University of Nevada, Reno

Evaluation of a Video Based Training Package on Staff Treatment Integrity Levels

by

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Abstract

Staff training is a critical element in assuring the effectiveness of behavior change agents in human services. Expense and time often limit the amount of training provided to staff members. Video based methods of training allow for flexible and repeated viewing. There has been no evaluation of the effectiveness of such methods on treatment integrity. To answer the question of whether an interactive video could improve performance in a meaningful way, an entirely video based training package was developed from methods that have been most effective in producing best outcomes according to the training literature. The package consisted of competency based instructions with modeling and video feedback evaluated across two different skills and four participants. The training package comprised three parts: competency based instructions with modeling, written feedback, and observational feedback. Each part of the training was evaluated for its efficacy. A multiple baseline design across participants counter balanced for skills was used and staff treatment integrity was measured as a percent correct of critical elements. All four participants achieved 100% treatment integrity on at least one of the skills trained. Two of the participants did not reach 100% on one of the skills. Maintenance and generalization probes conducted 4-8 weeks after completion of training showed that all three of the participants evaluated maintained high levels of treatment integrity.

Dedication

To my mom and dad, thank you for your love, support, devotion and encouragement throughout my education. I love you both very much! To my advisor, W. Larry Williams, thank you for your invaluable advisement, this project would not have been possible without you. I look to forward to our further collaborations in the coming years.

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Effective training programs are necessary to achieve proficiency in human service staff job performance. Applied behavioral research on staff training has focused on procedures such as instructions, modeling, and feedback to teach job skills to human service staff. Historically, staff training has been used as a solution to performance problems. Often, this was time wasted because the procedures utilized (usually instructions only) did not yield improved performance (Reid, Parsons, & Green, 1989). Recently, studies have been published on more economical ways to train staff (Catania, Almeida, Liu-Constant & Digennaro 2009; Moore & Fisher, 2007; Sarakoff & Sturmey, 2004).

Behavior skills training packages consist of different procedures that are combined into one training program, and have received significant attention in the applied research literature. They have been used to teach a wide variety of behavioral and other skills (Reid & Parsons, 1995), such as implementing discrete-trial teaching (Catania et.al, 2009; Sarokoff & Sturmey, 2004), functional analysis (Iwata et al., 2000; Moore & Fisher, 2007) and stimulus preference assessments (Lavie & Sturmey, 2002). The literature includes various combinations of a core set of procedures including: verbal instructions, written instruction, performance modeling, performance practice, and feedback. Components of these packages have different roles in the improvement of skills. For example, the feedback component was found to be critical in improving performance in skill acquisition procedures (Roscoe, Fisher, Glover, & Volkert, 2006) and improving treatment integrity (Witt, Noell, LaFleur, & Mortenson, 1997). For this reason, we included two different forms of feedback with modeling in the present study. Most recently Catania et al., (2009) evaluated video modeling as a less resource-intensive training method for

discrete trial instruction. Discrete trial instruction is one of the primary methods used in early intensive behavioral child interventions and they chose it for this reason. They found that the use of video modeling improved treatment integrity to rates between 85% and 98% compliance. Generalization and maintenance probes maintained performance at the same levels.

Classroom-Based Training Methods

Human service organizations often conduct classroom based trainings due to scheduling ease for large groups, efficient use of trainer time, facilitating staff acquisition of a verbal repertoire of their job duties, and minimization of distractions during training (Reid, Parsons, & Green, 1989). Although classroom based training methods are widely used in human service organizations, problems arise with scheduling paraprofessional staff to attend without incurring additional training expenses. For this reason, it is important to find methods of training that are effective in producing high levels of treatment integrity while allowing for flexibility in delivery.

Verbal Instruction Methods of Staff Training

A verbal instruction method (live delivery), a traditionally accepted means of training, is one of the most commonly used (Reid, Parsons, & Green, 1989). When used as the sole means of training staff, verbal instruction does not yield satisfactory levels of trainee skill acquisition (Gardner, 1972). However, verbal instruction is important in teaching trainees to discuss skills in contrast to performing them. This is important because a trainee's articulation of a job task can enhance their performance of that task (Reid, Parsons, & Green, 1989). Thus, the instructional component of training, while not an integral step in acquiring performance skills is important to overall ability to articulate function of job skills.

Verbal instruction typically involves a vocal presentation to the trainee of the rationale, background, and description of the targeted job skills. Verbal instruction has been provided by

individuals with a range of expertise, both internal and external to the organization. This training procedure also has been applied in both groups and one-to-one staff to trainer situations. Typical delivery format is live face-to-face verbal instructions. Other formats such as video-taped lectures, computer assisted programs, and audio tapes which do not rely on an interpersonal interaction between a trainer and trainee also have been employed.

Mozingo and Smith (2006) examined the effects of an instructional component of a training package for improving staff performance which included in-service training followed by feedback from supervisors. They assessed trainees recording accuracy when recording behavior frequencies. A 45-60 minute in-service was conducted and shown to be ineffective in improving frequency recording performance of staff until supervisor presence and feedback were added. This is consistent with other evaluations on the impact of instructions.

