011).

As with other studies, several limitations need consideration. First, generalization and long-term maintenance data were not collected from the teachers. Because the purpose of this study is to investigate the effect of BST on teachers' implementation of PCS, I did not follow and formally assess the student's progress about the target skills. Finally, due to the sample size of the study, the findings cannot be generalized to the overall population. However, this type of experimental research design is useful when the researcher is aiming to change the behavior of an individual or a small group of individuals-with a typical range of three to eight participants (Alberto & Troutman, 2009; Kazdin, 1982; Horner et al., 2005). As I emphasized in the suggestions, applying the study findings to different settings, participants, or skills in future research will enhance the external validity of the single subject design. Despite these limitations, the present findings of this study make several contributions to literature. The findings not only support earlier findings showing BST's effectiveness in staff training on various educational practices (such as DTT and mand training) used for individuals with ASD (see, e.g., Nigro-Bruzzi & Sturmey, 2010; Sarokoff & Sturmey, 2004), but also provide further evidence that BST is effective in teaching PCS. Furthermore, the findings regarding social validity of PCS enhance this strategy's social validity.

Based on the findings, some practical recommendations can be suggested. The use of power card strategy can be taught to educators via BST. In addition, families, and interdisciplinary team members (for example, speech and language therapists, paraprofessionals) can be taught this strategy with BST, because families and the interdisciplinary team members are an important part of special education. Also, after teaching PCS, users can use the strategy not only one-to-one teaching but also group and integration environments. Finally pre-service and in-service training can be organized by institutions (e.g., universities) to increase the use of BST and power card strategy. According to present findings, further research would be useful in making generalizations across children, assessing the setting, different target skills, and long-term skill maintenance. Effectiveness of BST in other evidence-based interventions can also be investigated in new studies. These new studies can be conducted as single-subject studies on the same topic in order to increase the ability to generalize, i.e., social validity of the findings in this study. Additionally, group experimental studies can be carried out on wider sample groups. Also, future research should conduct component analysis to determine which component(s) of the BST package is/are effective on the results. Finally, new studies can be carried out with research designs in which student performance is also evaluated.



Note: B: Baseline; T: Training; P-T: Post-Training; FP: Full Probe; M: Maintenance

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