Evaluation of Behavioural Skills Training with Volunteers Teaching Motor Skills to Individuals with Developmental Disabilities

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Submitted in partial fulfillment of the requirements for the degree of Master of Arts in Applied Disability Studies

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Abstract

Reaching early motor milestones is essential for positive growth and development. Individuals with developmental disabilities may fail to reach these milestones due to gross and fine motor impairments. However, very few physical education programs address motor development issues that may be a concern for individuals with developmental disabilities. The Special Needs Activity Program at Brock University capitalizes on university student volunteers to support individuals with developmental disabilities in developing motor skills. Evaluating various methods to train these volunteers may positively impact training outcomes, and save valuable time and resources. This research employed a mixed methods evaluation to evaluate volunteer training through: (1) a component analysis of behavioural skills training for teaching volunteers how to also use this methodology to support individuals with developmental disabilities in a movement program; and (2) a thematic analysis of the volunteers’ experiences and approaches to teaching this population. The component analysis results were variable across participants; however, following all training phases, all volunteers met a predetermined performance criterion. Through a qualitative analysis five themes in the volunteers’ approach to teaching individuals with developmental disabilities were identified: individualization, respect, collaboration, flexibility, and commitment. Strengths and limitations of this evaluation are discussed and recommendations for future research are provided.

Keyword(s): component analysis, thematic analysis, behavioural skills training, volunteers, motor skills
Acknowledgements

First, I would like to express my gratitude for the guidance and support that my advisor, Dr. Kendra Thomson has provided me throughout my graduate studies. It was your enthusiasm for research that inspired me to begin my research career, and your mentorship has shaped me into the scientist-practitioner that I am today. It has been an honour to work under your supervision, thank-you! To my thesis committee, Dr. Maureen Connolly and Dr. Priscilla Burnham Riosa, thank-you for agreeing to be part of my research journey. Your advice has been invaluable in the development of this research. To everyone involved with the Special Needs Activity Program, thank-you for making this collaboration possible. A special thank-you to the volunteers who participated in this study; without your involvement, this research would not have been possible. Your dedication to the program and its members is inspiring. I wish each of you all the best in your future endeavors. Lastly, Victoria Bernard, Carly Magnacca, and Dana Kalil, I am truly appreciative of all your hard work and dedication in supporting my research through data collection. Your contributions were vital to the success of this project, thank-you!
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Evaluation of Behavioural Skills Training with Volunteers Teaching Motor Skills to Individuals with Developmental Disabilities

Fundamental motor skills are established early in an individual’s development, however, acquiring these motor skills can be adversely impacted by motor impairments. A high prevalence of motor delays and deficiencies has been reported in the developmental disability (DD) population (Miyahara et al., 1997; Provost, Lopez, & Heimerl, 2007). As a result, this population may be less likely to participate in physical activities and be more at risk of living sedentary lifestyles (Anderson, 2010; Frey, Stanish, & Temple, 2008; Horvat & Franklin, 2008). Furthermore, there are limited physical education programs that focus specifically on motor skill deficits, and there are few personnel trained to support individuals with DD within this realm (Taub & Greer, 2000). Therefore, developing effective training protocols to teach people how to support individuals with DD is critical. Providing effective, efficient, and socially acceptable training to prepare people to support this population may lead to better experiences for the trainees, as well as the people being supported. Behavioural skills training (BST) is an empirically validated, performance- and competency-based method used to teach people new skills (e.g., Alaimo, Seiverling, Sarubbi, & Sturmey, 2018; Belisle, Rowsey, & Dixon, 2016; Hassan, Thomson, Khan, Burnham Riosa, & Weiss, 2017; Hassan et al., 2018; Hogan, Knez, & Kahngm 2015; Nigro-Bruzzi, & Sturmey, 2010; Ward-Horner & Sturmey, 2010). Trainees have also indicated that BST is a highly acceptable training procedure across multiple studies (e.g., Gunby & Rapp, 2014; Hassan et al., 2017; Hassan et al., 2018). Evaluating methods of training, such as BST, may assist in establishing more effective and efficient training procedures, which may save valuable time and resources. Moreover, training people to support individuals with DD in developing motor skills, using an empirically validated and socially acceptable method may
improve the support provided, and in turn positively impact outcomes for the DD population (Giles, Swain, Quinn, & Weifenbach, 2018; Kupzyk & Shriver, 2016; Pence, St. Peter, & Tetreault, 2012).

**Motor Development**

Motor development is an essential element in an individual’s growth, and may require particular attention and specialized training for individuals with DD. There is a belief that simple maturation is the primary contributor in an individual acquiring advanced motor repertoires, meaning that motor skills emerge irrespective of explicit teaching and/or focused practice (Clark, 2007; Clark & Metcalfe, 2002). As a result, there is an emphasis on the biological aspects of motor development, rather than on environmental aspects of learning that contribute to the development of motor skills. The concept of motor skills developing through maturation only may be a misconception. A more comprehensive view includes motor skills emerging through an interactive process with the environment, which includes focused instruction, specific practice opportunities, and relevant consequences (Clark, 2007).

There is no dispute that some motor skills, particularly involuntary and reflexive behaviours (e.g., sucking, grasping), are innate to an individual (Todd, 2012). Innate motor behaviours are essential for the development of movement repertoires across an individual’s lifetime (Barela, 2007). These motor behaviours allow an infant to explore the environment and contact new contingencies of reinforcement and/or punishment. The infant will continue to explore the environment and develop more motor skills as a result of the reinforcement contingencies contacted. For example, if an infant finds a new toy, while crawling, the new toy may serve as a positive reinforcer, increasing the likelihood that he/she will continue exploring the environment by crawling. From a behavioural perspective, the building blocks of motor
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development can be conceptualized as ‘behavioural cusps’, which are behaviours that expose an individual to new environmental contingencies that promote the development of many new, important behaviours (Rosales-Ruiz & Baer, 1997). Unfortunately, individuals with DD often fail to develop fundamental motor skills (that may be behavioural cusps for other skills), due to a lack of interest, or ability to explore the environment (Barela, 2007). Ultimately, without exploration it is unlikely that the individual will contact new contingencies that influence the learning process. If an individual fails to acquire these motor skills through natural practice opportunities in the environment, a specific focus on teaching these early motor skills will be necessary. It is critical for an individual to develop fundamental motor skills in early developmental stages to support complete social integration.

Locomotor (e.g., jumping, leaping, galloping, skipping) and object control (e.g., catching, throwing, dribbling, rolling, and striking an object with an instrument) are fundamental motor skills that emerge between the ages of one and seven years old, and are critical for later motor skill attainment (Todd, 2012). If these foundational motor patterns are not adequately acquired, an individual may encounter many difficulties attempting complex motor skills integral to engaging in numerous activities. Therefore, when an individual fails to acquire the appropriate motor skills, the ability to partake in many activities is also impaired (Todd, 2012). Thus, poor motor skills impact an individual’s ability to participate in physical activities, placing him or her at risk of leading a sedentary, and potentially socially isolated lifestyle (Frey et al., 2008; Kodish, Hodges Kulinna, Martin, Pangrazi, & Darst, 2006; Rimmer & Rowland, 2008). Although there are no prominent differences in the motor development sequences between individuals with, and without a diagnosis, individuals with DD frequently display a delay in acquiring motor skills (Barela, 2007; Miyahara et al., 1997; Provost et al., 2007). Thus, individuals with DD may not
reap the health benefits associated with physical activity (e.g., weight management, decreased risk of anxiety or depression) or peer social opportunities, which are particularly important for this population (Frey, Kodish, Hodges, Kulima, & Martin, 2006). Individuals with DD, who experience motor impairments require focused practice opportunities in an adapted physical education program (Connolly, 2008; Jobling, 2007).

Special Needs Activity Program

There are countless physical education programs that promote healthier lifestyles, however, very few address the needs of the DD population. An effective teaching approach to support motor development in the DD population is Movement Education. The Special Needs Activity Program (SNAP) is a developmentally appropriate movement education–based embedded curriculum. Dr. Maureen Connolly, a professor of Kinesiology at Brock University, with extensive experience working with people with DD developed the program in 1994. Since the program’s conceptualization, SNAP has offered individualized instruction in physical education to many children, youth, and adults with DD from the Niagara Region. The program development and implementation has won several awards and this approach to physical education for individuals with DD continues to be presented nationally and internationally (Connolly, 2008). The program objectives are to: (1) support the development of gross and fine motor repertoires, (2) promote healthier lifestyles for people with DD, and (3) foster social opportunities in an inclusive environment. In order to achieve these objectives, university student volunteers serve as trainers for the program participants (referred hereon in as members), plan exercises that are tailored to each member’s motor development needs, and work alongside members in achieving specific motor goals. The exercises in the program focus on developing fundamental motors skills, while increasing the member’s overall physical activity levels.
Moreover, the interaction between the volunteer and the member, or between members provides excellent social opportunities. The program provides members an opportunity to meet peers, and potentially establish friendships that can extend outside of SNAP. The interactions between the program volunteers and members may improve overall attitudes, and openness towards individuals with DD (Bergman & Hanson, 2000; Daruwalla & Darcy, 2005). Volunteers are an integral element in many recreational programs for individuals with DD, and SNAP is no exception. Unfortunately, in addition to the limited availability of programs like SNAP, there is also a lack of qualified personnel to support the DD population (Taub & Greer, 2000). Therefore, training people to provide support the DD population in developing motor skills is highly warranted.

**General Training Methods**

Although SNAP has support for the efficacy of the methods for teaching motor skills to the DD population, the potency of these training procedures is dependent on the precise implementation of teaching procedures by the volunteers. Therefore, providing effective training to SNAP volunteers is essential to maximize treatment outcomes for the members. There are numerous methods used to train people across environments. Given the importance of effectively trained volunteers to work with individuals with DD, evidence-based methods should be selected. Two general training approaches that are commonly used include didactic and performance- and competence-based training.

**Didactic Training.** Didactic lessons are a commonly used method of training, in which the learner is provided with theoretical knowledge on the target subject in a traditional lecture-based format. Didactic training has been shown to be most appropriate to teach knowledge of concepts or principles, rather than how to perform specific skills (e.g., Gardner, 1972; Himle,
Miltenberger, Gatheridge, & Flessner, 2004; Keating et al., 2010). A possible rationale for this suggestion is that didactic training focuses specifically on developing verbal skills related to the topic. For example, an in-class didactic driver’s training focuses on developing the learner’s ability to articulate basic road rules, however, the learner has not yet begun applying these skills while driving a vehicle. As a result, a significant limitation of this training method is that the learner may have knowledge on the subject but is unable to apply this knowledge in context. For example, Himle and colleagues (2004) showed that five typically developing children who participated in didactic training specific to gun safety were able to correctly identify the gun safety steps but were unable to perform these safety steps in real-life situations. Given the gap between knowledge and application of skills, it is important to utilize training strategies that appropriately reflect the goals of the training (Parsons & Reid, 2012). Based on the available evidence, didactic training may not be the most appropriate option to train volunteers to teach motor skills to individuals with DD.

**Performance- and Competency-Based Training.** Another approach to training ensures that the learner not only understands the material but also performs the skills to proficiency. Performance-based refers to the trainer and trainee behaviour training (i.e., actively performing the specific skills), and competency-based refers to continuing to practice the skills until the trainee accurately demonstrates the skill to a predetermined performance criterion (Parsons, Rollyson, & Reid, 2012). As previously described, training needs to appropriately prepare trainees to accurately and consistently perform the target skills. Inadequate training procedures not only ill-prepare the trainee, which may lead to poor implementation integrity and adversely impact the trainee’s experience. The overall effectiveness, efficiency, and acceptability of training programs are generally considered critical to its overall success (Daniels, 1994; Parsons
& Reid, 1999; Phillips, 1998). Performance- and competency-based training has demonstrated efficacy and efficiency in preparing trainees to perform skills in natural contexts (e.g., Alaimo, Seiverling, Sarubbi, & Sturmey, 2018; Belisle, Rowsey, & Dixon, 2016; Hogan, Knez, & Kahngm 2015; Nigro-Bruzzi, & Sturmey, 2010; Ward-Horner & Sturmey, 2010). The empirical evidence supports performance- and competency-based training as an appropriate method to teach volunteers how to support the DD population.

**Behavioural Skills Training**

The BST framework is an example of an evidence-based, performance- and competency-based training used to teach new skills to people. This approach is comprised of four elements: instructions, modeling, rehearsal, and feedback (Miltenberger, 2008; Parsons et al., 2012). Specifically, the trainer provides the learner with: (1) clear and concise instructions on how to perform the target skill; (2) a demonstration on how to complete the target skill; (3) an opportunity to practice the target skill; and (4) feedback on his/her performance. This is considered a performance and competency-based training method as the last two steps are repeated until the learner is able to demonstrate the skill to a predetermined performance criterion (Parsons et al., 2012). The BST framework has been used to effectively train numerous personnel, including: teachers (e.g., Hogan et al., 2015; Ward-Horner & Sturmey, 2010), caregivers (e.g., Alaimo et al., 2018; Hassan et al., 2018), university psychology students (e.g., Hassan et al., 2017), and staff (e.g., Belisle et al., 2016; Nigro-Bruzzi, & Sturmey, 2010). This training method has also been applied to teach a wide variety of skills, including but not limited to: safety skills (e.g., Hanratty, Milteberger, & Florentino, 2016; Himle et al., 2004), social skills (e.g., Dogan, King, & Fischetti, 2017; Nuernberger, Ringdahl, Vargo, Crumpecker, & Gunnarsson, 2013), and leisure skills (e.g., Speelman, Whiting, & Dixon, 2015; Thomas,
In addition to the demonstrated effectiveness and utility of BST, the treatment package also has been shown to have a high acceptability rating among participants (e.g., Gunby & Rapp, 2014; Hassan et al., 2017; Hassan et al., 2018). The perceived acceptability of a treatment is critical, as it may help inform program selection (Baer & Schwartz, 1991). The perceived acceptability of training has also been shown to impact treatment adherence (Strohmeir, Mule, & Luiselli, 2014). The utility and widespread application of BST provides support for evaluating the training package for teaching volunteers how to support individuals with DD in the SNAP movement program. While the BST framework has empirically validation in terms of effectiveness and acceptability across a variety of people and skills, it is important to continue to evaluate the specific components of BST in order to develop more efficient training procedures.