Performance Modeling Methods of Staff Training

While verbal instruction methods focus on an individual's ability to speak clearly and listen carefully, performance modeling as a staff training procedure centers more on job task performance skills. Using performance modeling or demonstration, the task(s) are physically demonstrated live or via video tape. Modeling was first researched as far back as the early sixties. Bandura and his colleagues demonstrated that video modeling of aggressive acts resulted in aggressive acts occurring in other settings (Bandura, Ross & Ross, 1962).

Although videotapes, usually in the context of modeling, have been shown produce behavior change, a number of factors influence their effectiveness (e.g. Charlop & Milstein, 1989, Moore & Fisher, 2007; Winett, Kramer, Walker, Malone & Lane, 1988). For example, a necessary component in the effective use of modeling as a means of training is the availability of a trainer (model) who has performance expertise in a given skill area. Modeling also usually

involves role-playing behavior according to a planned script in order to ensure that each skill targeted to be taught to staff is demonstrated. However, it also can be conducted in a less structured manner. An advantage of performance modeling is that often it is easier for staff to understand what a work skill entails if they view the task to be performed firsthand as opposed to listening to a description of the task (Reid, Parsons, & Green, 1989).

Moore and Fisher (2007) found video modeling could be used effectively to teach functional analysis methodology. They compared lectures and two types of video modeling to determine the relative effectiveness for teaching trainees to conduct functional analysis sessions. Video modeling containing a larger number of exemplars resulted in mastery-level performance eight of the nine times it was introduced; neither lectures nor partial video modeling produced significant improvements in performance. Results demonstrated that video modeling provided an effective training strategy but only when a wide range of exemplars of potential therapist behaviors were depicted in the videotapes.

Stokes and Baer (1977) did a review of technologies of generalization and indicated that multiple stimulus exemplars were often necessary to facilitate generalization across settings. Stokes and Baer state, "diversity of exemplars seems to be the rule to follow in pursuit of the maximum generalization".

Neef, Trachtenburg, Loeb, and Sturner (1991), conducted two studies to evaluate a video based method of training respite care providers and specifically the role of presentation format (alone, with one other person, or with a group in a classroom) as a contextual variable. Study 1 found that simulated (role-play) respite care situations improved 5 of 6 skills in 12 participants after presentation of the video tape, with no difference in formats. Study 2 replicated study 1,

but with different presentation formats that were closer to typical agency group trainings, and found similar results.

Feedback Methods

Video feedback as a descriptor has been associated with four main uses in the training literature. It has been described as a training procedure in which the person being trained watches videotaped examples of their own performance, with or without additional commentary or information as to the correctness or appropriateness of their performance (Panyan & Patterson, 1974). Video feedback also has been described as a training procedure in which people observe appropriate examples of targeted skills as performed by others, with the intention of increasing performances of the skills viewed, via modeling. However, video feedback can also refer to a variation in the source of feedback to a performer that involves the provision of descriptive written, spoken or graphical information on one's performance, delivered via videotape as opposed to a live interaction. Another form of video feedback training refers to a training procedure involving active identification by an observer, of correct and incorrect examples of someone performing a given task (typically the task to be taught) on a videotaped presentation of those performances (Dowrick & Johns, 1976).

Harrison (2003) and Alvero and Austin (2004) examined the use of the written video feedback component of training used in the present study. Harrison (2003) evaluated the effectiveness of watching a videotape of staff performing occupational safety skills. Participants were asked to complete a checklist which evaluated hygiene safety related staff performance based on a video of other individuals as they performed relevant hand washing and rubber glove usage. Results suggested that the videotaped scoring sessions were effective in increasing the quality of the observer's own subsequent hygiene safety performance with no other training.

Alvero and Austin (2004) found observers' own performances improved after they conducted observations of a confederate performing secretarial tasks while they scored them as correct or incorrect. All participants showed performance improvement as a result of watching and scoring confederate performances. In discussing their results, the authors suggest among other things that future studies could examine the type and specificity of the behavioral checklist, and variation in properties of the responses observed. A study by Williams and Gallinat (In press) replicated this with videos of the individual as opposed to others and found no apparent differences in effectiveness.

Ford (1984) evaluated another form of observational feedback. He attempted to evaluate the relative effects of videotaped feedback, supervisor feedback and a combination of these two types of feedback on the teaching skills of three trainees at a mental retardation facility. Results suggested that the largest improvement in performance was observed when supervisor and videotaped feedback were provided contingent on performance.

Evaluations of Training Packages

Krumhus and Malott (1980) examined the differential effects of instructions, modeling, and feedback in the training of tutors in a remedial education program. They found the effects of instructions alone were minimal. Modeling produced a marked and rapid improvement, whereas feedback produced a slight additional improvement. Based on their findings, they suggested that although instructions are typically used as the methodological control for evaluating feedback, the use of modeling would be a more appropriate control. This is specifically related to other investigations yielding inflated results of the effectiveness of feedback which has components of modeling within it, which may be the factor which actually improves performance.

Miles and Wilder (2009) evaluated the effects of behavioral skills training on caregiver implementation of guided compliance. Their training package consisted of modeling rehearsal,

and feedback and was evaluated across caregivers of 3 children. Results showed that the training package improved performance of guided compliance and generalized to different settings 3 to 6 weeks after training ended.

