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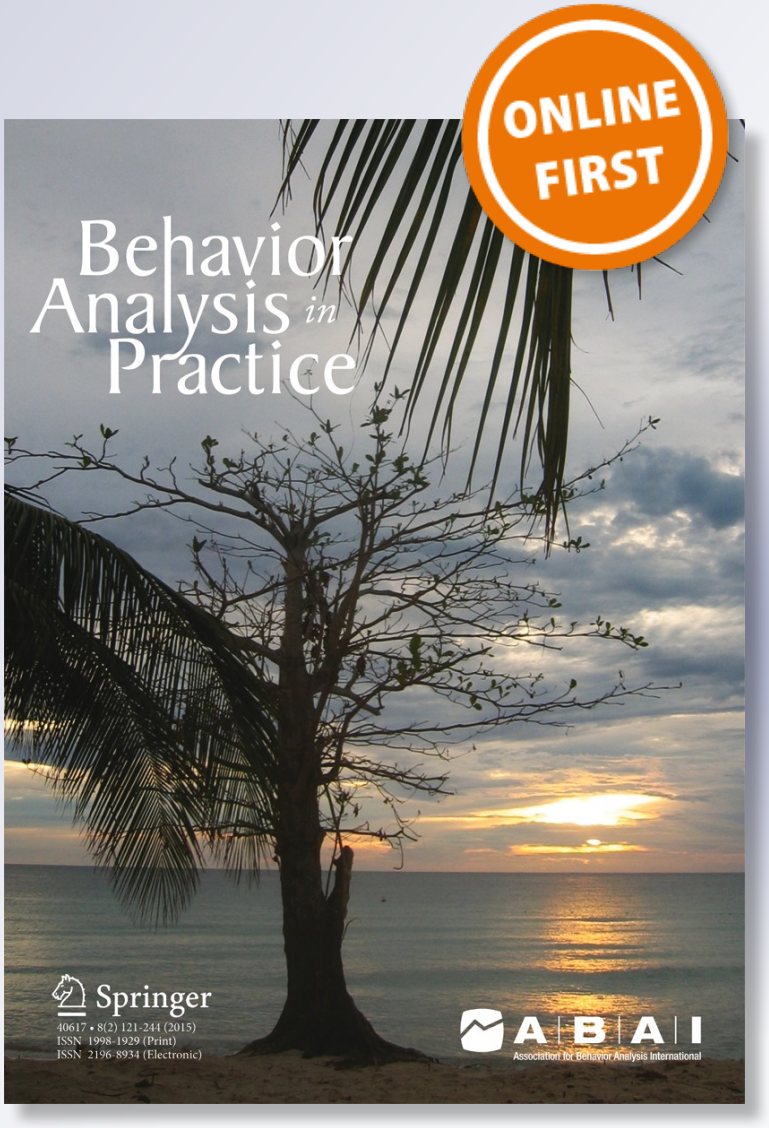

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EMPIRICAL REPORT

Using Video Modeling with Voiceover Instruction Plus Feedback to Train Staff to Implement Direct Teaching Procedures

Antonia R. Giannakakos[1] · **Jason C. Vladescu**[1] · **April N. Kisamore**[1] · **Sharon A. Reeve**[1]

Abstract Direct teaching procedures are often an important part of early intensive behavioral intervention for consumers with autism spectrum disorder. In the present study, a video model with voiceover (VMVO) instruction plus feedback was evaluated to train three staff trainees to implement a most-to-least direct (MTL) teaching procedure. Probes for generalization were conducted with untrained direct teaching procedures (i.e., least-to-most, prompt delay) and with an actual consumer. The results indicated that VMVO plus feedback was effective in training the staff trainees to implement the MTL procedure. Although additional feedback was required for the staff trainees to show mastery of the untrained direct teaching procedures (i.e., least-to-most and prompt delay) and with an actual consumer, moderate to high levels of generalization were observed.

Keywords Video modeling · Feedback · Direct teaching procedures · Staff training

When teaching consumers with autism spectrum disorder (ASD), instructors often need to provide prompts. Prompts are supplementary antecedent stimuli used to occasion a correct response in the presence of a discriminative stimulus (S^D) (Cooper et al. 2007). Prompts are typically faded over teaching trials or sessions such that the S^D comes to control the response. Three potential direct teaching procedures for fading prompts are the most-to-least (MTL), least-to-most (LTM), and prompt delay (PD) procedures.