**Component Analyses**

A component analysis is a method of systematically evaluating two or more independent variables that comprise a treatment package to determine which components are responsible for behaviour change (Baer, Wolf, & Risley, 1968; Ward-Horner & Sturmey, 2010). Component analyses have several benefits. This type of analysis provides a demonstration of a functional relationship between specific components of a treatment package and treatment effects (Ward-Horner & Sturmey, 2010). Completing a component analysis may also enhance the efficiency of a treatment package by including only the sufficient elements (Ward-Horner & Sturmey, 2010). Efficient treatment packages may promote better generalization and maintenance outcomes, since the participant is able to focus on the critical elements (Ward-Horner & Sturmey, 2010). Finally, eliminating ineffective and potentially effortful or aversive components may also contribute to positive social validity outcomes (Ward-Horner & Sturmey, 2010; Wolf, 1978).
Ward-Horner and Sturmey (2010) outlined two methods for completing a component analysis using single-subject experimental designs including: dropout or add-in. In a dropout analysis, a treatment package is presented, and then components of the package are systematically removed, while continuing to measure behaviour. With this method, a necessary element of a treatment package is identified if a treatment is no longer effective after a component has been eliminated. Although this method is parsimonious and can identify behaviour change quickly, it is not without limitations. The effects of combining treatment components may prevent conclusions from being drawn regarding individual components. That is, if a potentially effective component is removed after being presented in a treatment package, behaviour change may not be observed due to the exposure of the effective component with the other components in the previous phase.

An add-in analysis is another method used to conduct a component analysis, which evaluates components of a treatment package individually or in combinations, prior to presenting the full treatment package. If components of a treatment package that are presented individually produce levels of responding that are similar to that of the treatment package, it can be concluded that the components presented were sufficient, meaning the component was effective alone (Ward-Horner & Sturmey, 2010). Furthermore, if combinations of a treatment package are presented and produce behaviour change, it can be concluded that the components not yet presented are not necessary (Ward-Hornery & Sturmey, 2010). The term necessity within the context of component analyses refers to a component being required in order to produce behaviour change (Ward-Horner & Sturmey, 2010). While the add-in method provides an option to minimize the treatment effects associated with learning when a full treatment package is presented before eliminating components, the major limitation is that sequence, floor, and/or
ceiling effects may make it difficult to evaluate components that are introduced towards the end of the treatment (Ward-Horner & Sturmey, 2010). Previous research has employed multiple-baseline (e.g., Rogers-Warren et al., 1977; Sanders, 1983), reversal (e.g., Fisher et al., 1993), alternating treatments designs, or combinations to conduct add-in component analyses (Fisher et al., 1993; Jones and Baker, 1989; Rogers-Warren et al., 1977; Sanders, 1983; Sisson and Barett, 1984). Results of previous add-in component analyses suggested that using a reversal or alternating treatments designs to obtain the most accurate analysis of the active components of a treatment package because potential confounding effects of behavioural effects are reduced (Jones & Baker, 1989; Sisson & Barett, 1984). However, sequence effects are possible in a reversal or alternating treatments design. A potential solution may be to counterbalance the components of the treatment package to reduce the likelihood of these effects.

Component Analyses of BST. A review of the literature to date revealed five component analyses completed specifically on BST. All studies used single-subject experimental designs with an add-in analysis. Using a multiple-baseline design, Feldman, Case, Rincover, Towns, and Betel (1989) completed the first component analysis on BST to compare instructions versus modeling, rehearsal, and feedback for teaching parenting skills to parents with DD. Results indicated that instructions alone did not have a substantial effect on the parents’ performance, however, parent’s responsiveness to their children increased when the modeling, rehearsal, and feedback components were introduced. Results suggested that modeling, rehearsal, and feedback were necessary to provide effective training to parents with DD.

Kornacki, Ringdahl, Sjostrom, and Neurnberger (2013) and Drifke, Tiger, and Wierzba (2017) also used a multiple-baseline design across participants and had similar outcomes. Kornacki and colleagues (2013) evaluated the combined effects of the components of BST to
teach conversation skills to young adults with autism spectrum disorder (ASD). Each of the following six components were introduced in succession: (1) instruction, (2) modeling, (3) rehearsal, (4) feedback, (5) in situ training, and (6) reinforcement. Results varied across participants. Two participants reached mastery criterion after the introduction of four components; whereas, one participant needed in situ training to reach mastery criterion. These results suggest a full BST framework is necessary for effective training outcomes. Drifke and colleagues (2017) evaluated the use of BST to train caregivers to implement a treatment package to address their child’s noncompliance. The evaluation also incorporated a generalization measure by assessing how the parents applied the skills across various requests. Results indicated that the full BST framework was necessary for parents to reach mastery levels of correct implementation. Similar to Kornacki and colleagues (2013) these results suggest that BST was a necessary to provide caregivers with effective training.

Ward-Horner and Sturmey (2012) completed a component analysis of BST, using an alternating treatments design to evaluate the independent and combined effects of BST to train three teachers to conduct functional analyses on student problem behaviour. Results indicated that feedback, and to a lesser extent modeling, were effective. Conversely, rehearsal was ineffective at improving the teachers’ performance. Overall, these results suggested that feedback and modeling may be active components of BST. To date, this is the only component analysis of BST that has included a brief evaluation of the participants’ experience with the training components. Information obtained through social validity questionnaires indicated that all three participants rated the feedback component to be the most acceptability and effective component of BST. Moreover, there was a clear pattern in the participants’ responses that suggested a positive correlation between acceptability rating and perceived effectiveness.
Using a reversal design, LaBrot, Radley, Dart, Moore, and Cavell (2018) completed the fifth component analysis which evaluated the components of BST for teaching caregivers how to deliver effective instructions to their children diagnosed with ASD. The methodology incorporated a two-tiered approach; Study 1 systematically introduced components to evaluate additive effects, and Study 2 introduced feedback, which was determined to be most effective in Experiment 1, after all other components of BST were introduced. Together, results of Ward-Horner and Sturmey (2012), and LaBrot et al (2018) demonstrated that feedback is a necessary component of BST.

Within this small sample of five component analyses on BST, no research has examined the effects of the individual and combined treatment components of BST to train university student volunteers to teach motor skills to individuals with DD, while also using BST. Moreover, a qualitative analysis of the participants’ experience was not included in any of the previously completed component analyses on BST. Only one study included social validity questionnaires. Thus, a detailed account of participants’ experiences and perceptions of the training through social validity measures are highly warranted.

Specific Aims, Research Questions, and Hypotheses

This study aimed to extend the BST literature in a mixed methods evaluation by: (1) conducting a component analysis of BST for training university student volunteers how to also use BST to teach motor skills to individuals with DD, and (2) conducting a thematic analysis of how the volunteers’ experience working in SNAP, while also participating in BST research, relates to how the volunteers approach teaching individuals with DD.

The research questions were:
1. Are certain components of the BST treatment framework more effective for teaching the volunteers’ how to also use BST to teach motor skills to individuals with DD?

2. Are certain components of the BST treatment framework necessary and/or sufficient for volunteers to acquire and maintain BST for teaching motor skills to individuals with DD?

3. How will the volunteers rate the acceptability of the intervention (various combinations of BST), the research procedures and their outcomes?

4. How do volunteers’ experiences working with individuals with DD in SNAP, while also participating in BST research, relate to how the volunteers approach teaching individuals with DD?

Based on the findings of previous research the hypotheses were:

1. The instruction component of BST alone would yield a minimal change in the participants’ correct implementation of BST (Drifke et al., 2017; Kornacki et al., 2013; LaBrot et al., 2018);

2. The rehearsal component of BST alone would not yield change in the participants’ correct implementation of BST (Ward-Horner & Sturmey, 2012);

3. The feedback component alone would be an effective and necessary component of BST to increase participants’ correct implementation of BST (LaBrot et al., 2018; Ward-Horner & Sturmey, 2012);

4. The modeling component alone would be an effective and necessary component of BST to increase participants’ correct implementation of BST, but to a lesser extent than feedback (Ward-Horner & Sturmey, 2012);
5. Participants would meet the predetermined performance criterion for teaching all of the motor skills using BST after receiving training with the full BST framework (Drifke, et al., 2017; Kornacki et al., 2013);

6. Volunteers would indicate an overall satisfaction with the modeling and feedback components of BST (Ward-Horner & Sturmey, 2012); and

7. Volunteers would indicate an overall dissatisfaction with the rehearsal and instructions components of BST (Ward-Horner & Sturmey, 2012).

Method

Participants, Setting, and Materials

Volunteers were recruited from the SNAP program at Brock University by providing the program coordinator with a letter of invitation to distribute to all SNAP volunteers (Appendix A). Interested volunteers contacted the primary investigator who confirmed eligibility through an in-person or telephone consultation based on predetermined inclusion criteria; the participant: (a) was a student enrolled at Brock University; (b) had committed to volunteer with SNAP for the full duration of the program (October-April); (c) had no previous experience implementing BST; and (d) was not receiving any academic or monetary credit for his/her volunteer time in SNAP. There were no additional exclusionary criteria for SNAP volunteers to participate in the study. All interested volunteers were able to participate in the evaluation after providing informed consent (Appendix B).

Five university student volunteers consented to participate in the study. Participants ranged in age from 19 to 23 (M = 21, SD = 1.33) and had had varying durations of volunteer history with SNAP (M = 1.8 years, SD = 1.34, range, 0 to 3 years). Volunteer 1 was a 20-year-old female in her second year of volunteering with SNAP. Volunteer 2 was a 21-year-old female
that had only previously volunteered for the summer SNAP camp and reported to the researcher
that she had an ASD diagnosis. Volunteer 3 was a 19-year-old female, with no previous
volunteer experience working within SNAP. Volunteer 4 was a 21-year-old female with two
years of experience volunteering with SNAP. Volunteer 5 was a 23-year-old with three years of
volunteer experience within SNAP.

All research sessions took place at Brock University in either a gymnasium or classroom
setting in an analogue SNAP session. The volunteer, the primary investigator, and one to two
research assistants serving as observers were present. Volunteers required specific gym
equipment to teach each of the motor skills, which were available at individual stations within
the teaching setting. Each station was set up in a manner that replicated how the motor skills
were taught in the SNAP environment (Table 1). The mean duration of the training was
approximately 55-minutes per volunteer (range 30 to 110 minutes).

Table 1

<table>
<thead>
<tr>
<th>Motor skill</th>
<th>Equipment needed</th>
<th>Setup description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skiddles</td>
<td>One 10-lb medicine ball, 10 wooden rectangular blocks, two coloured agility dots</td>
<td>The two coloured agility dots were placed on the ground next to each other, shoulder width apart, and approximately six feet in front of the 10 wooden rectangular blocks (skiddles). The skiddles were presented in four horizontal rows. The first row (closest to the agility dots) had one skiddle, the second row had two skiddles, the third row had three skiddles, and the fourth row had four skiddles. Skiddles were placed approximately 10 cm apart.</td>
</tr>
<tr>
<td>Bosu Star</td>
<td>One bosu ball, six pylons</td>
<td>A bosu ball was placed in the centre of the station, with six pylons (stars) placed around the perimeter of the bosu ball, approximately 10 cm from the bosu ball, and other stars.</td>
</tr>
</tbody>
</table>
Target Skills  Three multi-coloured hula hoops, three multi-coloured bean bags, tape, two colour agility dots

Two coloured agility dots were placed on the ground next to each other, shoulder width apart, and approximately six feet in front of the hula hoops targets on the wall or floor. The bean bags were placed in a pile immediately next to the agility dots. Two hula hoops were taped onto the wall, next to each other, and approximately four feet from the ground. One hula hoop was placed on the ground, flush to the wall, and directly under the hula hoops on the wall.

Somatic Square  Four benches, four skipping ropes, or tape

The relevant materials were organized in such a way to create a square shape (somatic square) on the floor.

Experimental Design

**Quantitative.** Part of the evaluation employed an alternating treatments design embedded within a multiple-baseline design, across five participants. The alternating treatment component was based on Ward-Horner and Sturmey (2012) to evaluate the independent components of BST for teaching volunteers how to also use BST to teach motor skills. The alternating treatments design was replicated across the five participants in a multiple-baseline design. Unlike, Ward-Horner and Sturmey (2012) this study had an initial baseline phase which was staggered across volunteers. That is, the volunteer with the most stable baseline responding entered the training phase first, while the other volunteers remained in the baseline phase. When treatment effects were observed for the first volunteer, the volunteer with the next most stable baseline entered the training phase while the rest of the volunteers remained in baseline (Cooper, Heron, & Heward, 2007, p. 207). After the baseline phase, each volunteer completed one to three training phases dependent on their performance. Training Phase 1 assessed the independent effects of each of the components of BST on the volunteers’ correct implementation of BST to teach a randomly assigned motor skill (described in Table 2). Training Phase 2 assessed a
combination of two components of BST (i.e., the most and the least effective components for the volunteer). Training Phase 3 assessed the effects of the full BST framework. Across training phases, the predetermined mastery criterion was a score of “4” (i.e., volunteer performed all BST steps correctly), across two consecutive trials. If a volunteer met the mastery criterion for using BST to teach a motor skill in Phase 1, that specific skill was not assessed in subsequent training phases. For example, if a volunteer met mastery criterion for skiddles in Phase 1, but not for any of the remaining skills, skiddles would not be assessed in subsequent phases, but the remaining motors skills would be. Following the final training phase, the volunteer’s BST implementation for teaching each of the motor skills was evaluated at a 2-week and 1-month follow-up.