Purpose of Current Study

The purpose of the current study is to extend current research on staff training by investigating the effectiveness of a training package delivered completely in the context of interactive video to see if it could improve performance in a meaningful way. We used a combination of the core set of procedures found in the literature including: competency based instructions with performance modeling, and two types of video feedback. The first component of this package included instructions with modeling in the form of correct exemplars of the skill being trained as well as competency measures (multiple choice questions throughout the video). The second component of the package referred to as "written feedback" was a video that consisted of several scenarios including exemplars and non-exemplars of the skill being completed by a model, in which the participant was asked to use a checklist to identify which critical items were missed in the individual scenario. The video then showed the participant how their checklist should look. Alvero and Austin (2004); Harrison (2003), and Williams & Gallinat (in press) found that this type of feedback was effective in performance improvement. A third component of the package was an additional form of feedback delivered via video. There are no reported studies in the literature which specifically have evaluated the effects of a person observing someone else in a video being given feedback on performance improvement. However, we utilized this as a second type of feedback in the current study.

The ability to deliver training on skills in a completely automated video based format which produces high levels of treatment integrity would be useful in many clinical settings.

Specifically, the impact our programming has within clinical settings meets the barriers of ability to train staff in most settings. Researchers have evaluated treatment integrity on discrete trial procedures using video modeling and have found it to be successful (e.g., Catania et.al, 2009). For the current study we evaluated video training of discrete trial training and backward chaining skills. Backward chaining was selected because of its frequent use in training skill acquisition across settings with individuals with developmental disabilities.

To control for previous training effects we conducted a baseline evaluation of the trainee's experience with the two skill acquisition procedures prior to any training. After baseline, participants were randomly assigned to a dyad which varied only by the skill they were trained first (see Table 1).

Method

Subjects and Setting

Participants in this study were 4 undergraduate students (2 male and 2 female) who worked at a day program for adults with Intellectual disabilities. Training was conducted in a room at the day program where the participants worked. All participants had to score an average of 60% or less during baseline sessions to participate in the study. All participants were volunteers per institutional review board approval.

Materials

Participants sat at a desk with a laptop computer, a pencil, and a handout of materials relevant to the video being watched. During participant evaluation the stimuli necessary for the discrete trial teaching procedures included two sets of identical matching object cards with circles and squares, small cheese crackers as reinforcers, and rectangular and square shaped three dimensional blocks. The stimuli necessary for completing the backward chaining procedures

included peanut butter, squeezable jelly, bread, butter knife, cheese crackers, and a laundry basket with clothes, laundry detergent, and a washing machine.

Procedures

Treatment Integrity Measure. All participants were evaluated by the percentage of 8 critical steps to backward chaining and discrete trial training they were able to correctly complete. They implemented the teaching procedures with a research assistant before and after each training video that was watched throughout each phase (as described below under interventions). The opportunity to imitate the behavior modeled in the training occurred within 10 minutes following each of the phases of training. Skills to be evaluated with participants include the following:

1. Backward Chaining Teaching Procedure (BC). Two different tasks were developed to evaluate the participants' backward chaining skills. Two different motor tasks were chosen (washing a load of laundry and making a peanut butter and jelly sandwich). An instruction and data sheet were provided for each of these teaching procedures (See appendixes C and D).
2. Discrete Trial Teaching Procedures (DTT). Two different discriminated operant procedures were used to evaluate participants on discrete trial teaching (DTT) procedures (e.g., matching to sample and receptive actions). An instruction and data sheet were provided for each of these teaching procedures (See appendixes E and F).

Response Randomization and Control. A research assistant was trained to act as the learner during the participant evaluation trials. The research assistant was trained to respond in three different ways: incorrect, correct, and no response. These responses were written on slips

of paper which the research assistant randomly drew out of a cup before each trial. For discrete trial training, ten slips of paper (1 for each trial in the session). The 10 slips were made up of four correct, three incorrect, and three no-response instructions. For backward chaining there were three slips of paper for every three backward chaining sessions. The paper slips were made up of one correct, one incorrect, and one no response instructions. The research assistant placed the slips of paper in a container and drew one randomly without replacement until they were all gone. This was done to ensure that each participant had to respond to an equal number of each type of response that could occur. This method was used throughout the entire study.

Randomized Assignment to Dyads. Participants were randomly assigned to a dyad to determine which skill they would receive training on first in each treatment condition. The participant selected a non-marked binder from a selection of 4. The binder they chose contained information on the order in which they would receive training. All four participants selected binders prior to baseline data collection. After baseline, if the participant performed below an average of 60% the investigator opened the binder to see what order they would receive training. The first participant to select a binder selected from an array of 4. The last participant's binder selection was determined because there was only 1 binder remaining.

Baseline. Baseline data was collected to ensure that participants were unable to perform the skills prior to the training. If participants performed 60% or higher on either one of the skills prior to training they were excluded from the study. There were three participants that had to be excluded from the study for this reason. During baseline participants were given written backward chaining and discrete trial training programs and data sheets. Participants were not given any information and were then evaluated on their treatment integrity in performing these skills with a research assistant acting as the learner.