During MTL procedures, the instructor starts by using the most intrusive level of prompts needed to occasion the target behavior and these prompts are gradually *decreased* over successive trials as the consumer engages in independent correct responses (Demchak 1990). During LTM procedures, the instructor starts with the least intrusive level of prompts needed to occasion the target behavior and the prompts are gradually *increased* over successive trials if the consumer engages in repeated errors (Demchak 1990). During PD procedures, the instructor gradually increases the amount of time that elapses between the S^D and the prompt (Demchak 1990). Researchers have used these direct teaching procedures either in isolation or in combination with other procedures to teach numerous populations (e.g., individuals with ASD and other developmental, physical, and intellectual disabilities) and skills (e.g., pedestrian safety, spelling, intraverbals, activities of daily living, and food prep) (Batu et al. 2004; Coleman-Martin and Wolff Heller 2004; Humphreys et al. 2013; Jerone et al. 2007; Murzynski and Bourret 2007; Schuster et al. 1988).

Because these direct teaching procedures each has benefits and limitations in regard to their use as teaching procedures, staff who work in human service agencies may need to implement each with high integrity. If staff are able to implement these direct teaching procedures, they may be in a better position to meet the individual needs of consumers with whom they work. For example, Demchak (1990) found that MTL and PD procedures were most efficient for teaching a new response and a LTM procedure was most efficient for increasing the fluency of a skill already in a consumer's repertoire (Demchak 1990). McDonnell and Ferguson (1989)

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✉ Jason C. Vladescu
jvladescu@caldwell.edu

[1] Department of Applied Behavior Analysis, Caldwell University, 120 Bloomfield Avenue, Caldwell, NJ 07006, USA

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found that staff trained to use both MTL and PD procedures preferred MTL and reported that it was much less difficult to implement. As such, it may be best to first train staff to implement the MTL procedure. Furthermore, given the commonalities among prompting procedures (e.g., provide an instruction, provide an appropriate prompt, increase/decrease intrusiveness of prompts contingent on consumer responses), training one (MTL) may lead to some generalization to the others (PD and LTM).

Several studies have trained staff to implement at least one of the direct teaching procedures and to manipulate prompts during teaching (Lerman et al. 2004, 2008; Parsons et al. 2012). Lerman et al. (2004, 2008) used behavioral skills training (BST) in a group format to train staff trainees to implement the MTL, LTM, and PD procedures. Following training, all staff trainees implemented the procedures with increased integrity, although some did not achieve mastery, defined as more than 80 % global treatment integrity. Parsons et al. (2012) found that BST was effective in training all staff trainees to use a MTL procedure to teach consumers a variety of skills (e.g., using a CD player, shredding paper).

One potential limitation of these previous studies was that the procedures required the presence of a staff trainer throughout training. This may be problematic for human service agencies that have limited access to qualified staff trainers or limited flexibility to coordinate training schedules. Although completely eliminating the presence of a staff trainer is not likely a desirable or achievable goal, additional research is needed to identify training procedures that reduce the involvement of staff trainers. A second potential limitation was the training duration. For example, Parsons et al. (2012) reported a training time of 3 h to train each staff trainee to use a MTL procedure. Because it may be cumbersome for some agencies to provide such long training, more time effective staff training procedures would be beneficial. Additionally, while Lerman et al. (2004, 2008) instructed staff trainees to implement all three direct teaching procedures simultaneously, further reductions in training time may be possible if staff trainees are trained in one procedure and generalization to the remaining two procedures is programmed for and evaluated.

One potential alternative training procedure is video modeling with voiceover (VMVO) instruction. VMVO is a training method that uses a visual media format to model for the viewer behaviors she should engage in to correctly complete the steps of a procedure and incorporates voiceover instructions (e.g., Vladescu et al. 2012) that provide additional description and explanation of the behaviors being modeled. VMVO has several potential benefits that may make it attractive to human service organizations. First, unlike in vivo training modalities, a video is not necessarily bound by location or the presence of staff trainers. Staff trainees can view a video across a range of settings (e.g., work, home) using any device capable of showing the video (e.g., a personal computer, tablet, mobile phone). Second, although the creation of a video will require front-end input from a staff trainer, once completed, the video can subsequently be used to train staff over time without additional staff trainer input and the video may even be used to train multiple staff simultaneously. Lastly, VMVO may be particularly beneficial as a prelude to in vivo training modalities. In other words, one potential training format would be to have staff trainees view a video, and a staff trainer would then provide in vivo training.

VMVO has been used both in isolation and in combination with other training components (e.g., written instructions) to train staff to implement preference assessments (Rosales et al. 2015; Weldy et al. 2014), discrete trial instruction (Catania et al. 2009; Vladescu et al. 2012), individualized behavior plans (Macurik et al. 2008), several functional analysis conditions (Moore and Fisher 2007), and procedures related to providing respite care (Neef et al. 1991).