**Qualitative.** The next part of the evaluation used a thematic analysis to evaluate how the volunteers’ experience supporting individuals with DD in SNAP, while also participating in BST research related to their approach to teaching individuals with DD. The thematic analysis followed the six-phase approach outlined by Braun and Clarke (2012), which included: (1) becoming familiar with the data, (2) generating initial codes for the data, (3) searching for themes, (4) reviewing potential themes, (5) defining and naming themes, and (6) producing the report. The primary investigator conducted open-ended interviews with each of the volunteers. Each volunteer was asked six open-ended questions (Appendix C) that were developed based on the interview guidelines outlined by Quinn-Patton (2012). Salience and patterns in the interviews were analyzed through: (1) a within-case, within-content analysis, which included summarizing the answers to each question provided by selected volunteers, and reviewing the interview content as a whole, and (2) a cross-case, within-cohort (by question) analysis, which included summarizing the answers to each of the questions provided by all of the volunteers, and reviewing the summarized answers by question, while referencing the research question.
Independent Variable and Response Measures

The primary investigator taught the volunteer how to use BST to teach sample motor skills using variations of the independent variable (i.e., the individual components of BST, the combined components of BST, and/or the full BST framework) relevant to the condition.

**Response Measures.** The volunteer’s correct implementation of BST to teach the four sample motor skills (Table 2) from the SNAP curriculum was monitored across trials in the baseline, training, and follow-up phases. The volunteer’s performance teaching the target motor skill, using BST was measured as the number of responses on a task analysis of BST (Appendix D). That is, each component of BST that the volunteer used correctly when teaching the target motor skill was scored as a response. For a component of BST to be scored as “correct” the volunteer would be required to demonstrate all relevant aspects of the operational definition (Table 3). The volunteer could earn a maximum score of 4, or 4 correct responses. Each opportunity that the volunteer attempted to teach a motor skill was recorded as a trial. The volunteer could complete up to 12 trials per day. If the volunteer expressed fatigue, the primary investigator would discontinue trials that day. A Kinesiologist and coordinator of the SNAP program confirmed that the selected sample motor skills were equated for difficulty to control for possible differences between the skills, which could confound the results.

Table 2

*Description of Motor Skills Taught*

<table>
<thead>
<tr>
<th>Motor Skill</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skiddles</td>
<td>The learner stood approximately 6 feet away from the skiddles with a foot on each of the agility dots, bent his/her knees to pick up the medicine ball with his/her hands, then swung his/her arms between his/her legs while holding the medicine ball with his/her hands, until finally releasing the ball to roll on the ground towards the skiddles with the purpose of knocking over the skiddles.</td>
</tr>
</tbody>
</table>
Bosu Star  The learner sat with his/her stomach, buttocks, or knees on the bosu ball, and reached towards each of the stars with the purpose of either touching the stars with his/her hands/foot, knocking over the stars with his/her hand/foot, or stacking the stars with his/her hand.

Target Skills  The learner stood with one foot on each of the agility dots, which were approximately 6 feet away from the hula hoop targets, placed a bean bag into his/her hand, and threw the bean bag under or over hand towards the specified target.

Somatic Square  The learner either: (a) stepped onto the somatic square with one foot, then positioned the other foot next to the first foot, and then brought each foot back down to the ground; (b) stepped over the somatic square without stepping onto the somatic square with one foot, and then with the other, (c) sat onto the somatic square and returned to a standing position; or (d) stepped onto the somatic square, walked the perimeter of the somatic square, and then stepped off the somatic square with two feet.

---

Table 3

**Operational Definitions of BST components**

<table>
<thead>
<tr>
<th>Component</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructions</td>
<td>The volunteer ensures that the learner (primary investigator) is attending (i.e., the learner’s body is oriented towards the volunteer and the learner has made eye contact with the volunteer) prior to delivering instructions. The volunteer provides the learner with vocal instructions on how to complete the task, using clear and concise language that is understandable to the learner. The directions that the volunteer provides are complete.</td>
</tr>
<tr>
<td>Modeling</td>
<td>The volunteer ensures that the learner is attending (i.e., the learner’s body is oriented towards the volunteer and the learner has made eye contact with the volunteer) prior to demonstrating the skill. The volunteer uses a phrase that indicates to the learner to imitate the skill (e.g., “First, I’m going to show you what to do”). The volunteer provides a correct and complete model of the target skill.</td>
</tr>
<tr>
<td>Rehearsal</td>
<td>The volunteer directs the learner to practice and provides a satisfactory amount of time to practice (i.e., the learner demonstrates the skill correctly or the learner indicates he/she requires a break).</td>
</tr>
</tbody>
</table>
Feedback

The volunteer provides the learner with feedback on his/her practice immediately (i.e., within 3 seconds of completing the skill). If the learner demonstrates the skill correctly (i.e., without errors, and without additional assistance to complete), the volunteer provides the learner with descriptive social praise (e.g., “Great job, bending your knees”). If the learner demonstrates the skill incorrectly (i.e., makes an error, or requires additional assistance to complete), the volunteer provides gentle corrective feedback (“Next time, remember to bend your knees”) and does not provide social praise.

Interobserver Agreement. Two trained observers, familiar with the BST methodology, but blind to the research hypotheses, independently scored the volunteer’s performance teaching the motor skills using BST in real time. Before coding any research sessions, the observers were trained using videos in which the primary investigator (acting as a volunteer participant) was teaching the sample motor skills to another research assistant (acting as a SNAP member). The observers were trained to independently score the primary investigator’s performance teaching motor skills, using BST. The observers were required to demonstrate a minimum of 80% reliability compared to a scoring key of the videos, prior to coding live research trials. Observers completed additional training videos if they scored below 80%. Seven observers (4 graduate students and 3 undergraduate students) were trained to fidelity. Two of the observers were required to complete additional training prior to live coding. Prior to scoring the live trials, the role of primary observer and secondary observer was assigned by the primary investigator. After each session, observers discussed any disagreements with the primary investigator, though only the primary observer’s results were reported. An agreement was recorded when both observers scored the presence or absence of the volunteer accurately completing a component of the BST task analysis while teaching the motor skill. The primary investigator calculated IOA for each trial as a percentage by dividing the number of agreements by the total number of agreements plus disagreements, and then multiplying by 100 (Cooper, et al., 2007, p. 117; Martin & Pear,
2015). Observers scored 81% of the total trials across all phases and participants (100%, 98%, 69%, 70%, and 69% for Volunteers 1, 2, 3, 4, and 5, respectively). The overall average IOA score was 86% (range, 71% to 94%). The individual IOA scores for each participant across phases were: 94% (range, 75% to 100%), 93% (range, 91% to 100%), 71% (range, 55% to 100%), 89% (range, 67% to 100%), and 81% (range, 73% to 100%) for Volunteers 1, 2, 3, 4, and 5, respectively.

**Treatment Integrity.** The same trained observers collected treatment integrity data on the primary investigator’s implementation of the research protocol across randomly selected baseline, treatment, and follow-up trials. Treatment integrity data were collected for an average of 35% of the total trials across volunteers, and 25%, 32%, 36%, 37%, and 44% for Volunteer 1, 2, 3, 4, and 5, respectively, and was 100%. The overall mean percentage of correctly implemented trials across participants and experimental phases was 100%. IOA was calculated for 78% of a randomly selection of the scored trials and was also 100%.

**Baseline.** Observers monitored whether the primary investigator provided the volunteer with the instruction to teach the motor skill, and did not provide additional instructions, a model, prior practice opportunities, or feedback to the volunteer (Appendix E).

**Training Phase 1.** For the instruction condition, observers monitored that the primary investigator provided vocal instructions on how to teach the motor skill using BST to the volunteer, but did not provide a model, an opportunity to practice, or feedback (Appendix F). For the modeling condition, the observers monitored whether the primary investigator presented a correct and complete model of how to teach the motor skill, without additional instructions, the opportunity to practice, or feedback (Appendix G). For the rehearsal condition, the observers recorded whether the primary investigator provided the volunteer with up to 5 min to practice
how to teach the motor skill, and there was an absence of additional instructions, modeling, or feedback on how to teach the motor skill (Appendix H). For the feedback condition, the observers monitored whether the primary investigator provided descriptive social praise contingent on a volunteer’s correct response (e.g., “Great job, incorporating a demonstration into your teaching”), or corrective feedback contingent on an incorrect response by the volunteer (e.g., “Next time, remember to include a demonstration of the skill”), and that there was absence of additional instructions, a model, or practice opportunities (Appendix I).

**Training Phase 2.** Combinations of the above descriptions were monitored during the second training phase (when the least efficient and most efficient components of BST were combined, described in Procedure). For example, if rehearsal and feedback were combined, the observer would monitor whether the primary investigator: (1) provided the volunteer with up to 5 min to practice how to teach the motor skill, (2) provided the volunteer with descriptive social praise contingent on a correct response, or corrective feedback contingent on an incorrect response, and (3) that there was the absence of additional instructions, or a model of how to teach the motor skill (Appendices J, K, and L).

**Training Phase 3.** During the third training phase (when the volunteer was provided with training using the full BST framework, described in Procedure), the observer monitored whether the primary investigator provided the volunteer with all the elements of the BST framework (i.e., instructions, modeling, rehearsal, and feedback) to teach a motor skill (Appendix M). Observers scored all follow-up phases identical to the baseline condition (Appendix E).

**Effect Size of Overall Treatment Effects.** To supplement the visual analysis, effect size was estimated by calculating the percentage of data points exceeding the median of baseline (PEM; Ma, 2006). PEM allows for quantifiable comparisons between interventions with less
susceptibility to floor or ceiling effects observed in baseline than other effect size measures such as percentage of nonoverlapping data points (PND; Ma, 2006). That is, PEM assumes that values will fluctuate around a median, should no treatment effect be observed (Ma, 2006). PEM scores were calculated by: (1) determining the median of the baseline data points, (2) drawing a horizontal line through the baseline and treatment data points at the median value, (3) counting the number of data points that exceed the median value in the treatment phase, and (4) dividing the number of non-overlapping data points by the total number of data points in the treatment phase, and multiplying by 100 (Ma, 2006). As per Ma (2006), if PEM scores are below 50%, the treatment is believed to be ineffective, scores between 51-70% are believed to have questionable treatment effect, scores between 71-90% are believed to have a moderate treatment effect, and scores exceeding 90% are believed to have been a highly effective treatment.

**Effectiveness of Individual and Combined BST Components.** Results were analyzed through differential responding observed through visual analysis of level change, mean shift, and slope (Kratochwill, 2013; Martin & Pear, 2015). In addition, for each type of training (e.g., instructions only, rehearsal and feedback, BST) an effectiveness score was calculated, using the methods outlined by Ward-Horner and Sturmey (2012). Effectiveness scores were presented as the total number of times the BST component was effective (i.e., the volunteer met the predetermined mastery criteria, or had a score of 4 on the BST tasks analysis, Appendix D), over the total number of times the training component was presented. These scores are presented by participant, and averaged across participants.

**Social Validity.** Each volunteer was asked to complete an adapted version of the Treatment Acceptability Rating Form-Revised (TARF-R; Reimers & Wacker, 1992; Wacker, et al., 1998; Appendix N). The original TARF-R questionnaire has high internal validity when used
to evaluate the effectiveness and the acceptability of a treatment (Reimers & Wacker, 1992; Wacker, et al., 1998). The adapted version of the TARF-R included 41 questions that volunteers were asked to rate on a 5-point Likert scale to evaluate their experience with each component of BST, as well as their overall experience participating in the research. For each component of BST, the volunteers were asked to evaluate: (a) the appropriateness of that specific component, (b) their willingness to use the component, (c) the likelihood of disadvantages to that component, (d) the time required to use that component, (e) their confidence after receiving training on that component, (f) how much they enjoyed the training when that component was used, and (g) how much that component impacted their ability to teach using BST. The volunteers were also asked to evaluate their participation in the research, by rating if: (a) the primary investigator provided adequate training overall, (b) the primary investigator provided instructions, (c) the primary investigator demonstrated the skills, (d) the primary investigator provided an opportunity to practice, (e) the primary investigator provided feedback, (f) if they enjoyed participating in the training, (g) if the presence of the primary investigator impacted their performance, (h) if the training impacted their ability to teach in SNAP, and (i) if the training impacted their ability to teach other skills using BST. Questions regarding each of the components of BST and about participating in the research were analyzed individually and as mean responses per question across volunteers.

Procedure

**Informed Consent.** The primary investigator described the procedures, as well as the risks and benefits of participating in the research, with each of the volunteers. The information was also outlined in the letter of invitation (Appendix B) and consent form (Appendix A). The volunteers were also provided with an opportunity to review the letter of invitation and consent
form independently and then pose any additional questions and/or concerns. After all questions and/or concerns were addressed the volunteers provided written informed consent. The SNAP coordinator was also present during the consent process and served as a witness. The volunteers were provided with a copy of the signed informed consent form for their records.

**Experimental Phases of Component Analysis.**

*Baseline.* The primary investigator asked the volunteer to teach a sample motor skill from the SNAP curriculum (Table 1) as she normally would to a SNAP member (person with a DD). In this case, however, the primary investigator role-played a SNAP member. Role-play exercises were completed for each of the four sample motor skills in an analogue setting. The primary investigator did not provide additional instructions, modeling, practice opportunities, or feedback to the volunteer. If the volunteer posed a question to the primary investigator, the primary investigator reassured the volunteer by repeating the initial direction but did not provide any further clarification.