Video Training 1: Competency Based Instructions with Modeling (CBIM). This video consisted of a presentation of instructional information for completing the skill with voice over narration. This video was produced using software (Adobe Captivate™) which allowed us to insert multiple choice questions throughout the presentation which were set to repeat if an incorrect answer was selected by the participant. In order to complete training the participant was required to answer all questions correctly. The participant could not skip through the presentation without each slide playing in its entirety. Exemplar modeling was included in the training video so the participant was able to watch the entire procedure completed correctly by a model twice, and a prompt sequence performed correctly as described in the instructions of the training. Both videos included a list of critical steps to complete the skills and video models which were in direct correspondence with the skills to be trained. These critical steps were then used to evaluate the participant on training (See appendixes A and B). Immediately after watching this video the participants were asked to complete trials of the skill with a research assistant as the learner. The competency based instruction and modeling videos were approximately 20 minutes each in length. The discrete trial video was 19 minutes and 30 seconds and the backward chaining video was 20 minutes and 10 seconds.

Video Training 2: Written Feedback (WF). Written feedback consisted of four scenarios in which the first author and a research assistant demonstrated one exemplar and three non-exemplars of performance of the skill. The participant was provided a checklist of the critical items for the skill performed in the video. The participant would be able to read the steps completed correctly after watching each scenario. The video would then display how their checklist should look. The participant completed four scenarios in this manner. The written feedback videos lasted approximately 10 minutes in length. The discrete trial video was 10

minutes and 20 seconds and the backward chaining video was 10 minutes and 45 seconds.

Video training 3: Observed Feedback (OF). If the participant had still not met 100% treatment integrity on either of the skills, they were provided observed feedback videos. Skills were not ordered according to the dyad assigned, training was conducted according to whichever skill on which the participant had not yet met 100% criteria. Observed feedback consisted of the participant watching the same scenarios of the skill being completed as during the written feedback video. In this condition, instead of identifying missing steps they were then shown a video of the trainer in the video being given specific feedback on performance of the critical items for each scenario. The observed feedback videos lasted approximately 10 minutes in length. The discrete trial video was 10 minutes and 12 seconds and the backward chaining video was 10 minutes and 20 seconds.

Maintenance and Generalization Probes. For three participants a maintenance probe was conducted in the same location with the same research assistant between 4 and 6 weeks following training. Following the maintenance probe, generalization probes were conducted in the day–program setting where the participants either were employed or were volunteers. All three participants worked with the same client for the generalization probes.

Response Measurement and Interobserver Agreement.

Participants were videotaped during training as well as during all trials following training (including maintenance and generalization probes). Research assistants watched the videos and scored each participant's integrity level of treatment measured by their completion of critical steps that were trained during the videos. For agreement on the discrete trial sessions, observers collected data in ten trial blocks and averaged the percent correct of ten trials to get one data point. For agreement on the discrete trial sessions the total number of agreements for a 10 trial

block was divided by the total number of agreements plus disagreements and then multiplied by 100. This was done for 35% of all sessions. Mean interobserver agreement (IOA) for discrete trial procedures across participants was 97.4% (range, 92.5% to 100%).

For backward chaining, observers recorded one data point for every instance of the backward chaining procedure that was performed. The number of items in agreement was divided by the total number of agreements plus disagreements and then multiplied by 100. IOA was collected for 35% of sessions across all sessions. Mean inter-observer agreement for backward chaining across participants was 98% (range, 94% to 100%).

Experimental Design

A multiple baseline design across participants, counterbalanced for skills, was used to evaluate effects of the training package on participants' treatment integrity. During baseline participants were handed a data sheet and asked to complete the skill training with a research assistant as the learner. This was done to assess skill level prior to training. There were three phases to the multiple baseline design which included competency based instructions with modeling, written feedback, and observed feedback. To control for order effects in which the two skills were trained they were counterbalanced across two dyads of participants: two participants received backward chaining instruction first and two participants received discrete trial training first.

Data Analysis

Data for treatment integrity of participants were collected via paper and pencil by primary observers as well as secondary observers during inter-observer agreement sessions. The data was graphed and visually inspected on a daily basis following delivery of training methods for each skill.

Results

In Table 2 data are displayed for all four participants on the percentage of multiple choice questions answered correctly within the competency based instructional video with modeling (Phase I) of the training package. Jennifer scored 100% on the multiple choice questions as well as reached 100% treatment integrity across both skills. Nancy scored 100% on competency level and treatment integrity for backward chaining. On DTT, Nancy scored 80% on competency level and 92.75% on treatment integrity for this skill. Adam scored 80% on competency level across both skills but still reached 100% on treatment integrity for both skills. Daniel scored 100% on both competency level and treatment integrity for discrete trial training. For backward chaining Daniel scored 80% on competency level and then 93.75% on treatment integrity for BC. Competency level on multiple choice questions were not related to treatment integrity levels achieved.

Results for each dyad being reported include the overall level of treatment integrity reached as well as the level of training required for reaching this level. Differences among each training condition were calculated by comparing the highest scores from each of the phases being compared for both DTT and BC. If there were improvements in the skill not trained, those new levels were used as the baseline going into the next treatment condition. For example, Adam improved in both BC and DTT after only having viewed the BC video in CBIM training.

Dyad 1, (see Figure1) received DTT videos first and BC videos second across all training conditions. Jennifer performed at 100% treatment integrity during the WF treatment of the study

and did not require any further training. Nancy required all training phases only for DTT and reached 95% treatment integrity. For Jennifer, from baseline to CBIM treatment there was a 28% improvement on DTT and a 37.5% improvement on BC. From instructions to WF treatment of training there was a 12% improvement in DTT and a 12.5% improvement in BC. Jennifer did not require the OF treatment of the study. For Nancy, from baseline to CBIM phase there was a 45% improvement on DTT and a 75% improvement on BC. From CBIM to WF phase of training there was a 7% improvement in DTT and a 12.5% improvement on BC. Nancy required OF treatment for DTT and after training remained at 92% treatment integrity.