One procedural element common to VMVO studies is for staff trainees to watch the video multiple times until they meet a mastery criterion (Catania et al. 2009; Rosales et al. 2015; Vladescu et al. 2012; Weldy et al. 2014). For example, Weldy et al. (2014) required participants to re-watch the training video if they did not meet the mastery criterion after the initial viewing. Each video viewing increased the training time by 30 min. Thus, re-watching the video may have required more time than if other training approaches were used following the initial video viewing. A quicker approach may be performance feedback. Performance feedback involves responding to quality work behavior in ways that support and maintain that behavior and responding to work behavior that is not of acceptable quality in ways that correct and improve those behaviors. Performance feedback is often used as a component of staff training packages and has been shown to increase staff trainee treatment integrity (e.g., Casey and McWilliam 2011; Lambert et al. 2013; Ward-Horner and Sturmey 2008). Performance feedback could be provided following staff trainee exposure to VMVO in lieu of having staff trainees view a training video multiple times. If effective, such an arrangement may not only decrease the amount of time staff trainers must be present for training (compared to fully in vivo training approaches) but also reduce overall training duration (compared to training scenarios in which staff trainees view a training video multiple times).

The purpose of the present study was to use VMVO plus feedback to train three staff trainees to use a MTL procedure when implementing a variety of programs and to evaluate generalization to novel direct teaching procedures (i.e., LTM and PD) and from a simulated consumer to an actual consumer in the natural environment.

Method

Participants

Three 22-year-old female graduate students served as participants (hereafter referred to as staff trainees). All reported having approximately 18 months of experience working with children with ASD (although the specific experiences could not be documented), had bachelor's degrees, and had recently enrolled in an ABA master's program. Additionally, all staff trainees reported having little to no experience with these three direct teaching procedures. The consumer was a 17-year-old male with a diagnosis of ASD from an independent outside agency. He had a history of receiving instruction based on the principles of ABA and his current instruction incorporated MTL, LTM, and PD procedures. The consumer had been receiving services at the center where the study took place for three and a half years. His instructional goals consisted mainly of self-help and prevocational skills. Informed consent was obtained from all individual participants included in the study and the consumer's caregiver. The first author, a 25-year-old female graduate student, served as the simulated consumer during the baseline, VMVO plus feedback, and generalization phases. She had 4 years of experience working with individuals with ASD.

Setting and Materials

Sessions were conducted at a university-based center for individuals with ASD. Sessions were conducted in a room that contained the materials necessary to conduct each session (see below), a table, two chairs, and a laptop. A video camera was used to record all sessions.

Participants were given a data sheet, a pencil, and guidelines for implementing each consumer program. The guidelines described the direct teaching procedure, the materials needed to implement the consumer program, and the criterion for increasing and decreasing the intrusiveness of prompts or prompt delays. The guidelines had a Flesch-Kincaid tenth-grade readability level and are available from the second author. Instructional materials included a shirt with buttons, a jacket with a zipper, a puzzle, and blocks. Instructional materials during the generalization sessions included (five square towels, 10 standard envelopes, and 10 pieces of paper).

Response Measurement, Interobserver Agreement, and Procedural Integrity

The dependent variable was the percentage of direct teaching procedure steps the staff trainee correctly implemented (see below for a description of these steps; more detailed definitions are available from the second author). Staff trainee responses were scored from video using a data sheet specific to the direct teaching procedure used in that session. Data on correct and incorrect implementations of each step were scored only once per session. For a step to be scored as correct, the staff trainee was required to complete that step correctly on all possible opportunities during the session. The percentage of steps correctly implemented was calculated by dividing the number of correctly implemented steps by the number of correctly implemented steps plus the number of incorrectly implemented steps, and the resulting quotient was multiplied by 100.

Duration data were collected on the length of sessions conducted with a simulated consumer following the implementation of VMVO plus feedback and on the length of feedback sessions prior to sessions with the simulated and actual consumer. Data were collected from video time stamps of recorded sessions. The session duration measurement started when the experimenter gave the instruction to implement the direct teaching procedure and ended when the experimenter or staff trainee indicated the session was over. The duration of feedback measurement started when the experimenter started to provide the feedback and ended when the experimenter finished providing the feedback. Duration data were summarized in minutes and seconds.