*Training Phase 1.* Instructions, modeling, rehearsal, and feedback training occurred separately. The primary investigator randomly assigned each of the motor skills to one of the BST components (instructions, modeling, rehearsal, or feedback). For example, the primary investigator provided Volunteer 1 with instructions on how to teach Motor Skill 1 (skiddles), modeling to teach Motor Skill 2 (bosu star), rehearsal to teach Motor Skill 3 (target skills), and feedback to teach Motor Skill 4 (somatic square). The presentation order of individual BST components was also counterbalanced across volunteers, such that if Volunteer 1 was assigned instructions for Motor Skill 1, then Volunteer 2 was assigned modeling, Volunteer 3 was assigned rehearsal, and Volunteer 4 was assigned feedback for the same skill. The presentation of components for Volunteer 5 replicated that of Volunteer 1. The volunteer taught the primary
investigator, who role-played the SNAP member. The primary investigator’s behaviour as a SNAP member was ecologically valid in that some of motor skills were performed correctly and some were performed incorrectly (e.g., incomplete, not to criteria). The motor skills were presented in the same order for all volunteers and across all phases: skiddles, bosu star, target skills, and somatic square. The volunteer transitioned between motor skills stations with only brief breaks (approximately 5 min). During training Phase 1, if the volunteer taught the motor skill to the predetermined mastery criterion (a score of 4 on the BST task analysis, across two consecutive trials) teaching that particular motor skill would not be assessed again until the scheduled maintenance checks (2 weeks and 1 month following the training). If the volunteer did not teach a motor skill to the predetermined mastery criterion within 3 trials, teaching the same motor skill would be assessed again in training Phase 2. During this phase, the primary investigator provided the volunteer with a component of BST as training. Following the training, the volunteer was directed to teach the motor skill to the primary investigator in a role-play exercise. Trained observers scored the volunteer’s performance using BST to teach the target motor skill as a trial.

Instructions. The primary investigator provided the volunteer with vocal instructions on how to teach the target motor skill using BST. The instructions included: (a) ensure that the learner is attending prior to delivering instructions or demonstrations, (b) provide complete instructions on how to complete the target motor skill, (c) use clear and concise language, (d) provide a statement that indicates to the learner to reference a demonstration, (e) accurately demonstrate how the to complete the motor skill, (f) ensure that the demonstration is complete, (g) provide an opportunity for the learner to practice the motor skill, (h) continue practice until the learner is able to complete the motor skill accurately, (i) provide descriptive social praise if
the learner completes the target motor skill correctly, and (j) provide gentle corrective feedback if the learner does not complete the motor skill correctly (Appendix F).

**Modeling.** The primary investigator demonstrated a correct example of how to teach the target motor skill using BST, while the volunteer assumed the role of the learner for the purpose of the demonstration. Specifically, the primary investigator’s correct model included: (a) ensuring that the learner is attending prior to delivering instructions or demonstrations, (b) providing complete instructions on how to complete the target motor skill, (c) using clear and concise language, (d) providing a statement that indicates to the learner to reference a demonstration (e) accurately demonstrating how to complete the motor skill, (f) ensuring that the demonstration is complete, (g) providing an opportunity for the learner to practice the motor skill, (h) continuing practice until the learner is able to complete the motor skill accurately, (i) providing descriptive social praise if the learner completes the target motor skill correctly, and (j) providing gentle corrective feedback if the learner does not complete the motor skill correctly (Appendix G).

**Rehearsal.** The volunteer was provided with an opportunity to independently practice teaching the motor skill with the primary investigator assuming the role of the learner for up to 5-minutes. If the volunteer expressed that he/she wanted to forgo the practice opportunity early, the primary investigator honored the request (Appendix H).

**Feedback.** The primary investigator provided the volunteer with vocal feedback based on his/her performance. Descriptive praise statements (e.g., “Nice job, providing clear and concise instructions”) were provided for the components of BST that the volunteer completed correctly. Gentle corrective statements (e.g., “Next time, try to include a demonstration for the
BEHAVIOURAL SKILLS TRAINING FOR TEACHING VOLUNTEERS

learner”) were provided to the volunteer for the components of BST that were completed incorrectly or absent (Appendix I).

Training Phase 2. The procedures in this phase were identical to Phase 1 with the exception that the primary investigator conducted two types of training for each motor skill that did not meet the predetermined mastery criterion. The primary investigator selected the most effective BST components for that volunteer (based on their responding in Phase 1) to add to the training for the target motor skill. For example, if the volunteer had previously been provided with instruction training for Motor Skill 1, and did not meet mastery criterion, and modeling was the most effective for another motor skill, then the primary investigator would provide the volunteer with instructions and modeling training on how to use BST to teach Motor Skill 1.

After being provided with the combined training components, the volunteer was asked to teach the target motor skill to the primary investigator acting as the SNAP member. The volunteer’s performance teaching the motor skill using BST was scored as a trial. Again, if the volunteer was able to teach the motor skills to the predetermined mastery criterion (a score of 4 on the BST task analysis, across two consecutive trials) teaching that particular motor skill would then be assessed at the scheduled maintenance checks. If the volunteer was not able to teach a motor skill to the predetermined mastery criterion within three trials, teaching that motor skill was assessed again in training Phase 3.

Training Phase 3. The primary investigator used the full BST framework to teach the volunteer how to teach the motor skill also using the full BST framework as outlined in Phase 1. To specify, the primary investigator provided the volunteer with: (a) vocal instructions on how to teach the motor skill, (b) a demonstration of how to teach the sample motor skill, (c) an opportunity to practice teaching the motor skill with the primary investigator, and (d) feedback
on his/her practice teaching the motor skill. The volunteer was asked to teach the target motor skill with the primary investigator acting as the SNAP member after receiving the full BST framework. The volunteer’s performance teaching the motor skill using BST was scored as a trial. The volunteer continued in this training phase until she demonstrated teaching the target motor skill to the predetermined mastery criterion (a score of 4 on the BST task analysis, across two consecutive trials).

**Follow-up.** Evaluation of the volunteer’s performance teaching four sample motor skills occurred at a 2-week and 1-month follow up. The procedure was identical to baseline. If the volunteer’s performance did not meet the predetermined mastery criterion additional sessions (that included all components of BST) were provided until the volunteer achieved a score of 4 on the BST task analysis across two consecutive trials.

**Social Validity.** Following the completion of all training phases, the primary investigator provided each of the volunteers with a copy of the adapted version of the TARF-R (Reimers & Wacker, 1992; Wacker, et al., 1998) and a blank envelope. Volunteers were asked to complete and return the questionnaire in the sealed envelope to the general mailbox in the Department of Applied Disability Studies at Brock University.

**Thematic Analysis.** After participating in the component analysis, the primary investigator conducted an open-ended interview with each volunteer individually in a classroom at Brock University. Each volunteer was asked six open-ended questions. The primary investigator audio recorded the participant’s interview using a secure password-protected, hand-held recording device. Interviews were then transcribed verbatim by a trained research assistant. Following transcription, the primary investigator provided the volunteers with a recording of the interview to review. Next, the two external reviewers (one familiar with qualitative research
methods and one who was not) determined that it would be appropriate to compare and contrast the interviews provided by the volunteer with the most experience and least experience with SNAP. The primary investigator read the interview transcripts and listened to the audio recordings several times to become familiar with the dataset. The primary investigator then completed a within-case, within-content analysis of the two selected volunteers (Volunteer 1 and 2), and a cross-case, within-cohort (by question) analysis of all the volunteers’ interviews by initially coding the answers to the interviews and then reviewing the coded answers for pattern and salience. A secondary coder also completed a within- and cross-interview thematic analysis using the same methods as the primary investigator. The summaries were arranged in an excel file in order to complete the analysis more conveniently. The primary investigator and the secondary coder each selected reoccurring themes from the within- and cross-interview analyses. Common themes were then discussed between the primary investigator and the secondary coder and a consensus on the definitions and labels of the identified themes was established.

Results

Component Analysis

Visual Inspection. Figure 1 illustrates the results of the component analysis of BST for teaching five volunteers to teach motor skills while also using BST. The y-axis represents each volunteer’s correct implementation of BST (scored 1-4) while attempting to teach four motor skills. The x-axis represents trials across the baseline, training, and follow-up phases. Labels denote the type of training provided in each experimental phase.

Overall, all volunteer’s performance teaching the motor skills using BST was below the predetermined performance criterion during baseline trials ($M = 1.03$, $SD = 0.97$, range 0 to 3). During baseline trials Volunteer 1, 2, and 3 had low and stable levels of responding across motor
skills with some exceptions. Volunteer 1 had one outlier data point for the bosu star and the final data point (skiddles) for Volunteer 3 was ascending. Volunteer 3 also showed a downward trend for the somatic square, which was introduced following nine baseline trials of teaching the other three motor skills. Volunteer 4, showed an increasing trend in performance in the initial 12 trials, however, the volunteer was then observed teaching a SNAP member skiddles, target skills, and somatic square during the regularly scheduled SNAP session and her performance was lower (score of 0 or 1) than the predetermined criterion (score of 4). Finally, Volunteer 5’s performance was highly variable but became stable after Trial 16.

During training Phase 1 there was an increase in all volunteers’ performance teaching each of the motor skills with minimal overlapping data points when instructions, modeling, rehearsal, and feedback components were provided alone ($M=3.53$, $SD=0.82$, range 0 to 4). For Volunteer 1, all training components were effective, however, the modeling component applied to the bosu star was only effective on the final presentation (Trial 22). Similar rates of acquisition for the bosu star, irrespective of the training component applied were also observed for Volunteers 3, 4, and 5. For Volunteer 3 and 5, the bosu star, which the primary investigator provided rehearsal and modeling training for respectively, showed a minimal level change from baseline but did not reach mastery criterion. Volunteer 2 showed an immediate increase in responding for the instructions, modeling, and feedback training, with no overlapping data points from baseline. For the instructions and feedback training, Volunteer 2 met mastery criterion across all trials. An increasing trend was observed for the rehearsal component applied to the skiddles, however, this training was ineffective, as the volunteer did not meet mastery criterion. Volunteer 3 also demonstrated an immediate increase in performance across instructions, modeling, and feedback training, however, rehearsal training was not effective. Volunteer 4
showed an increasing trend or stable performance at the mastery criterion level for all training components with one exception; instruction training applied to the bosu star was only effective on the final presentation (Trial 31). Finally, only instructions, rehearsal, and feedback training were effective for Volunteer 5. Overall, the instructions, modeling, and feedback training components of BST alone were effective across at least 3 trials for 4 of 5 volunteers. The rehearsal component alone however, was ineffective for 2 out of the 5 volunteers.

In training Phase 2, four of five volunteers (Volunteer 2, 3, 4, and 5) received an individualized combination of two training components for the motor skills that did not meet mastery criterion in Phase 1. Feedback training was applied to the skiddles and bosu star, which had previously received rehearsal training for Volunteer 2 and 3. With a rehearsal and feedback combination, Volunteer 2 immediately reached the mastery criterion for skiddles (i.e., performed all of the elements on the BST task analysis), whereas Volunteer 3 required an additional trial to teach the bosu star motor skill using all of the elements correctly. Volunteers 4 and 5 met mastery criterion within two trials after being provided a combination of instructions and modeling, and modeling and feedback respectively.

Maintenance was initially assessed for all volunteers 2 weeks following their last training trial, excluding Volunteer 2, who was initially assessed 2 months after her last training trial. At a 2 week follow up, two of the five volunteers (Volunteer 1 and 4) maintained their results, teaching all of the motor skills using all of the components of BST correctly. Volunteer 3 only maintained teaching skiddles and target skills, and Volunteer 5 only maintained teaching bosu star using BST. Volunteer 2 did not maintain teaching any of the motor skills at the 2-month follow up. As a final training phase, Volunteers 2, 3, 4, and 5 were provided with training using the full BST framework for the motor skills that were not maintained with BST accuracy. All
volunteers correctly and consistently taught each of the motor skills, using the all of the components of BST within 2 trials.

Maintenance was assessed again for the volunteers 1 month following their last training trial. Volunteer 1 and 4, who did not receive the full BST framework in training Phase 3 maintained their correct BST implementation across motor skills. Volunteer 3, who received the full BST framework, maintained results for 3 of the 4 motor skills (skiddles, bosu star, and target skills). Volunteer 2, who did not maintain results at a 2-month follow up was assessed first at a 2-week follow up, and then at a 1-month follow up. At the 2-week follow up, Volunteer 2 maintained 3 of the 4 motor skills, and all skills at the 1-month follow up. Volunteer 5 was not assessed at a 1-month follow up.
Figure 1. The number of BST steps each volunteer demonstrated correctly across trials during baseline, training, and follow-up.
**Effect Size.** The overall PEM scores of each training component and combination are presented in Table 4, and each was considered to be highly effective according to PEM guidelines (Ma, 2006). That is, the PEM score was 100% for all of the training combination, with the exception of instruction training which was 93%.

Table 4

*Overall PEM Scores by Individual and Combined Training Components.*

<table>
<thead>
<tr>
<th>Type of training</th>
<th>PEM Score</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructions</td>
<td>93</td>
<td>Highly effective</td>
</tr>
<tr>
<td>Modeling</td>
<td>100</td>
<td>Highly effective</td>
</tr>
<tr>
<td>Rehearsal</td>
<td>100</td>
<td>Highly effective</td>
</tr>
<tr>
<td>Feedback</td>
<td>100</td>
<td>Highly effective</td>
</tr>
<tr>
<td>Rehearsal &amp; Feedback</td>
<td>100</td>
<td>Highly effective</td>
</tr>
<tr>
<td>Modeling &amp; Feedback</td>
<td>100</td>
<td>Highly effective</td>
</tr>
<tr>
<td>Instructions &amp; Modeling</td>
<td>100</td>
<td>Highly effective</td>
</tr>
<tr>
<td>BST</td>
<td>100</td>
<td>Highly effective</td>
</tr>
</tbody>
</table>

Table 5 includes the PEM scores for each type of training component and combination across volunteers, which were *highly effective* (100%) for all volunteers with one exception; the instructions training for Volunteer 1 had a PEM score of 67%, or a *questionable* treatment effect.