Dyad 2 (see Figure 2) received BC videos first and DTT second across all conditions. Adam performed at 100% treatment integrity by WF treatment of the study for DTT, he did require OF treatment for BC but reached 100% afterwards. Daniel required all treatments for BC and then only reached an average of 95% treatment integrity. Daniel performed at 100% treatment integrity without any variability for DTT after the OF video was shown for BC. For Adam, from baseline to CBIM treatment there was a 52.5% improvement on DTT and a 50% improvement on BC. From instructions to WF treatment of training there was a 10% improvement in DTT and a 25% improvement in BC. The OF phase was conducted with Adam for BC because the data were unstable even though there had been one trial of 100% treatment integrity. After OF treatment Adam scored 100% treatment integrity across all trials. For Daniel, from baseline to CBIM treatment there was a 70% improvement on DTT and a 40% improvement on BC. From CBIM to WF treatment of training there was a 20% improvement on DTT and a 25% improvement on BC. Daniel required observed feedback phase for BC and had an average of 95% treatment integrity.

For three participant's maintenance and generalization probes were conducted 4-8 weeks

following training (see Figures 1 and 2 and Table 3). The participants were given the same programs that were used in training and asked to conduct them again with the research assistant (maintenance) and also with a client in the natural environment of a day service setting where they were either employed or volunteering (generalization). Maintenance and generalization probes for Jennifer remained at the same 100% levels. For Nancy, maintenance and generalization probes for backward chaining remained at 100%, there was a decrease from 92.75% to 90.5% (maintenance) and then 90% (generalization) for discrete trial training. For Daniel, maintenance and generalization probes for discrete trial training remained at 100%, there was a decrease from 97.5% to 87.5% (maintenance and generalization respectively) for backward chaining.

Following training participants were all asked whether they preferred a live training to the video based training. Participants reported that they would prefer to have a video based training.

Discussion

All 4 participants showed rapid skill acquisition after competency based instructions with modeling. Written feedback following the CBIM phase showed small additional improvements for all participants. Interestingly an error analysis of Nancy's data, who did not achieve 100% treatment integrity on discrete trial, showed that her errors occurred when the research assistant responded incorrectly (i.e. when she was required to prompt and correct errors). There was a similar finding in the Catania et.al (2009) study and in the Williams and Gallinat (in press) study. In the Catania study one participant responded incorrectly when they were required to prompt and correct errors. In the Williams and Gallinat study all inaccurate responding was related to inaccurate observations that required more steps. This may point to a need for more non-

exemplars which demonstrate how to respond when the student makes errors when teaching discrete trial procedures. Correct responses require a praise response where incorrect responses require the trainer to decide what should come next.

Participants in this study were given the same ratio of types of responses during evaluation to control for differences in responding of the learner. This allowed us to compare improvements across all conditions regardless of the learners' behavior. Typically, as trials are repeated over and over the learner improves performance and has more accurate responses, making it less difficult for the trainer to respond. Catania et. al (2009) used a similar arrangement where responses were consistent across all evaluation trials.

Another interesting finding was Adam's performance change from baseline to CBIM condition. After watching CBIM on backward chaining there were improvements in both the backward chaining performance and discrete trial performance. An item analysis revealed that this generalized performance improvement can be attributed to two common critical items between the two procedures (having materials ready and recording data).

The instructional video and feedback were separated to evaluate their component efficacy. Having a baseline level of staff treatment integrity allows us to make inferences about this data to the extent that all participants in the first two conditions of the study (CBIM and WF) were able to reach high levels of treatment integrity. A limitation of CBIM was the inclusion of only exemplars of correct performance. Future research could incorporate non-exemplars into the instructional video as well to evaluate whether the feedback component is necessary. Another limitation to the competency based component of the videos was functionality of the multiple choice questions. The participants were allowed repeated attempts to answer the same question until they responded correctly. Future research could use a training module which includes a

question bank of other multiple choice questions would be used after incorrect answers. Additionally, the software (Adobe Captivate™) now has functions which allow multiple choice questions to be linked to content which can be replayed after incorrect responses. The updated software was unfortunately released after the videos for this study had already been produced.

Possible ceiling effects in this study made it difficult to determine how much of an effect was produced by the second intervention. All four participants had such improvements after the first intervention that they reached 100% treatment integrity after the second intervention was introduced.

Results were consistent with the findings of Alvero and Austin (2004) and Harrison (2003) where participants showed performance improvement as a result of watching and scoring confederate performances. In the current study, all participants' performance improved as a result of the written feedback intervention where the participants watched someone engage in the response and then scored them as correct or incorrect on a checklist of items.

Moore and Fisher (2007) found that modeling was most effective when a wide array of therapist exemplar behavior were used. The first treatment of this study included only one exemplar of modeling, greater gains may have been seen had we incorporated more examples of therapist performance.