Interobserver agreement (IOA) data were collected from video for a minimum of 37 % of all sessions across staff trainees. Two graduate students were trained by the experimenter to score videos. The experimenter provided each observer with the appropriate data sheets and step definitions for each direct teaching procedure. The experimenter explained the steps and their definitions; then the experimenter and each observer reviewed videotapes of actual sessions and practiced scoring. Training was complete when the experimenter and observer had 100 % agreement for two consecutive sessions. IOA was calculated on an opportunity-by-opportunity basis for each trial in a session. The number of agreements was divided by the number of agreements plus disagreements and the resulting quotient was converted into a percentage. Mean IOA scores were 97.9 % (range, 94 to 100 %) for Marina, 97.1 % (range, 89 to 100 %) for Kristina, and 96.8 % (range, 89 to 100 %) for Iliana.

Data on treatment integrity were collected from video by a graduate student for a minimum of 32 % in all treatment sessions across staff trainees. The observer watched video recordings of sessions and collected data using a checklist. Treatment integrity data were calculated as the number of correctly completed checklist steps, divided by the number of correctly and incorrectly completed steps, and the resulting quotient was converted into a percentage. The mean treatment integrity scores were 100 % for Marina, 98.5 % (range, 80 to 100 %) for Kristina, and 98.3 % (range, 80 to 100 %) for Iliana.

A second graduate student recorded treatment integrity during a minimum of 38 % of treatment integrity sessions across

staff trainees using the same checklist as the primary treatment integrity data collector. Treatment integrity IOA was calculated as the number of agreements on correctly completed steps divided by the number of agreements plus disagreements on correctly completed steps, and the resulting quotient was converted into a percentage. The mean treatment integrity IOA scores were 100 % for Marina and Iliana and 98 % (range, 80 to100%) for Kristina.

Scripted Responses for Simulated Trainees and Simulated Consumers

The simulated consumer responded according to predetermined scripts during the baseline, VMVO plus feedback, and generalization phases. One of five scripts (available from second author) created for each direct teaching procedure was selected for use in a random selection without replacement fashion. The order of scripts was randomized through random.org. The scripts indicated the type of response the simulated consumer was to engage in for each trial. Responses included up to six correct responses, one to two errors of commission, and one to two errors of omission. Additional behaviors (i.e., stereotypy and problem behavior) occurred during two trials. The purpose of the scripts was to expose staff trainees to a variety of potential consumer responses and sequences of responses during training to program for generalization.

Simulated and Actual Consumer Skill Acquisition Programs

Six skill acquisition programs were created for use in this study to examine generalization across a variety of consumer programs. Programs were selected from three instructional areas: educational, leisure, and self-care. The two educational programs included receptive identification of a body part (i.e., shoulders) and following a one-step direction (i.e., "clap your hands"). The two leisure skills programs used in the study were completing a puzzle (i.e., a 30-piece child's puzzle) and playing with blocks (i.e., make various structures using six wood blocks). The self-care programs were buttoning (i.e., a five button shirt) and zipping (i.e., zip a hooded jacket). Two (i.e., stuffing envelopes and folding towels) of the actual consumers existing skill acquisition programs were selected for use during generalization probes because they were conducive to being taught using the three direct teaching procedures.

Direct Teaching Procedures

Each procedure consisted of 10 steps modified from Lerman et al. (2004). There were several steps that were common to all direct teaching procedures. The first common step was to fill out the data sheet. The staff trainee was to use the program guidelines to fill out the data sheet with the date, her initials, the target skill being taught, and the direct teaching procedure being used. The next step was to establish attending. The staff trainee was to start each trial by obtaining eye contact from the consumer before she presented an instruction. If the consumer was not attending, the staff trainee was to establish eye contact by saying, "look." Next, the staff trainee was to present a clear instruction in a plainly audible voice using a neutral tone. The staff trainee was to provide the appropriate prompt within 2 s of providing the instruction. During the LTM and MTL procedures, a staff trainee was to wait 5 s for a response to the initial direction and/or prompt without providing another instruction or prompt. Following a correct response (defined as the consumer responding correctly at the current prompt level) during any of the procedures, the staff trainee was to provide immediate reinforcement that included behavior-specific verbal praise and a token to the consumer's token system within 5 s of the correct response. The staff trainee was to manage incorrect and inappropriate behaviors by immediately (within 2 s) providing physical guidance hand-over-hand for the consumer to complete a correct response if the consumer engaged in an error of commission or omission, engaged in problem behavior or stereotypy. The staff trainee was to maintain a neutral facial expression and not verbally acknowledge any inappropriate behaviors. Following each trial, the staff trainee was to record data in the column for the specific prompt used. A "+" was scored if the consumer engaged in a correct response. A "−" was to be scored if the consumer engaged in an error of commission (i.e., an incorrect response), engaged in problem behavior, or engaged in stereotypy. An "NR" was to be recorded if the consumer engaged in an error of omission (i.e., no response). The final step in each direct teaching procedure was to calculate the data. The staff trainee was to divide the number of correct responses recorded in each prompt column by the number of correct and incorrect responses recorded in each column and convert the quotient into a percentage.