Table 5

*Overall PEM Scores by Individual and Combined Training Components and Volunteer.*

<table>
<thead>
<tr>
<th>Type of training</th>
<th>Volunteer 1</th>
<th>Volunteer 2</th>
<th>Volunteer 3</th>
<th>Volunteer 4</th>
<th>Volunteer 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructions</td>
<td>67%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Modeling</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Rehearsal</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
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</tr>
<tr>
<td>Feedback</td>
<td>100%</td>
<td>100%</td>
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<td>100%</td>
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</tr>
<tr>
<td>Rehearsal &amp; Feedback</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Modeling &amp; Feedback</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
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<td>100%</td>
</tr>
<tr>
<td>Instructions &amp; Modeling</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
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</tr>
<tr>
<td>BST</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
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</tr>
</tbody>
</table>
Effectiveness of Individual and Combined BST Components. Table 6 provides a summary of the overall effectiveness of each type of training arranged across volunteers; the number of times a particular training component or combination was effective (a score of 4 on the BST task analysis) out of the total number of times a particular training component or combination was implemented. The various combinations of two components and the full BST framework were effective for volunteers to meet the mastery criterion 100% (or 9/9) of the time. Feedback was effective at improving the volunteers’ performance 93% (or 14/15) of the time, and instructions were effective 80% (or 12/15) of the time. Modeling and rehearsal alone were effective at improving volunteer performance less than 60% (or 7/15) of the time.

Table 6

The Overall Effectiveness of Each Type of Training.

<table>
<thead>
<tr>
<th>Type of training</th>
<th>Effectiveness measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructions</td>
<td>12/15</td>
</tr>
<tr>
<td>Modeling</td>
<td>9/15</td>
</tr>
<tr>
<td>Rehearsal</td>
<td>7/15</td>
</tr>
<tr>
<td>Feedback</td>
<td>14/15</td>
</tr>
<tr>
<td>Rehearsal + Feedback</td>
<td>4/4</td>
</tr>
<tr>
<td>Modeling + Feedback</td>
<td>2/2</td>
</tr>
<tr>
<td>Instructions + Modeling</td>
<td>2/2</td>
</tr>
<tr>
<td>Full BST</td>
<td>9/9</td>
</tr>
</tbody>
</table>

Table 7 includes the effectiveness of each type of training (components alone and combination of components) by motor skill. There was no difference in the effectiveness of the full BST framework across motor skills. The various combination of two training components was applied most often to bosu star and the combinations yielded limited to no variability in terms of effectiveness. Feedback training was effective every time for every motor skill except bosu star. Target skills and somatic square were always effective when taught using instructions, modeling, or feedback. Modeling and rehearsal components were effective once when applied to
the bosu motor skill. The rehearsal component applied to any of the motor skills was the least effective component (never effective for bosu star, effective once for skiddles, and twice for target skills and somatic square).

Table 7

*The Effectiveness of Each Type of Training by Motor Skill*

<table>
<thead>
<tr>
<th>Motor skill</th>
<th>Instructions</th>
<th>Modeling</th>
<th>Rehearsal</th>
<th>Feedback</th>
<th>Rehearsal &amp; Feedback</th>
<th>Modeling &amp; Feedback</th>
<th>Instructions &amp; Modeling</th>
<th>Full BST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skiddles</td>
<td>2/3 (V1)</td>
<td>2/3 (V2)</td>
<td>1/3 (V3)</td>
<td>3/3 (V4)</td>
<td>2/2 (V2)</td>
<td></td>
<td></td>
<td>2/2 (V2)</td>
</tr>
<tr>
<td></td>
<td>2/3 (V5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bosu Star</td>
<td>1/3 (V4)</td>
<td>1/3 (V1)</td>
<td>0/3 (V2)</td>
<td>2/3 (V3)</td>
<td>2/3 (V3)</td>
<td>2/2 (V5)</td>
<td>2/2 (V4)</td>
<td>2/2 (V2)</td>
</tr>
<tr>
<td></td>
<td>0/3 (V5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target Skills</td>
<td>3/3 (V3)</td>
<td>3/3 (V4)</td>
<td>2/3 (V1)</td>
<td>3/3 (V2)</td>
<td></td>
<td>2/2 (V5)</td>
<td>2/2 (V2)</td>
<td>2/2 (V5)</td>
</tr>
<tr>
<td>Somatic Square</td>
<td>3/3 (V2)</td>
<td>3/3 (V3)</td>
<td>2/3 (V4)</td>
<td>3/3 (V1)</td>
<td>3/3 (V5)</td>
<td></td>
<td></td>
<td>2/2 (V5)</td>
</tr>
</tbody>
</table>

*Note.* The V+number in parentheses represents the volunteer.

**Social Validity.** The results from the social validity questionnaire are organized by questions related to the instructions component (Figure 2), the modeling component (Figure 3), the rehearsal component (Figure 4), the feedback component, (Figure 5) and overall participation in the research (Figure 6). Figures 2-6 include each volunteer’s rating and the mean across all volunteers for each question. Volunteers rated each question on a scale from “1” (“strongly disagree” or a “negative experience”) to “5” (“strongly agree” or a “positive experience”). The scale was inverted for the two questions regarding the disadvantages and time required for each component of BST, and one question regarding reactivity (i.e., “1” on the scale represented a “positive experience” and “5” represented a “negative experience”). Four of five questionnaires were returned, with one partially complete.

Volunteers rated the instructions component as moderately favourable. That is, all
volunteers scored their willingness to use instructions to teach motor skills as a “5” on the Likert scale, however, there was considerable variability ($M = 2.75$; range, 1 to 5) among volunteers regarding the amount of time required to provide instructions. The ratings for the instructions component was above acceptable levels for appropriateness ($M = 4.5$, range 4 to 5), presence of disadvantages ($M = 1.66$, range 1 to 2), their confidence to teach following only instructions training ($M = 4$, range, 3 to 5), difficulty to use ($M = 4.25$, range 4 to 5), likeability ($M = 4.25$, range 3 to 5), and impact on their ability to teach ($M = 4.5$, range 4 to 5).

Volunteers rated the modeling component slightly more favourably than the instructions component; all volunteers rated their willingness to use modeling to teach motor skills, and their confidence teaching motor skills after being provided with a model, as highly acceptable (a rating of “5” on the Likert scale). The time required to use modeling was rated similar to that of
the instructions component \(M=2.5;\) range, 1 to 4). Volunteers rated the modeling component in the mid-to high range for: appropriateness \(M = 4.25,\) range 3 to 5), presence of disadvantages \(M = 1.5,\) range 1 to 3), time required to use \(M = 2.5,\) range 1 to 4), difficulty to use \(M = 4.75,\) range 4 to 5), likeability \(M = 4,\) range 2 to 5), and for impact on their ability to teach \(M = 4.5,\) range 4 to 5).

![Figure 3](image)

**Figure 3.** Volunteer ratings on the modeling component of BST. Circles represent the rating for each volunteer for each question, and horizontal lines represent the mean response across volunteers for each question.

The feedback component was rated most favourably across volunteers. When asked questions regarding the appropriateness, their willingness to use, and the difficulty of the feedback component, all volunteers rated these questions as a “5” on the Likert scale. All volunteers also provided a score of “1” on the Likert scale (which represented “strongly agree”), when asked if they believed there were any disadvantages associated with the feedback component. Furthermore, volunteers rating feedback were high for: time required to use \(M = 2,\)
range 1 to 3), confidence to teach after being provided only feedback ($M = 4$, range 3 to 5), likeability ($M = 4.67$, range 4 to 5), and for impact on their ability to teach ($M = 4.5$, range 4 to 5).

![Figure 4](image)

**Figure 4.** Volunteer ratings on the feedback component of BST. Circles represent the rating for each volunteer for each question, and horizontal lines represent the mean response across volunteers for each question.

The rehearsal component was rated least favourably across volunteers. Ratings were lower and more variable compared to the other components when volunteers rated the rehearsal component for: appropriateness ($M = 3.5$, range 2 to 5), their willingness to use ($M = 3.33$, range 2 to 5), presence of disadvantages ($M = 2.67$, range 1 to 4), time required to use ($M = 2$, range 1 to 3), their confidence to teach following only rehearsal training ($M = 3.67$, range, 1 to 5), difficulty to use ($M = 4.33$, range 3 to 5), likeability ($M = 3.33$, range 2 to 5), and impact on their ability to teach ($M = 4$, range 3 to 5).
Volunteers also indicated an overall satisfaction with their participation in the research study ($M = 4.67$, range 4 to 5). As per the ratings (where a score of “1” represented a “positive experience”), all volunteers did not believe the presence of the primary investigator and research assistants adversely impacted their performance. Furthermore, all volunteers rated their experience as a “4” on the Likert scale when asked to rate the impact on their ability to teach motor skills in SNAP and other skills outside of SNAP, “5” in relation to the adequacy of the instructions, modeling and opportunity to practice, and “5” referencing their enjoyment participating. The quality of the feedback provided was rated as “5” by two volunteers and “4” by one volunteer.
Thematic Analysis

There were five common themes identified through the thematic analysis: individualization, respect, collaboration, flexibility, and commitment. These themes describe how the volunteers’ experience in a movement program, while also participating in BST research, impact their approach to teaching individuals with DD.

**Individualization.** The most frequently occurring theme was ‘individualization’. This theme was also the first to be identified by both the primary investigator and the secondary coder as a result of a consistent pattern in responding that emerged during the first interview question. When asked to provide a description of the volunteer role, each volunteer described selecting
motor development goals that were meaningful to the member. For example, a volunteer explained “I develop exercise plans that are purposeful for the member’s motor skills in a way that is engaging and fun.” On numerous occasions, volunteers also described the method used in goal selection being based on determining the individual needs of the member. A volunteer explained that she, “would identify gaps in the member’s repertoire, and develop goals specifically to improve the gaps”, and another stated she, “developed a set of exercises that were specific to the needs of the member and that address some of the milestones missed in early development.” Volunteers also provided examples of how their teaching strategies were based on the member’s learning profile and adjustments to the plan were based on the learner’s performance. One volunteer explained how it was initially difficult to determine the appropriate teaching strategies to use with the member as she was unaware of the member’s learning style. The volunteer elaborated by providing a specific example from her experience with SNAP in which she had originally been using vocal instructions with the member with no success. It was not until she demonstrated (modeled) the expectation for the skill to the learner that she felt her teaching strategies were effective.

**Respect.** The second theme identified was “respect”. It was evident that the volunteers highlighted the importance of valuing the member’s strengths in many ways. Providing the members with an opportunity for choice was one method that the volunteers demonstrated respect. For example, volunteers would often allow members to determine the order of the activities, or incorporate the option to select between different exercises and materials. It was the volunteers’ understanding that members were capable of making these choices, and it often facilitated the members’ interest in completing the tasks. Interacting with the members in a way that reflected a peer relationship was another way that volunteers demonstrated respect. A
volunteer explained that she learned to treat members appropriate to their age. She described that this meant she would speak to the member using clear and concise language in a non-condescending manner. Age appropriate respect also extended to the volunteer planning sessions. A volunteer provided an example, when she had planned an exercise for a member using materials that had cartoon animal characters as she thought the member enjoyed animals. The member had been refusing to engage in a particular activity. In order to adapt to the situation, the volunteer elected to try using similar materials, without the cartoon animal characters, and discovered that the member readily participated in the activity. The volunteer’s experience with the member solidified the importance of approaching teaching the DD population with respect.

**Collaboration.** The third theme identified was “collaboration.” Throughout each of the interviews, the volunteers stressed the importance of working as team, with the coordinators, and other volunteers, in order to make improvements to their teaching. Debriefing immediately after SNAP, and weekly planning sessions were essential to the collaboration process. This was evident in the following volunteer statement, “planning sessions were important to incorporate suggestions on how to improve outcomes to certain situations in the future.” Collaboration was also present between the volunteers and members. While volunteers provided support to the members, volunteers also learned valuable lessons on how to adjust their teaching approaches. Overall, volunteers’ comments suggested that these were positive experiences. For example, one volunteer described her feelings of happiness when members and volunteers were bonding through their work together.

**Flexibility.** The fourth theme was “flexibility.” The volunteers explained it can be challenging to adequately prepare to support this population, as unexpected situations often
occur. This theme is demonstrated by one volunteer’s honest account of her experience: “at times, I did not have a set plan, as my plan would need to change based on how the member felt that day.” Volunteers recognized the need to be able to quickly adapt their teaching plans to the situations.

**Commitment.** The final theme identified was “commitment.” Volunteers are an integral part of the SNAP program, and each volunteer stated that their own consistency in attendance at SNAP was important for the learner’s success. One volunteer described her work with SNAP as a large commitment “as a lot of people depend on you”. Without committed volunteers, members would not have the opportunity to participate in SNAP. One volunteer further described, “members respond better to volunteers who want to be here.” Committed volunteers may have contributed to a positive SNAP experience for the members.

Also, while not an identified theme related to how the volunteer’s approached teaching this population, all volunteers highlighted a need for volunteer training. Volunteers described any feelings of uneasiness, or frustration were often linked to not knowing what to do. The volunteers also believed that the tools learned from supporting individuals with DD in SNAP and participating in the BST research would be applied in their future career endeavors.