Kruhmus and Malott (1980) suggested that a better theoretical baseline for the evaluation of feedback would be modeling. We did exactly this in the current study and found gains of up to 70% improvement from baseline at the highest and 20% at the lowest. Still, we have not really isolated the effects of modeling versus feedback. A further study, as mentioned above would include multiple therapist exemplars within the instructional video, followed by a feedback component. In the current study more exemplars were provided within the first

feedback intervention, so we cannot tell whether the feedback or the modeling that occurred within that video was the change variable.

Maintenance and generalization probes were conducted for three of the participants. The participant that we did not conduct maintenance and generalization probes for was not available. Maintenance and generalization scores maintained and generalized at 100% for those participants that reached 100% after training. This is consistent with other studies which used a treatment package which consisted in some form of modeling and feedback (Miles & Wilder 2009; Catania et.al 2009; Williams & Gallinat, in press). It was interesting that for skills where a participant did not reach 100% treatment integrity, there was consistently some decrease during maintenance and generalization probes. It would be helpful to identify what levels of treatment integrity are necessary to continue seeing client progress with backward chaining and discrete trial procedures.

The creation of the video modules used in this study can be time intensive depending on the skill level and resources available to an agency. The development of one 20 minute training video took approximately 40 hours. This includes filming of modeling videos, development of presentation, audio voiceover, video editing, and sequencing of animations. Time involvement can quickly increase if time is not spent carefully planning each step. A cost/benefit analysis, including number of employees requiring the training and development costs should be conducted on an individual agency basis.

Caution should be exercised in the application of these results to video based trainings which do not utilize video models in exact correspondence to the skills being trained to staff members. Although we used some measures to facilitate generalization across settings we did not vary the stimuli (e.g. data sheets and exact correspondence to skills trained) from training

videos to implementation. An investigation is in progress to replicate these results with videos in which the video models and protocols are significantly different than those which the staff member will encounter.

This study shows an approach to training delivery on particular discrete trial and backward chaining instructional approaches. The training package resulted in significant improvements across all participants and maintenance and generalization at high levels for the three participants that were evaluated. Two other areas for future research are an examination of how treatment integrity levels impact client performance and also an evaluation of trainee performance levels when performed with a consumer.

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Participants	IV-1 CBIM		IV-2 Written Feedback		IV-3 Observed Feedback	
1	**BC**	DTT	**BC**	DTT	**BC**	DTT
2	**BC**	DTT	**BC**	DTT	**BC**	DTT
3	DTT	**BC**	DTT	**BC**	DTT	**BC**
4	DTT	**BC**	DTT	**BC**	DTT	**BC**

Table 1: Method: arrangement of conditions with participant assignment.

Participant Name	Backward Chaining		Discrete Trial Training	
	Competency Level	Treatment Integrity	Competency Level	Treatment Integrity
Jennifer	100%	100%	100%	100%
Nancy	100%	100%	80%	92.75%
Adam	80%	100%	80%	100%
Daniel	80%	93.75%	100%	100%

Table 2. Summary Table of Percent Correct on Multiple Choice Questions and highest competency level reached.

Participant	BC High	BC 4-8 week probes		DTT High	DTT 4-8 week probes	
		Maint.	Gen		Maint	Gen
Jennifer	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Nancy	**100%**	**100%**	**100%**	**92.75%**	**90.5%**	**90%**
Daniel	**93.75%**	**87.5%**	**87.5%**	**100%**	**100%**	**100%**

Table 3. These cells show the highest treatment integrity score attained for each participant on each skill as well as the maintenance and generalization probes for three of the participants.