Most-to-least During the MTL procedure, the staff trainee was to start with the most intrusive prompt and was to decrease and increase intrusiveness according to the prompting hierarchy (i.e., physical, model, verbal). If the consumer responded correctly on two consecutive trials, the staff trainee was to decrease the intrusiveness of the prompt. If the staff trainee used a physical prompt, she was to move to a model prompt, and if she used a model prompt, she was to move to a verbal prompt. The staff trainee was to increase the intrusiveness of the prompt if the consumer engaged in an error of commission or omission, problem behavior, or stereotypy on two consecutive trials. If the staff trainee used a verbal prompt, she was to move to a model prompt. If using a model prompt she was to move to a physical prompt.

Least-to-most During the LTM procedure, the staff trainee was to start with the least intrusive prompt and increase and decrease intrusiveness according to the prompting hierarchy (i.e., verbal, model, physical). The staff trainee was to increase the intrusiveness of the prompt if the consumer engaged in an error of omission or commission, problem behavior, or stereotypy on two consecutive trials. If the staff trainee was using a verbal prompt, she was to move to a model prompt. If using a model prompt, she was to move to a physical prompt. If the consumer responded correctly on a trial, the staff trainee was to decrease the intrusiveness of the prompt. If the staff trainee was using a physical prompt, she was to move to a model prompt and if she was using a model prompt, she was to move to a verbal prompt.

Prompt delay During the PD procedure, only physical and verbal prompts were to be used the staff trainee was to provide an immediate physical prompt (0 s) following the instructions on initial trials of the procedure. During this time, the staff trainee was not to provide another instruction or prompt. Next, the staff trainee was to increase or decrease the prompt delay. When implementing this step, the staff trainee was to increase the PD from 0 to 5 s if the consumer responded correctly on two consecutive trials. The staff trainee was to decrease the PD from 5 to 0 s if the consumer engaged in an error of commission or omission, problem behavior, or stereotypy on two consecutive trials.

Feedback Scripts

Feedback scripts were designed for each of the three direct teaching procedures (available from second author). Each script contained behavior specific positive feedback statement for each component of the direct teaching procedure. For example, "nice job, when the consumer engaged in a correct response you delivered a token and behavior-specific praise." Corrective feedback was also behavior specific but was individualized based on the specific errors each staff trainee engaged in during her session. For example, "you provided verbal praise when the consumer engaged in a correct response, remember to deliver one token to his token system as well."

Design and General Procedure

A concurrent multiple baseline across participants design was used to evaluate the effects of VMVO plus feedback in teaching staff trainees to use direct teaching procedures. At the beginning of each session, the experimenter provided the staff trainee with the materials necessary to conduct one of the consumer programs (i.e., consumer program guidelines, a data sheet, and related program materials). The experimenter then instructed the staff trainee "Here are the materials you will need to run the session. You will have a maximum of 10 min to look them over. I cannot answer any questions during this time. Please let me know if you are finished before the 10 min are up." During this 10-min review period, the staff trainees had an opportunity to review the program guidelines, fill out the data sheet, and set up the program materials. Following this 10-min review period, the experimenter instructed the staff trainee, "Do your best to teach the consumer to (specified skill) using a most-to-least prompt fading procedure. I will not be able to answer any questions during this time. Please let me now when you are finished. I will be acting as the consumer during this session." Each session consisted of up to 10 trials. A time based termination criteria was established for each direct teaching procedure. These termination criteria were established by timing the duration it took three individuals, not part of the study, to use each direct teaching procedure with a simulated consumer. The termination criterion was yoked to the maximum duration that the three individuals needed to complete a 10-trial session. The termination criteria for the MTL, LTM, and PD procedures were 6 min 36 s, 7 min 8 s, and 8 min, respectively (although termination never occurred).

Baseline The experimenter provided the staff trainee with program guidelines and the materials necessary to conduct a training session and conducted the session as described above. No feedback was provided and no questions were answered.

Video modeling with voiceover instruction plus feedback During the first session, the experimenter seated the staff trainee in front of a computer, and told her, "Please watch the following video model depicting a most-to-least prompt fading procedure. When you are ready to start, click the play button. I cannot answer any questions during this time. Please let me know when you are finished watching the video. You will watch the video one time." The video was 26 min 47 s in length and consisted of video clips depicting each of the steps of the MTL procedure accompanied by voiceover instruction highlighting specific aspects of the video clips. The video was created using Corel VideoStudio Pro X6. The first author played the role of the instructor in the video, and a research assistant played the role of the consumer. The skill acquisition program depicted in the video was coloring, which was not a consumer program during the study. Within 10 min of watching the video, the experimenter provided the staff trainee with the necessary materials to conduct a session as described above. During this time, no questions were answered and no feedback was provided. The staff trainees did not have access to the VMVO following this session.