**Discussion**

This research employed a mixed method approach, which included: (1) a component analysis of BST for teaching volunteers to teach motor skills to individuals with DD, while also using BST, and (2) a thematic analysis of the volunteers’ experience in SNAP, while also participating in BST research relate to how they approach teaching the DD population. To our knowledge, no evaluation of BST has combined quantitative and qualitative research methods. Thus, this research provides novel, and important information.
Component Analysis

The component analysis of BST for teaching volunteers to teach motor skills, while also using BST, contributes to the BST literature in a few important ways. First, this research adds to the limited number of studies ($N = 5$) that have conducted component analyses of BST in general. The complexity and labour-intensive nature of component analyses has likely contributed to the dearth of this type of evaluation (Ward-Horner & Sturmey, 2010). Given the importance of developing effective and efficient training methods to teach volunteers and others how to support the DD population, this type of evaluation is highly warranted. The current evaluation replicated the methodology employed by Ward-Horner and Sturmey (2012) with some modifications. Second, this is the first and only component analysis of BST for teaching university student volunteers how to also use BST to teach motor skills specifically to people with DD. There is an emphasis within the literature on evaluating the use of BST, particularly to train mediators, due to the impact mediators have on the outcomes of the support they provided to others (Giles, et al., 2018; Kupzyk & Shriver, 2016; Pence, et al., 2012). Of the five published component analyses of BST, four evaluated the use of BST to teach caregivers (Drifke, et al., 2017; Feldman et al., 1989; LaBrot et al., 2018) and one to train staff (Ward-Horner & Sturmey, 2012). While volunteers may be considered a form of mediator, it cannot be assumed that the contingencies that influence the performance of caregivers or paid staff participating in BST research will be similar for this population. Furthermore, the availability of resources for volunteer-based programs is limited demonstrating a necessity for efficient, yet effective training methods (Taub & Greer, 2000). This evaluation was successful in identifying the components of BST that were responsible for the change in the volunteers’ performance, which is necessary for behavioural treatments to be considered analytic (Baer, et al., 1968). Overall, results suggested
that instructions, modeling, rehearsal, and feedback alone were sufficient in training the
volunteers how to teach motor skills effectively using BST. However, when components of BST
were applied alone, volunteers did not maintain results, suggesting that full BST may be
necessary for skill maintenance. Third, determining the necessary and sufficient components of
BST for training university student volunteers may enhance future training efficiency;
unnecessary components could be eliminated saving critical time and resources. Based on these
findings, instructions, modeling, or feedback only, could provide sufficient and effective training
to volunteers. This is in line with previous research that identified feedback, and to a lesser
extent, modeling to be sufficient components of BST (LaBrot et al., 2018; Ward-Horner &
Sturmey, 2012). However, instructions alone have not been supported as an effective method of
training (Feldman et al., 1989; Gardner, 1972; Himle et al., 2004; Keating et al., 2010). In
contrast, our findings suggest that the instructions provided to volunteers was sufficient for
teaching volunteers to teach motor skills using BST. A possible explanation for the difference in
these findings may reflect the modality of the particular instructions provided to the volunteers.
Typically, only written instructions outlining the target skills are provided to participants.
Whereas, in this evaluation, the primary investigator (serving as the trainer) provided the
instructions orally, without following a script, which allowed the instructions to be explained in a
more naturalistic manner. Fourth, this component analysis provided valuable information about
the maintenance effects of the independent and combined components of BST, which no
previous component analyses on BST have evaluated. A consistent pattern in the results
suggested that providing volunteers the full BST framework positively impacted skill
maintenance. These findings are similar to previous research that evaluated the combined effects
of BST components (Feldman et al., 1989; Kornacki et al., 2013). Combined, these results
support that it may be beneficial to provide volunteers with training using the full BST method. Fifth, the evaluation of the volunteers’ experience with the individual components of BST identified that volunteers consistently rated rehearsal less favourably than instructions, modeling, or feedback, similar to previous findings (Ward-Horner & Sturme, 2012). While the volunteers rated their experience with rehearsal low, the results of the component analysis suggested that this component is necessary within a full BST framework for effective behaviour change. Finally, this research extended the utility of BST to a wider population. To our knowledge, BST had not been used to teach university student volunteers to teach motor skills, while also using BST, which provides support for a wider application of the BST framework.

**Thematic Analysis**

Results of the thematic analysis of the volunteers’ experience supporting individuals with DD in SNAP, while also participating in BST research identified five unique themes: individualization, respect, collaboration, flexibility, and commitment. Each of the themes contributes novel information related to how volunteers approach teaching individuals with DD. It is important to assess volunteers’ experience as it may provide valuable information related to their performance. The collaboration theme suggested that the volunteers’ performance was positively impacted by lessons learned through feedback. Volunteers explained that they modified their teaching strategies based on suggestions provided by members, other volunteers, and program coordinators. These results are also corroborated by the effectiveness and acceptability of feedback, as demonstrated by the quantitative analysis. The flexibility theme demonstrates that volunteers were often faced with challenges that required the ability to quickly adapt to the circumstances. These results suggest that the training provided to volunteers must incorporate challenging situations in order to adequately prepare volunteers. The commitment
theme showed that volunteers understood that their consistent attendance was important for the member’s success. It was also evident that each volunteer had a vested interest in the success of the member they were supporting. Further consideration of this theme may also be explained behaviourally in that the volunteers contacted reinforcement each time the member achieved a positive outcome. Evidence for this can be found in the brief descriptions each volunteer provided of a situation that required them to persevere (continue to perform in the absence of reinforcement) in order for the member to reach an outlined goal. Moreover, volunteers expressed feelings of disappointment or sadness when a member did not attend SNAP. This provides further support for the role of reinforcement in that the member not attending served as a discriminative stimulus for extinction, meaning that the absence of the member signaled that reinforcement was not available. This finding suggests establishing contingencies of reinforcement is essential for committed action of volunteers. Finally, the themes “individualization” and “respect” demonstrated teaching values that were a relative strength for the volunteers. This information could be used to demonstrate areas that the volunteer does not require further training in, and assist in prioritizing areas that the volunteer may still require training in, which may lead to more effective, efficient, and social valid training procedures.

**Intersection**

The quantitative and qualitative analysis each offer a unique evaluation, however, additional information can be gained by examining the intersection between these analyses. The objective and rationale related to providing volunteer training was the first identifiable point of intersection. During interviews, several of the volunteers expressed feelings of uneasiness and frustration related to their uncertainty in how to provide support to the DD population. Baseline assessment from the component analysis also demonstrated that volunteers were not yet teaching
the motor skills using BST. Without training to adequately prepare the volunteers to support the DD population, the volunteers experience working with this population and the outcomes for the DD population may be adversely impacted. Following BST, each of the volunteers developed the skills necessary to effectively support the DD population using BST, and volunteers reported positive experiences working with the DD population. These findings suggest that volunteers may providing more effective support to the members as a result of BST training.

Another notable intersection point is the role of feedback in training the volunteers. Results of the component analysis demonstrated that feedback was an effective and sufficient component of BST. The feedback component was also rated most favourable among the participants in the social validity questionnaire. Furthermore, in the thematic analysis, volunteers emphasized the importance of receiving feedback in order to improve the support they provide to the members. These findings provide support for a positive relationship between acceptability of a treatment and its effectiveness. That is, the perceived acceptability of a treatment may increase its effectiveness, which is consistent with previous literature (Baer & Schwartz, 1991; Strohmeir, et al., 2014).

The similarities between the philosophical underpinnings of the respective disciplines involved in this collaborative project is the final intersection point. The SNAP curriculum has a foundation in kinesiology, the science of human movement. Whereas, BST has developed from applied behaviour analysis (ABA), which is a science that seeks to make behaviour change that is of social significance to an individual. On the surface, these disciplines may not appear to have significant overlap. However, this mixed methods evaluation revealed a few notable similarities. The volunteers with no previous experience with ABA strategies expressed selecting motor skill goals that were ‘purposeful for the learner’ or ‘based on the individuals’ needs. These sentiments
directly coincide with how Baer and colleagues (1968) operationally define the ‘applied’ dimension of ABA, which involves selecting target behaviours that are of social significance to the participant. Reinforcement, a core principle in ABA was another demonstration of overlap between disciplines. Reinforcement is best defined as the addition or removal of a stimulus contingent on a response that increasing the likelihood of that response in the future under similar conditions (Cooper et al., 2007). Several volunteers described situations in which they provided the member access to a preferred item or activity following the completion of a target exercise. One volunteer described this strategy as a method used to ‘motivate’ the member. This is a clear example of the use of positive reinforcement and capitalizing on motivating operations (Laraway, Snycerski, Michael, & Poling, 2003; Michael, 2007). Despite the differences between Kinesiology and ABA the evidence clearly supports mutual goals.

**Limitations**

This study is not without limitations. First, teaching the bosu star motor skill had a slower rate of acquisition for 4 out of the 5 volunteers. Despite having a Kinesiologist assess all skills to equate for difficulty, these results suggest there may have been inherent differences associated with teaching bosu star. A possible explanation for this pattern of responding is that despite the volunteers’ involvement with SNAP, and exposure to the curriculum, this motor skill may not have been as familiar to some of the volunteers. The elements of this particular motor skill are not as easily identified in other common leisure activities, whereas, the elements of skiddles, target skills, and somatic square are. For example, skiddles can be identified in bowling, target skills can be associated with darts, and somatic square can be associated with gymnastics. All of which the volunteers may have been exposed to from a young age. Moreover, the volunteers had
varying levels of experience volunteering with SNAP ($M = 1.8$ years, $SD = 1.34$), which may have also impacted their familiarity with the SNAP curriculum.

It is also difficult to draw conclusions regarding the independent effects of instructions, modeling, rehearsal, and feedback evaluated in Training Phase 1. Due to the rapid alternation between conditions in the alternating treatment design of the component analysis, carryover effect is possible and is an inherent limitation of the design. Time between trials was brief (5 min) in order to increase the ecological validity. That is, the research sessions were structured similarly to a SNAP session in which the activities are continuous. The duration of inter-trial interval may have contributed to a potential carryover effect in Training Phase 1. Moreover, additive effects may have also contributed to the effectiveness of the final trials, during Training Phase 1. With each additional trial, the volunteer gained exposure to contingencies of reinforcement that may have influenced future responding. Thus, the final trials may have contacted more instances of positive reinforcement (in the form of social descriptive praise) than the initial trials. This may have also impacted the interpretability of the results, once a ceiling (a score of “4”) was obtained, as it is no longer possible to observe differential responding.

Furthermore, although valuable information was obtained from the social validity questionnaire, only three volunteers completed the social validity questionnaire (one volunteer did not return the social validity questionnaire, and one volunteer returned the questionnaire partially completed). Therefore, the mean ratings do not reflect all of the participants’ ratings. The length of the questionnaire (responding to 41 questions) may have adversely impacted the volunteers’ willingness to complete the questionnaire due to fatigue, boredom, etc. Finally, volunteers may have been susceptible to reactivity, when answering questions during the
interviews for the qualitative analysis. Therefore, the answers obtained may not have been an accurate reflection of the volunteers’ experiences but rather what the volunteer believed was the appropriate answer.

**Future Direction**

These combined results provide insight for developing effective and efficient training for volunteers to use BST to teach motor skills to the DD populations. Additional replications across more participants are required to generalize findings. An evaluation of the independent and combined components of BST with a larger sample size could also broaden the generalizability of the results. This study did not address the impact of the individual and combined components of BST on generalization to working with people with DD. Therefore, future research should evaluate the volunteers’ use of BST to teach members in SNAP, or applying BST to teach to novel skills. Finally, it may be beneficial for future researchers to systematically evaluate the effects of the volunteers’ performance teaching motor skills on the outcomes for the individual with DD.
References


Appendix A

Volunteer Letter of Invitation

July 2017

We, Kendra Thomson, PhD, BCBA-D, Assistant Professor, from the Department of Applied Disability Studies, Brock University, Maureen Connolly, PhD, Professor, from the Department of Kinesiology, the Department of Applied Disability Studies, and the Department of Child and Youth Studies, Brock University, and Sarah Davis, M.A. student, from the Department of Applied Disability Studies, Brock University, invite you to participate in a research project titled, “An Evaluation of Behavioral Skills Training for Teaching Motor Skills to Individuals in the Special Needs Activity Program.”

The purpose of this research is to evaluate an evidence-based teaching method, behavioral skills training (BST), for training student volunteers such as yourself, how to teach motor skills to members of the Special Needs Activity Program (SNAP) at Brock University. Should you choose to participate, you will be asked to engage in active strategies (e.g., rehearsal) to learn how you can use BST to teach the SNAP members motor skills from the SNAP curriculum.

To be eligible to participate in the study you must: (a) be enrolled as a student at Brock University; (b) have committed to volunteer with SNAP for the full duration of the program; (c) not be receiving credit for participation in SNAP; and (d) have no previous experience implementing BST. Once we confirm your eligibility, we will provide you with initial training during the first three weeks of the Fall semester (scheduling to be determined based on your availability). Further training will be provided during the volunteer-member dyad sessions throughout the SNAP program on Saturday afternoons (between 2:30-4:45pm). The maximum total time commitment to complete the training will be approximately 37 hours (i.e., approximately 10 hours during the initial weeks of the Fall semester and 2.25 hours on Saturday for 12 weeks).

This research has potential benefits for you and the SNAP members. As a volunteer, you will learn how to implement BST, which may help you teach other important skills to the SNAP members in the future. Your participation will also contribute to the lack of research on effective methods for teaching these skills. Furthermore, the SNAP members may experience enhanced motor skill development. Please note that given the novelty of the research, the likelihood of such outcomes are not assured and there are minor associated risks, including potentially becoming fatigued and/or having negative feelings associated with the perception of being evaluated. We will work together with you to mitigate these risks as much as possible.