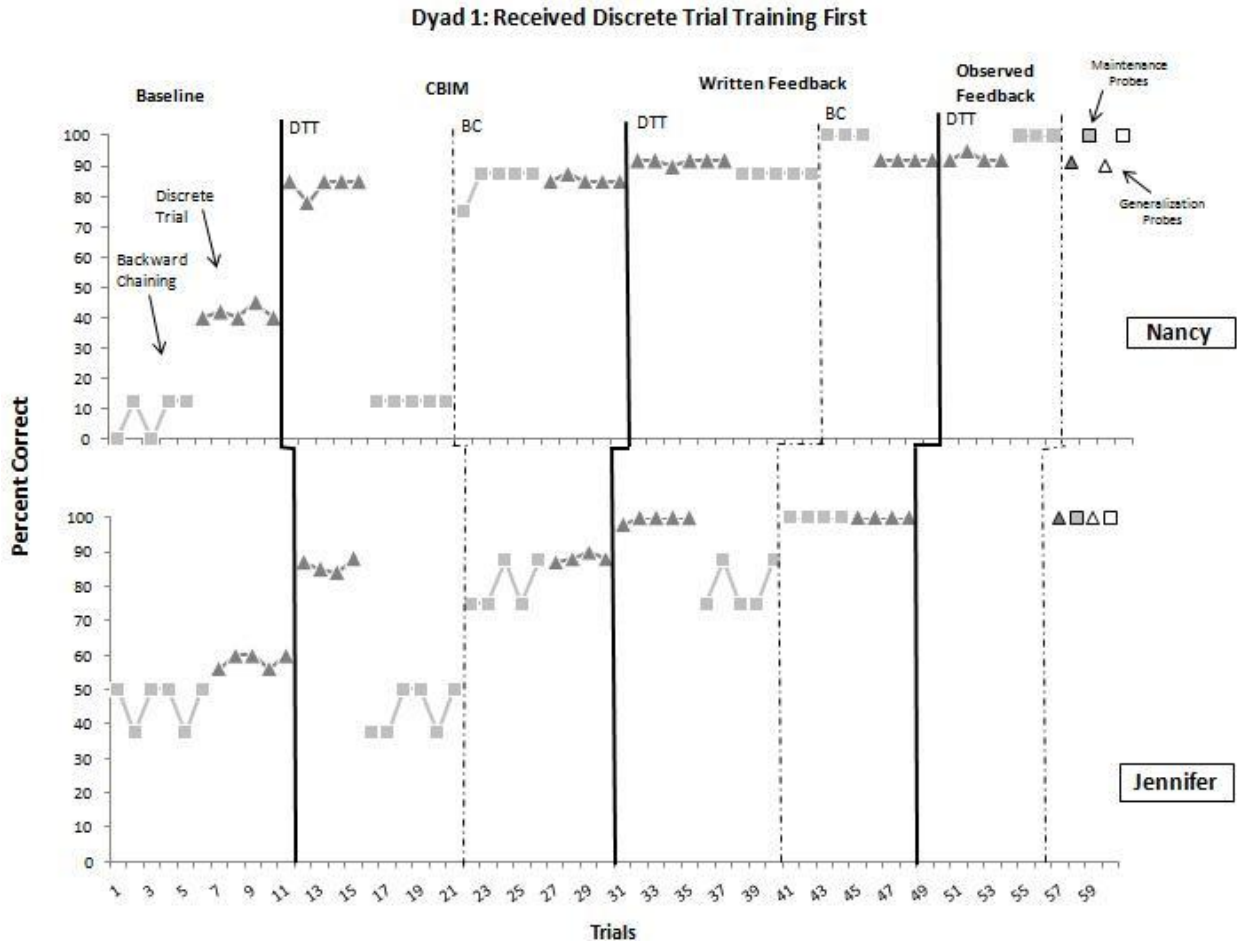

Figure 1. Dyad 1 received discrete trial training first across all phases. These graphs depict all phases of treatment for Jennifer and Nancy. Jennifer did not receive observed feedback.

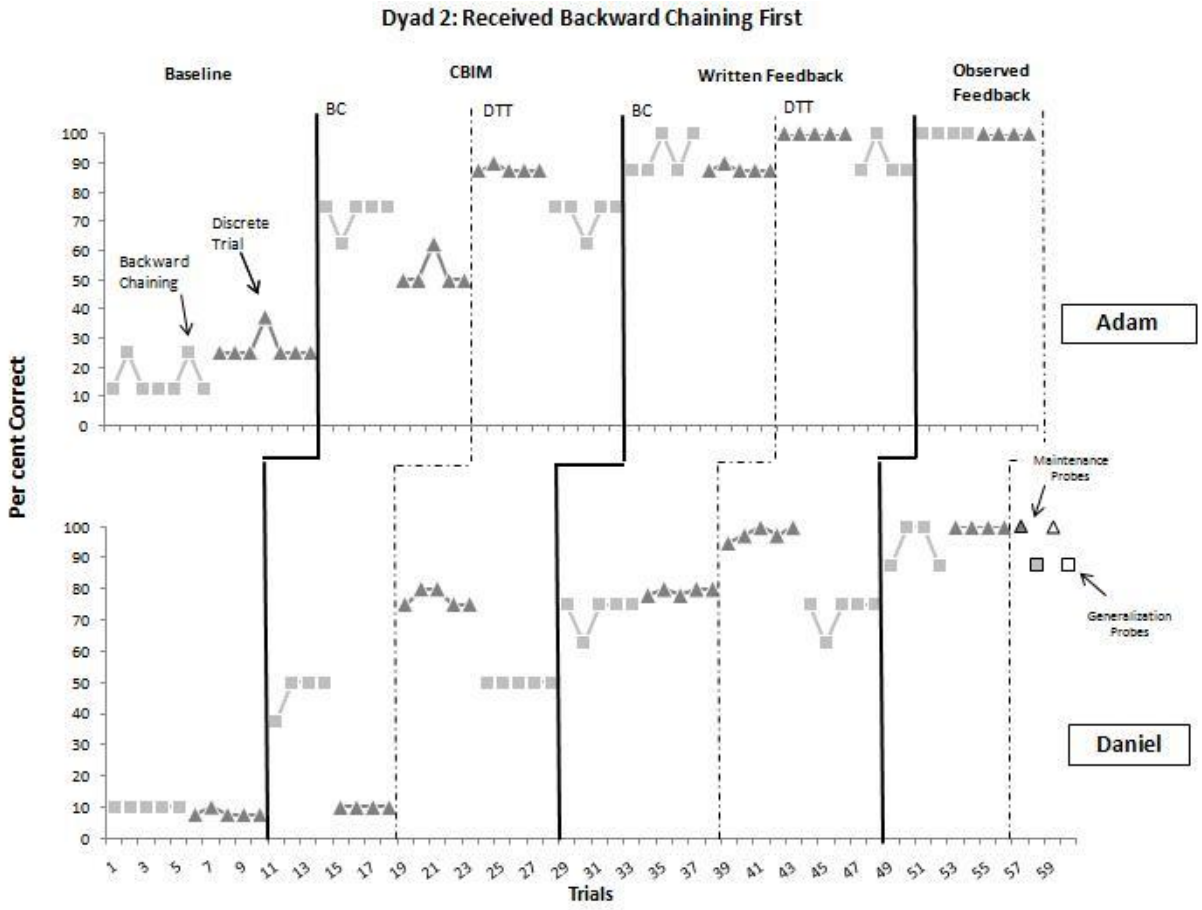

Figure 2. Dyad 2 received backward chaining first across all phases of the training package. These graphs depict Daniel and Adam's data through all phases of treatment.