During subsequent sessions, the experimenter started the session by saying "I will start this session by providing you with feedback regarding your performance during your last session.".The experimenter sat across from the staff trainee and used the feedback script described above to provide

positive feedback. Corrective feedback was also provided based on the specific errors the staff trainee made during the previous session. Any questions posed by the staff trainee were answered. After feedback was provided, the session proceeded in the manner described above. Training continued until the staff trainee implemented the MTL procedure at or above 90 % correct for two consecutive sessions.

Generalization Generalization, across untrained direct teaching procedures (i.e., LTM and PD) with a simulated consumer and with an actual consumer (i.e., MTL, LTM, and PD) was assessed. Because the actual consumer was unscripted, generalization was assessed with the simulated consumer to ensure staff trainees demonstrated correct implementation of the procedures across a variety of consumer behaviors. A program was selected at random from the six programs that were used during the baseline and VMVO plus feedback phases for generalization sessions with a simulated consumer or from the two programs that were part of the actual consumer's regular school programming (i.e., stuffing envelopes and folding towels) for generalization sessions with the actual consumer. The staff trainees did not have access to the video and did not receive feedback. Each generalization probe consisted of up to 10 trials unless the time-based termination criterion was met (although this never occurred). For each direct teaching procedure, staff trainees had up to two sessions to implement the steps at or above 90 % for one session. If the staff trainee did not achieve this performance for a direct teaching procedure, then vocal feedback was implemented.

Feedback At the start of the session, the experimenter escorted the staff trainee into the session room and informed her "I will start this session by providing you with feedback regarding your performance during your last session using a (specific direct teaching procedure)." Feedback consisted of behavior-specific statements about what steps the staff trainee implemented correctly and what steps were implemented incorrectly. The experimenter provided information on how incorrect steps could be performed correctly and answered any questions from the staff trainee. The remainder of the session was conducted as described above. After receiving feedback for each direct teaching procedure, staff trainees had up to three sessions to implement the steps at or above 90 % for one session. If the staff trainee did not achieve this performance for a direct teaching procedure, then video feedback was implemented.

Video feedback At the start of the session, the experimenter escorted the staff trainee into the session room and informed her "I will start this session by showing you a video of your last session using a (specific direct teaching procedure) and I will provide you with feedback regarding your performance as we watch the video." The experimenter started the video and provided the staff trainee with positive and corrective feedback on each step of the direct teaching procedure, as it occurred in the video. Following feedback, the experimenter provided the staff trainee with the materials necessary to conduct the session and conducted the session as described above. No questions directed towards the experimenter were answered during this part of the session. After receiving feedback for each direct teaching procedure, staff trainees had up to three sessions to implement the steps at or above 90 % for one session.

Social Validity

Staff trainees completed an adapted version of the Intervention Rating Profile-15 (IRP-15; Martens et al. 1985) following the completion of data collection to assess the social validity of the procedures. The social validity of the outcomes was assessed by having four graduate students enrolled in a master's program in ABA and familiar with the three direct teaching procedures view pairs of video clips of baseline and VMVO plus feedback or generalization sessions, then recording on a data sheet the video clip in which the staff trainee displayed more skill at implementing the direct teaching procedures with a simulated consumer. The order of the video clips (baseline sessions vs. VMVO plus feedback or generalization session) within each pair was alternated randomly.

Results

Figure 1 depicts the percentage of steps performed correctly by the staff trainees. During baseline, all staff trainees implemented the MTL procedure with a simulated and actual consumer well below the mastery criterion. Following the introduction of VMVO plus feedback, all staff trainees showed an increase in the percentage of MTL steps they completed correctly with a simulated consumer, Marina (top panel) met the mastery criterion in five sessions and Kristina (middle panel), and Iliana (bottom panel) met the mastery criterion in two sessions. Additionally, all staff trainees increased the percentage of MTL steps they completed correctly with an actual consumer. Mariana and Iliana met the mastery criterion in one and two sessions, respectively. Kristina did not meet the mastery criterion within two sessions; therefore, she was provided with vocal feedback and met the mastery criterion in one session.