Please be aware that we are under an obligation to follow mandatory reporting laws. This means that if any abuse, neglect or witnessing (i.e., an individual has witnessed the emotional or physical abuse of a child) occurs, we must by law report it to child protective services or the police. Data (e.g., records of the training and practice sessions) will be kept in a secure location (i.e., a locked filing cabinet at Brock University and on a password-protected computer drive) for 10 years, after which point it will be destroyed confidentially. All SNAP volunteer and member names will be removed from any data collected and instead, a numerical code will be assigned.
Access to this data will be restricted to the primary investigators, co-investigator and trained research assistants (who will have signed lab confidentiality agreements before observing sessions or dealing with data). Volunteers and members will never be identified in any way if/when the results of this study are published in a peer-reviewed journal or presented at professional conferences. If a SNAP volunteer or member chooses to withdraw from the study, any data will be destroyed immediately in a confidential manner.

If you have any pertinent questions about your rights as a research participant, please contact the Brock University Research Ethics Officer (905) 688-5550 ext. 3035, reb@brocku.ca. If you are interested in participating in the study or have any additional questions about the research, please feel free to contact us with the contact information provided below.

Thank you,

Kendra Thompson

Email: kthomson@brocku.ca; Ph: (905) 688-5550 x 6710

Maureen Connolly

Email: meconnolly@brocku.ca; Ph: (905) 688-5550 x 3381

L. Davis

Email: sd06xj@brocku.ca; Ph: (416) 453 – 7122

This study has been reviewed and received ethics clearance through Brock University’s Research Ethics Board #16-221 - THOMSON
Appendix B

Volunteer Consent Form

Research Consent Form for SNAP Volunteers

**Project Title:** "An Evaluation of Behavioral Skills Training for Teaching Motor Skills to Individuals in the Special Needs Activity Program"

**Principal Investigator (PI):** Kendra Thomson, PhD, BCBA-D, Assistant Professor  
Department of Applied Disability Studies, Brock University  
Phone: (905) 688-5550 x6710; Email: kthomson@brocku.ca

**Student Principal Investigator (PI):** Sarah Davis, M.A. Student  
Department of Applied Disability Studies, Brock University  
Phone: (416) 453-7122; Email: sd06sj@brocku.ca

**Co-Investigator (Co-PI):** Maureen Connolly, PhD, Professor  
Department of Kinesiology, the Department of Applied Disability Studies, Department of Child and Youth Studies, Brock University  
Phone: (905) 688-5550 x3381; Email: mconnelly@brocku.ca

**INVITATION**

You are invited to participate in a research project that is evaluating the effect of behavioral skills training (BST) to help student volunteers, such as, yourself teaching motor skills to members of the Special Needs Activity Program (SNAP) at Brock University motor skills.

BST is an empirically supported teaching method that has been shown to be effective for teaching individuals many skills. The current study will assess whether BST is helpful for you to teach the SNAP member motor skills and will include the following four components: (1) **instructions**, telling the SNAP member the steps of what to do; (2) **modeling**, showing the SNAP member the steps of what to do; (3) **practice**, role playing the steps of what to do with the SNAP member; and (4) **feedback**, telling the SNAP member how he or she did with respect to the steps outlined above.

**WHAT'S INVOLVED IN CURRENT STUDY**

The study aims to complement the teaching strategies you are already using to teach the motor skills curriculum from the SNAP program. During initial weeks of the Fall semester, you will be provided with training on how to use BST (i.e., approximately 10 hours). In September, a follow-up assessment will be completed, which will take approximately 30 minutes. Then during the Fall/Winter 2017-2018 SNAP term, the researcher will work with you on Saturdays (between 2:30-4:45), to implement components of BST with the SNAP members. All training will be completed on an individual basis. Training sessions will be observed and scored by members of the research team. The commitment should not exceed the time you have previously commitment to the SNAP (i.e., 10 hours during the initial weeks of the Fall semester and 2.25 hours on Saturday for 12 weeks). At the end of the project, the researcher will provide you with a brief ques-
BEHAVIOURAL SKILLS TRAINING FOR TEACHING VOLUNTEERS

The questionnaire about your experience to complete and return. The questionnaire should not take more the 10-15 minutes to complete. Finally, the researcher would like to complete a brief interview (approximately 30 minutes) with you about your experiences volunteering during the final SNAP meeting of the semester. This interview will be audio-recorded for transcribing purposes.

POTENTIAL BENEFITS AND RISKS
Possible benefits of participation may include:
- Your participation may lead to understanding how to implement training from a behaviour analytic framework (i.e., BST).
- Your participation may also contribute to the limited empirical research on meditator training, particularly as it relates to teaching motor skills.

There may also be risks associated with participation:
- You may at times feel fatigued from participating in the training stages. If at any time you feel uncomfortable or would like to take a break, please notify the researcher(s).
- You may become uncomfortable due to being observed by a researcher. If at any time you are concerned, please notify the researcher(s).

CONFIDENTIALITY
Please be aware that we are under obligation to follow mandatory reporting laws. This means that if you disclose any child abuse, child neglect or child witnessing (i.e., a child has witnessed the emotional or physical abuse of another person, such as, their parent or sibling), we must by law report it to child protective services or the police. Data (e.g., records of the training and practice sessions) will be kept in a secure location (i.e., a locked filing cabinet at Brock University and on a password-protected computer drive) for 7 years, after which point it will be destroyed confidentially. Your name will be removed from any data collected and instead, a numerical code will be assigned to any data collected. Access to this data will be restricted to the primary investigators, co-investigator, and trained research assistants (who will have signed lab confidentiality agreements before observing sessions or dealing with data). You will never be identified in any way if/when the results of this study are published in a peer-reviewed journal or presented at professional conferences. If you choose to withdraw from the study, any data will be destroyed immediately in a confidential manner.

VOLUNTARY PARTICIPATION
Participation in this study is voluntary. Participation in the study will have no impact on your volunteer status in the SNAP program. You may decline to participate in any component of the study. Further, you may decide to withdraw from this study at any time and may do so without any reprisal from Brock University in any capacity. Should you wish to withdraw from the study, your participation with the SNAP program will not be impacted.

PUBLICATION OF RESULTS
Results of this study may be published in professional journals and presented at conferences. Feedback about this study will be available from the student principal investigator via email (sd06xj@brocku.ca) approximately 3-6 months after the study concludes.

CONTACT INFORMATION AND ETHICS CLEARANCE
If you have any questions about this study or require further information, please contact Dr.
Appendix C

Qualitative Interview Questions

Qualitative Open-Ended Interview

Experiential/Behavioural Question:
1. - Provide information about your role and responsibilities with the SNAP program.
   - Describe what I would see you doing in a typical session from the time you arrive until the time you leave.

Opinion/Value Question:
2. - What are the pro and cons of using a volunteering based approach to instruction and facilitation at SNAP?
   - What strengths and skills have you had to develop?
   - How will these skills benefit you in the future?
   - What elements of the program are the most challenging for you?

Feeling Question:
3. Tell me about a time when you felt:
   (a) Happy, delighted, fulfilled
   (b) Irritated or frustrated
   (c) Afraid
   (d) Exhausted and discouraged
   (e) Determined
   (f) Confused
   (g) Sad

Knowledge Question:
4. - Describe what you have learned from your volunteer experience with the SNAP program (e.g., about yourself, about the individuals you supported, about volunteering).
   - How has your mind changed and how has your mind stayed the same since participating in SNAP?

Sensory Question:
5. - Describe any relevant sensory experiences (e.g., what is seen, heard, smelled, touched, tasted) you may have had while volunteering with the SNAP program.
   - Describe any surprising and/or distributing sensory experiences.

Demographic Questions:
6. Please identify the following information:
   i. Age:
   ii. Highest level of education completed:
   iii. Occupation:
### Task Analysis of BST

#### Volunteer Behaviour – Data Sheet

<table>
<thead>
<tr>
<th>Motor Skill:</th>
<th>Trial:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volunteer provides instructions:</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>Volunteer ensures that the member is attending (i.e., member’s body is oriented towards volunteer and makes eye contact with volunteer) prior to delivering instructions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volunteer verbally tells the member how to engage in the motor using clear and concise language (i.e., understandable to the member)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The directions provided are complete.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volunteer models the motor skill:</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>Volunteer ensures that the member is attending (i.e., member’s body is oriented towards volunteer and makes eye contact with volunteer) prior to demonstrating the skill</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volunteer uses a phrase indicating to imitate the skill (e.g., “watch what I’m doing, I’m going to show you what ______ looks like)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volunteer provides a correct and complete demonstration of the motor skill</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volunteer provides an opportunity to practice:</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>Provides the member with a satisfactory amount of time to practice (i.e., until the member demonstrates the skill correctly OR the member indicates they no longer want to practice)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volunteer provides feedback:</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>Volunteer provides feedback to the member immediately (i.e., within 3 seconds of completing the motor skill)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If the member completes the motor skill correctly (i.e., without errors and without additional assistance to complete), the volunteer provides the member with descriptive social praise (e.g., “Great job doing ______ + high five)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If the member completes the motor skill incorrectly (i.e., has an error, or requires additional assistance to complete), the volunteer provides the member with gentle corrective feedback (e.g., “Next time you could try ______”) and does NOT provide any social praise</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
</tbody>
</table>

Score (out of 4):
Appendix E

Treatment Integrity Checklist for Baseline/Generalization Probes/Follow Up

Data Sheet – Treatment Integrity-
Baseline/Generalization/Maintenance Condition

Observer: ___________ Primary: Y/N Volunteer ID: ___________
Trainer: ______________ Date: ___________

Instructions
1. The trainer does not provide the volunteer with verbal instructions on how to teach the motor skill ☐

Modeling
2. The trainer does not provide the volunteer with a demonstration ☐

Rehearsal
3. The trainer does not provide the volunteer with an opportunity (i.e., 5 minutes) to practice teaching the motor skill ☐

Feedback
4. The trainer does not provide the volunteer with descriptive social praise OR corrective feedback ☐
Appendix F

Treatment Integrity Checklist for Instructions Condition

Data Sheet – Treatment Integrity – Instructions Condition

Observer: ____________  Primary: Y/N  Volunteer ID: ____________  
Trainee: ____________  Date: ____________

Instructions

1. The trainer provides the volunteer with verbal instructions on how to teach the motor skill which includes the following information:
   a) Ensuring that the member is attending (i.e., body is oriented towards the trainer and is making eye contact with the trainer) prior to delivering instructions □
   b) Provide instructions on how to complete the motor skill using clear and concise language □
   c) Provide complete instructions on how to complete the motor □
   d) Ensure that the member is attending (i.e., body is oriented towards the trainer and is making eye contact with the trainer) prior to demonstrating the skill □
   e) Provide a phrase that indicates that the member needs to imitate the motor skill (e.g., watch what I’m doing, I’m going to show you how to do ___) □
   f) Provide the member with a demonstration of the motor skill that is correct and complete □
   g) Provide the member with the opportunity to practice the motor skill until he/she demonstrates the skill correct OR until he/she indicates that he/she would like to discontinue practice □
   h) Provide feedback immediately (i.e., within 3-5 seconds) following the practice opportunity □
   i) Provide gentle corrective feedback (e.g., “Next time, you should try _____”) if the member does not complete the practice opportunity correctly (i.e., requires prompting or makes an error) □
   j) Provide descriptive social praise (e.g., “Awesome job, doing ____”), if the member completes the practice opportunity correctly (i.e., without errors or prompting) □

Modeling

2. The trainer does not provide the volunteer with a demonstration □

Rehearsal

3. The trainer does not provide the volunteer with an opportunity (i.e., 5 minutes) to practice teaching the motor skill □

Feedback

4. The trainer does not provide the volunteer with descriptive social praise OR corrective feedback □
Appendix G

Treatment Integrity Checklist for Modeling Condition

Data Sheet – Treatment Integrity – Modeling Condition

Observer: ___________ Primary: Y/N Volunteer ID: ___________

Trainer: ___________ Date: ___________

Instructions
1. The trainer does not provide the volunteer with verbal instructions on how to teach the motor skill ☐

Modeling
2. The trainer provides the volunteer with a demonstration on how to teach the motor skill which includes the following information:
   A. Ensuring that the member is attending (i.e., body is oriented towards the trainer and is making eye contact with the trainer) prior to delivering instructions ☐
   B. Provide instructions on how to complete the motor skill using clear and concise language ☐
   C. Provide complete instructions on how to complete the motor ☐
   D. Ensure that the member is attending (i.e., body is oriented towards the trainer and is making eye contact with the trainer) prior to demonstrating the skill ☐
   E. Provide a phrase that indicates that the member needs to imitate the motor skill (e.g., watch what I’m doing, I’m going to show you how to do ____) ☐
   F. Provide the member with a demonstration of the motor skill that is correct and complete ☐
   G. Provide the member with the opportunity to practice the motor skill until he/she demonstrates the skill correct OR until he/she indicates that he/she would like to discontinue practice ☐
   H. Provide feedback immediately (i.e., within 3-5 seconds) following the practice opportunity ☐
   I. Provide gentle corrective feedback (e.g., “Next time, you should try ____) if the member does not complete the practice opportunity correctly (i.e., requires prompting or makes an error) ☐
   J. Provide descriptive social praise (e.g., “Awesome job, doing ____) if the member completes the practice opportunity correctly (i.e., without errors or prompting) ☐

Rehearsal
3. The trainer does not provide the volunteer with an opportunity (i.e., 5 minutes) to practice teaching the motor skill ☐