Yes	No	Checklist Item
		1. Have appropriate materials ready.
		2. Write date of training session on the data sheet
		3. Write down the step you are working on the data sheet
		4. Complete all steps in the task up to the training step
		5. Use a least to most prompt sequence in teaching the individual to complete the step currently being taught
		6. Allow 3 seconds for responding at any level of prompt sequence before providing the next level of assistance
		7. Provide appropriate reinforcement for completed responses.
		8. Circle the prompt level you used for the trial on the data sheet.

Appendix A: Critical Items Backward Chaining

Yes	No	Checklist Item
		1. Have appropriate materials ready
		2. Make eye contact with the individual
		3. Deliver the instruction
		4. Wait at least 3 seconds for a response
		5. If no response after 3 seconds, used a **least to most** prompt sequence to get correct response
		6. Provide appropriate reinforcement for the response
		7. Record Data
		8. Provide a 5 second interval between each trial

Appendix B: Critical Items Discrete Trial Training

Backward Chaining Staff Data Sheet

Use a backward chaining procedure to teach this skill. Collect data on the sheet below.

Materials Needed: two slices of bread, squeeze strawberry jam, butter knife, peanut butter
Instruction: "Make the sandwich"
Task Analysis:
1. Take 2 slices of bread out of the bag
2. Place each slice on the counter next to one another
3. Open the strawberry jam flip top container
4. Squeeze some jam on one slice
5. Spread the jam on the bread with a wide butter type knife
6. Open peanut butter jar and scoop some peanut butt out with knife
7. Spread peanut butter on the other slice of bread
8. Place peanut butter slice on top of the jelly side
9. Use knife to cut sandwich in half

Reinforcer: Two goldfish for independent completion of the training step.
Instructions: Circle prompt level necessary for individual to complete step being trained in the task analysis. Use a least to most prompting sequence.

Session Date: Staff Name:		TRAINING TRIALS									
Training Step	Description of Step	1	2	3	4	5	6	7	8	9	10
		I G V P	I G V P	I G V P	I G V P	I G V P	I G V P	I G V P	I G V P	I G V P	I G V P

Appendix C: Backward Chaining Skill A

Backward Chaining Staff Data Sheet

Use a backward chaining procedure to teach this skill. Collect data on the sheet below.

Materials Needed: basket of clothes, and bottle of clothes detergent with a measurement cap
Instruction: "Wash the Clothes"
Task Analysis:
1. Open the lid to the washer
2. Dump basket of clothes into the washer
3. Twist open the cap on the detergent
4. Pour the detergent in the lid
5. Pour the lid of detergent on the clothes
6. Put Lid back on the detergent
7. Close the lid on the washer
8. Turn the knob and pull when lines match up

Reinforcer: Two goldfish for independent completion of the training step.
Instructions: Write the name of the step and then circle prompt level necessary for individual to complete step being trained in the task analysis. Use a least to most intrusive prompting sequence.

Session Date: Staff Name:		TRAINING TRIALS									
Training Step	Description of Step	1	2	3	4	5	6	7	8	9	10
		I G V P	I G V P	I G V P	I G V P	I G V P	I G V P	I G V P	I G V P	I G V P	I G V P

Appendix D: Backward Chaining Skill B

Discrete Trial Training Data Sheet

Program: Stacking Blocks
Individual's Name: _____

Materials Needed: Two rectangular blocks of any shape or color
Setup: Place both blocks in front of the individual and say "Stack Them". Use a least to most prompting sequence.

Correct Response: Places one object on top of the other

In-correct Response: Places the object anywhere except on top of the other block

Instruction: "Stack Them"
Reinforcer: Verbal Praise and 1 Goldfish for independent correct responses.

Put an "x" in the box over the prompt level that was necessary to complete the trial.

Date/Time	Trial	Correct/Incorrect Response		Prompt Level			Staff Initials
	1	+	---	V	G	P	
	2	+	---	V	G	P	
	3	+	---	V	G	P	

Appendix E: Discrete Trial Skill A

Discrete Trial Training Data Sheet

Program: Matching Shapes
Individual's Name: _____

Materials Needed: 2 sets of matching shape cards (circles and squares)
Setup: Place one card of each shape directly in front of the individual next to each other. Hand one of the cards to the individual and say "Match". Use least to most prompting.

Correct Response: Places the card on top of the corresponding shape card.
In-correct Response: Places the card anywhere but on top of the matching card.

Instruction: "Match"
Reinforcer: Verbal Praise and 1 Goldfish for independent correct.

Put an "x" in the box next to the prompt level that was necessary to complete the trial.

Date/Time	Trial	Correct/Incorrect Response		Prompt Level			Staff Initials
	1	+	---	V	G	P	
	2	+	---	V	G	P	
	3	+	---	V	G	P	

Appendix F: Discrete Trial Skill B