During baseline generalization probes, all staff trainees implemented the LTM procedure with a simulated and actual consumer well below the mastery criterion. Following VMVO plus feedback specific to the MTL procedure, Marina met the mastery criterion in two sessions for LTM with a simulated consumer. Neither Kristina nor Iliana met the mastery criterion within two sessions, so feedback was

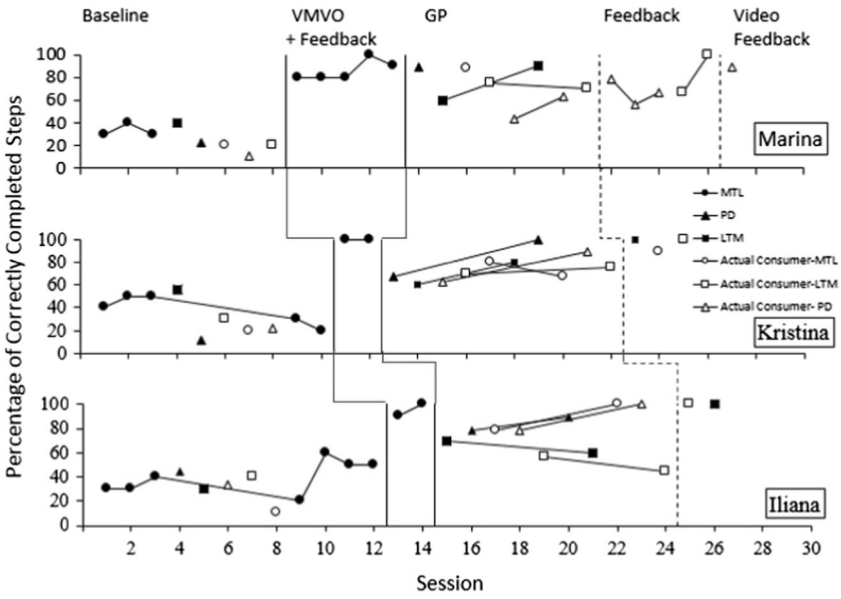

Fig. 1 Percentage of steps completed correctly for each staff trainee during baseline, video modeling with voiceover (VMVO) plus feedback, generalization (GP), feedback, and video feedback

provided, and both attained mastery in one session for LTM with a simulated consumer. Following VMVO plus feedback for the MTL procedure, none of the staff trainees achieved mastery within two sessions for LTM with an actual consumer. Following feedback, Kristina and Iliana met the mastery criterion in one session and Marina met the mastery criterion in two sessions for LTM with an actual consumer.

During baseline, all staff trainees implemented the PD procedure with a simulated and actual consumer well below the mastery criterion. Following the introduction of VMVO plus feedback for the MTL procedure, Marina, Kristina, and Iliana met the mastery criterion in one, two, and two sessions for PD with a simulated consumer. Additionally, Kristina and Iliana met the mastery criterion in two sessions for PD with an actual consumer. Marina did not meet the mastery criterion within two sessions or following three sessions of feedback. Following the implementation of video feedback, Marina met the mastery criterion in one session.

We calculated the total duration of staff training to provide additional detail regarding the training structure. We calculated duration to include time staff trainees spent watching the training video, implementing direct teaching procedures with a simulated consumer, and receiving feedback from the experimenter. Marina, Kristina, and Illiana experienced a total training duration of 1 h 48 min 40 s, 1 h 27 min 47 s, and 1 h 21 min 16 s, respectively, to demonstrate mastery of all direct teaching procedures with a simulated and actual consumer (training duration for individual direct teaching procedures is available from the second author).

All three staff trainees completed the IRP-15 (Martens et al. 1985) to evaluate the social validity of the training method used in the study. The questionnaire involved rating 10 items on a 6-point Likert scale (e.g., 1—strongly disagree; 6—strongly agree). Staff trainees indicated VMVO plus feedback would be an acceptable training method (M=6), that VMVO plus feedback should be effective in teaching a variety of skills (M=5.6, range 5–6), that they would suggest the use of VMVO plus feedback to others (M=5.3, range 4–6), that VMVO plus feedback was not overly intensive (M=5), that they found VMVO plus feedback a suitable training method (M=5.6, range 5–6), that they would be willing to use VMVO plus feedback to learn additional skills (M=5.6, range 5–6), that VMVO plus feedback did not result in negative side effects (M=6), that VMVO plus feedback would be appropriate for a variety of individuals receiving training (M=5.6, range 5–6), that they liked the procedures used in training (M=5.6, range 5–6), and that overall, this training method would be beneficial for those receiving training (M=5.6, range 5–6). For the social validity of the outcomes, the four graduate students selected the video clips of VMVO plus feedback or generalization sessions as the ones in which the staff trainees displayed more skill at implementing the direct teaching procedures for 100 % of comparisons.