Feedback
4. The trainer does not provide the volunteer with descriptive social praise OR corrective feedback ☐
Appendix H

Treatment Integrity Checklist for Rehearsal Condition

Data Sheet – Treatment Integrity – Rehearsal Condition

Observer: ___________  Primary: Y/N  Volunteer ID: ___________

Trainer: ___________  Date: ___________

Instructions
1. The trainer does not provide the volunteer with verbal instructions on how to teach the motor skill ☐

Modeling
2. The trainer does not provide the volunteer with a demonstration on how to teach the motor skill ☐

Rehearsal
3. The trainer provides the volunteer with an opportunity (i.e., 5 minutes) to practice teaching the motor skill ☐

Feedback
4. The trainer does not provide the volunteer with descriptive social praise OR corrective feedback ☐
# Treatment Integrity Checklist for Feedback Condition

**Data Sheet – Treatment Integrity – Feedback Condition**

<table>
<thead>
<tr>
<th>Observer:</th>
<th>Primary: Y/N</th>
<th>Volunteer ID:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trainer:</td>
<td>Date:</td>
<td></td>
</tr>
</tbody>
</table>

**Instructions**

1. The trainer *does not* provide the volunteer with verbal instructions on how to teach the motor skill.

2. The trainer *does not* provide the volunteer with a demonstration on how to teach the motor skill.

**Rehearsal**

3. The trainer provides the volunteer with an opportunity (i.e., 5 minutes) to practice teaching the motor skill.

**Feedback**

4. Following an opportunity for the volunteer to demonstrate teaching the motor skill, the trainer provides the volunteer with:
   - Feedback immediately (i.e., within 3-5 seconds) following the practice opportunity.
   - Gentle corrective feedback (e.g., “Next time, you should try ____”) if the volunteer does not complete the practice opportunity correctly (i.e., requires prompting or makes an error).
   - Descriptive social praise (e.g., “Awesome job, doing ____”), if the volunteer completes the practice opportunity correctly (i.e., without errors or prompting).
Appendix J

Treatment Integrity Checklist for Rehearsal and Feedback Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Data Sheet – Treatment Integrity – Rehearsal + Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observer:</td>
<td>Primary: Y/N  Volunteer ID: ____________</td>
</tr>
<tr>
<td>Trainer:</td>
<td>Date: ____________</td>
</tr>
</tbody>
</table>

Instructions
1. The trainer **does not provide** the volunteer with verbal instructions on how to teach the motor skill □

Modeling
2. The trainer **does not provide** the volunteer with a demonstration on how to teach the motor skill □

Rehearsal
3. The trainer **provides** the volunteer with an opportunity (i.e., 5 minutes) to practice teaching the motor skill □

Feedback
4. The trainer **provides** the volunteer with descriptive social praise OR corrective feedback □
   - Provide feedback immediately (i.e., within 3-5 seconds) following the practice opportunity □
   - Provide gentle corrective feedback (e.g., “Next time, you should try ___”) if the member does not complete the practice opportunity correctly (i.e., requires prompting or makes an error) □
   - Provide descriptive social praise (e.g., “Awesome job, doing ___”), if the member completes the practice opportunity correctly (i.e., without errors or prompting) □
Appendix K

Treatment Integrity Checklist for Modeling and Feedback Condition

Data Sheet – Treatment Integrity – Modeling + Feedback Condition

Observer: ___________  Primary: Y/N  Volunteer ID: ___________

Trainer: ___________  Date: ___________

Instructions
1. The trainer does not provide the volunteer with verbal instructions on how to teach the motor skill □

Modeling
2. The trainer provides the volunteer with a demonstration on how to teach the motor skill □
   • Ensure that the member is attending (i.e., body is oriented towards the trainer and is making eye contact with the trainer) prior to demonstrating the skill □
   • Provide a phrase that indicates that the member needs to imitate the motor skill (e.g., watch what I’m doing, I’m going to show you how to do ___) □
   • Provide the volunteer with a demonstration of the motor skill that is correct and complete □

Rehearsal
3. The trainer does not provide the volunteer with an opportunity (i.e., 5 minutes) to practice teaching the motor skill □

Feedback
4. The trainer provides the volunteer with descriptive social praise OR corrective feedback □
   • Provide feedback immediately (i.e., within 3-5 seconds) following the practice opportunity □
   • Provide gentle corrective feedback (e.g., “Next time, you should try _____”) if the member does not complete the practice opportunity correctly (i.e., requires prompting or makes an error) □
   • Provide descriptive social praise (e.g., “Awesome job, doing _____”), if the member completes the practice opportunity correctly (i.e., without errors or prompting) □
Appendix L

Treatment Integrity Checklist for Instructions and Modeling Condition

Data Sheet – Treatment Integrity – Instructions and Modeling

Condition

Observer: ___________  Primary: Y/N  Volunteer ID: ___________

Trainer: ___________  Date: ___________

Instructions and Modeling

1. The trainer provides the volunteer with verbal instructions AND a demonstration on how to teach the motor skill which includes the following information:
   a) Ensuring that the member is attending (i.e., body is oriented towards the trainer and is making eye contact with the trainer) prior to delivering instructions □
   b) Provide instructions on how to complete the motor skill using clear and concise language □
   c) Provide complete instructions on how to complete the motor □
   d) Ensure that the member is attending (i.e., body is oriented towards the trainer and is making eye contact with the trainer) prior to demonstrating the skill □
   e) Provide a phrase that indicates that the member needs to imitate the motor skill (e.g., watch what I’m doing, I’m going to show you how to do ___) □
   f) Provide the member with a demonstration of the motor skill that is correct and complete □
   g) Provide the member with the opportunity to practice the motor skill until he/she demonstrates the skill correct OR until he/she indicates that he/she would like to discontinue practice □
   h) Provide feedback immediately (i.e., within 3-5 seconds) following the practice opportunity □
   i) Provide gentle corrective feedback (e.g., “Next time, you should try ___”), if the member does not complete the practice opportunity correctly (i.e., requires prompting or makes an error) □
   j) Provide descriptive social praise (e.g., “Awesome job, doing ___”), if the member completes the practice opportunity correctly (i.e., without errors or prompting) □

Rehearsal

2. The trainer does not provide the volunteer with an opportunity (i.e., 5 minutes) to practice teaching the motor skill □

Feedback

3. The trainer does not provide the volunteer with descriptive social praise OR corrective feedback □
# Appendix M

## Treatment Integrity Checklist for Full BST Condition

<table>
<thead>
<tr>
<th>Data Sheet – Treatment Integrity – Full BST Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recorder: ___________ Primary: Y/ N Participant ID: ___________</td>
</tr>
<tr>
<td>Trainer: ___________ Date: ___________</td>
</tr>
</tbody>
</table>

### Instructions
1. The trainer provides the volunteer with verbal instructions on how to teach the motor skill

### Modeling
2. The trainer provides the volunteer with a demonstration on how to teach the motor skill

### Rehearsal
3. The trainer provides the volunteer with an opportunity (i.e., 5 minutes) to practice teaching the motor skill

### Feedback
4. The trainer provides the volunteer with descriptive social praise OR corrective feedback immediately after practicing teaching the motor skill
Appendix N

Social Validity Questionnaire (adapted from Treatment Acceptability Rating Form – Revised)

Please score each item by circling the number that best indicates how you feel about the instructions component of the behavioural skills training (BST) procedure.

1. How appropriate did you find being provided with instructions for how to teach the target motor skill to be?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all acceptable</td>
<td>Neutral</td>
<td>Very acceptable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. How willing are you to provide instructions on how to complete the target motor skill to the SNAP member?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all willing</td>
<td>Neutral</td>
<td>Very willing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. To what extent do you think there may have been disadvantages to being provided with instructions on how to teach the target motor skill?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>None likely</td>
<td>Neutral</td>
<td>Many likely</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. How much time was required to provide you with clear and concise instructions for how to teach the target motor skill?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little time</td>
<td>Neutral</td>
<td>Much time</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. How confident are you in teaching the target motor skill after being provided with instructions only?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not confident</td>
<td>Neutral</td>
<td>Very confident</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. How difficult was it to interpret the instructions for how to teach the target motor skill?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very difficult</td>
<td>Neutral</td>
<td>Not difficult</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. How much did you like being provided with instructions for how to teach the target motor skill?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not like them at all</td>
<td>Neutral</td>
<td>Like them very much</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Did you feel you that being provided with instructions only impacted your ability to teach motor skills to SNAP members?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative impact</td>
<td>Neutral</td>
<td>Positive impact</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please score each item by circling the number that best indicates how you feel about the **modeling (demonstration)** component of the behavioural skills training (BST) procedure.

9. How appropriate did you find being provided with a model for how to teach the target motor skill to be?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all acceptable</td>
<td>Neutral</td>
<td>Very acceptable</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. How willing are you to carry out the modeling procedure with the SNAP member?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all willing</td>
<td>Neutral</td>
<td>Very willing</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. To what extent do you think there may have been disadvantages to being provided with a model on how to teach the target motor skill?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>None likely</td>
<td>Neutral</td>
<td>Many likely</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12. How much time was needed to provide you with a model of how to teach to the target motor skill?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little time</td>
<td>Neutral</td>
<td>Much time</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13. How confident are you in teaching the target motor skill after being provided with a model only?

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<tr>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not confident</td>
<td>Neutral</td>
<td>Very confident</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. How difficult was it understand the modeling procedure for how to teach to target motor skill?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very difficult</td>
<td>Neutral</td>
<td>Not difficult</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. How much did you like the modeling procedure for how to teach the target motor skill?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not like them at all</td>
<td>Neutral</td>
<td>Like Them very much</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16. Did you feel you that being provided with modeling only impacted your ability to teach motor skills to SNAP members?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative impact</td>
<td>Neutral</td>
<td>Positive impact</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please score each item by circling the number that best indicates how you feel about the rehearsal (practice) component of the behavioural skills training (BST) procedure.

17. How appropriate did you find the opportunity to practice teaching the target motor skill to be?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all acceptable</td>
<td>Neutral</td>
<td>Very acceptable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
18. How willing are you to provide the SNAP member with an opportunity to practice?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all willing</td>
<td>Neutral</td>
<td>Very willing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

19. To what extent do you think there may have been disadvantages to being provided with an opportunity to practice teaching the target motor skill?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>None likely</td>
<td>Neutral</td>
<td>Many likely</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

20. How much time was needed to provide you with an opportunity to practice teaching the target motor skill?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little time</td>
<td>Neutral</td>
<td>Much time</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

21. How confident are you in teaching the target motor skill after only having an opportunity to practice?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not confident</td>
<td>Neutral</td>
<td>Very confident</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

22. How difficult was it to understand how to teach the target motor skill after only having an opportunity to practice?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very difficult</td>
<td>Neutral</td>
<td>Not difficult</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

23. How much did you like being provided with an opportunity to practice teaching the target motor skill?

<table>
<thead>
<tr>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not like them at all</td>
<td>Neutral</td>
<td>Like them very much</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

24. Did you feel that being provided with modeling only impacted your ability to teach motor skills to SNAP members?
<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative impact</td>
<td>Neutral</td>
<td>Positive impact</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please score each item by circling the number that best indicates how you feel about the feedback component of the Behavioural Skills Training (BST) procedure.

25. How appropriate did you find being provided with feedback for how to teach the target motor skill to be?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all acceptable</td>
<td>Neutral</td>
<td>Very acceptable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

26. How willing were you to provide feedback to the SNAP member?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all willing</td>
<td>Neutral</td>
<td>Very willing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

27. To what extent do you think there may have been disadvantages in being provided with feedback?

<table>
<thead>
<tr>
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<th>2</th>
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<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>None likely</td>
<td>Neutral</td>
<td>Many likely</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

28. How much time was needed for you to understand how to teach the target motor skill having been provided only with feedback?

<table>
<thead>
<tr>
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<th>2</th>
<th>3</th>
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<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little time</td>
<td>Neutral</td>
<td>Much time</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

29. How confident are you in teaching the target motor skill after being provided with feedback only?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not confident</td>
<td>Neutral</td>
<td>Very confident</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

30. How difficult was it to interpret the feedback provided to you?
31. How much did you like providing feedback to the SNAP member?

<table>
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<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very difficult</td>
<td>Neutral</td>
<td>Not difficult</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

32. Did you feel you that being provided with modeling only impacted your ability to teach motor skills to SNAP members?

<table>
<thead>
<tr>
<th></th>
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<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Do not like them at all</td>
<td>Neutral</td>
<td>Like them very much</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please score each item by circling the number that best indicates how you feel about the research in general.

33. I felt that the researcher provided me with adequate training.

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<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Neutral</td>
<td>Strongly agree</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

34. The researcher provided adequate instructions during training and answered any questions I had.

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<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Neutral</td>
<td>Strongly agree</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

35. The researcher provided me with a model (demonstration) during training.

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<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Neutral</td>
<td>Strongly agree</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

36. The researcher physically rehearsed the procedures with me during the trainings.

<table>
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<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Neutral</td>
<td>Strongly agree</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
37. During training, the researcher told me when I was doing the correct thing and told me when I was doing something incorrectly.

<table>
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<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>Neutral</td>
<td>Strongly agree</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

38. I enjoyed learning to teach motor skills using the BST procedure.

<table>
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<th>3</th>
<th>4</th>
<th>5</th>
<th>_</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>Neutral</td>
<td>Strongly agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

39. The presence of the researcher negatively impacted my performance

<table>
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<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>Neutral</td>
<td>Very much</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

40. Since receiving BST training, I feel more confident in my ability to teach the SNAP members.

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<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>Neutral</td>
<td>Very much</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

41. Since receiving BST training, I feel more confident in my ability to teach skills to others.

<table>
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<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>Neutral</td>
<td>Very much</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>