Discussion

The failure to implement teaching procedures with high integrity may impede consumer skill acquisition (Carroll et al. 2013). As such, it is important to identify, practical effective methods for training staff. Identifying effective training approaches that decrease the presence of staff trainers may increase the feasibility of increasing integrity for all staff. Overall, VMVO plus feedback was effective in training staff trainees to implement a MTL procedure and resulted in generalized responding to an actual consumer. Additionally, moderate to high levels of generalized responding to untrained direct teaching procedures (LTM

and PD) with a simulated and actual consumer were observed. These findings are important in several ways.

First, similar to previous studies, the current study found VMVO resulted in immediate increases in staff trainee integrity (e.g., Catania et al. 2009; Vladescu et al. 2012). Second, rather than teach the three direct teaching procedures simultaneously as in Lerman et al. (2004, 2008), the present study trained staff trainees on one direct teaching procedure and demonstrated generalized responding to two untrained direct teaching procedures. This generalization of skills is likely due to the availability of the program guidelines, similarities between the three direct teaching procedures and data sheets across sessions, and instructions and models in the videos for how to respond to consumer behaviors (e.g., no eye contact) that could be applied to all direct teaching procedures and increased the saliency of aspects of the program guidelines. Third, this study is one of only a few to teach staff trainees to increase and decrease the intrusiveness of prompts when implementing direct teaching procedures.

In the current study, less training time was required by providing feedback than requiring staff trainees to re-watch the video. For example, Kristina required only 2 min 6 s of feedback to demonstrate mastery of the MTL procedure with a simulated consumer, compared with the 26 min 47 s that would have been required to re-watch the training video. This suggests that training may be more efficient if staff trainees view a training video once and subsequent feedback is provided rather than have trainees view the video prior to each session until reaching mastery criterion as has been done in previous studies (e.g., Catania et al. 2009; Vladescu et al. 2012; Weldy et al. 2014). Compared to the training times of other studies (Parsons et al. 2012), the training times obtained in this study were lower. On average, staff trainees required 1 h 32 min 34 s to master all three direct teaching procedures.

VMVO plus feedback may offer a cost-effective option to human service agencies. While creating a training video will require cost to purchase materials (e.g., a video camera) and time to produce, the training video can be used many times without incurring additional cost and production time. Additionally, within the context of a VMVO plus feedback training structure, a staff trainer would at minimum be required to only provide feedback following staff viewing of the video. If staff demonstrate large increases in integrity following exposure to a training video, only minimal feedback from a trainer may be required. Future research could conduct a cost analysis of several different common training methods (e.g., BST, VMVO with and without feedback, enhanced written instructions) to more objectively compare the cost and outcomes associated with each approach.

Few staff training studies have evaluated trainee satisfaction with training methods. The current study provides information regarding the social validity of VMVO plus feedback. Overall staff trainee ratings of the procedures were positive and indicated VMVO plus feedback may be a favorable training method to use in human service agencies. Further, social validity of the outcomes was verified as viewers always selected the post VMVO plus feedback video clips as demonstrating the more component performance of the direct teaching procedures.

Although we took steps to program for generalization during the study, future researchers could further enhance generalization by including a wider variety of consumer responses in the simulated consumer scripts such as instances when the simulated consumer engages in an approximation of a correct response. Furthermore, including examples of an instructor implementing the MTL procedure with an actual consumer in the video may further enhance generalization.

A primary limitation of the current evaluation was that maintenance data were not collected. While previous studies have shown that incorporating feedback into training improves maintenance of staff trainee skills (Alavosius and Sulzer-Azaroff 1990; Casey and McWilliams 2011; McGimsey et al. 1995), the present study did not conduct follow up probes to see if this was the case. Future studies could compare procedures that incorporated VMVO to VMVO plus feedback to see if a difference in staff trainees' maintenance of skills is observed. Additionally, the current study did not teach staff the conditions under which to select to use each of the direct teaching procedures. Future research could incorporate training to teach staff trainees how to identify the best direct teaching procedure to use based on the individual needs of the consumer. In the current study, training closely proceeded assessment of staff trainees' skills; this is a potential limitation as the training may have served as a priming effect for performance. Future studies should consider evaluating the temporal relationship of training to skill assessment to determine the effects of different training arrangements.

The findings of this study indicate some clear advantages to VMVO plus feedback as a training modality. These findings demonstrate a comprehensive video model may reduce the need for in vivo training during initial training and during generalization, thereby making VMVO plus feedback a more cost and time effective method for training staff.

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Compliance with Ethical Standards All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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