# Teaching Daily Living Skills to Children with Autism Through Instructional Video Modeling

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**Abstract:** Research on video modeling has typically utilized either competent peer models or self-models engaging in criterion performances. Although both methods have demonstrated utility in achieving skill acquisition, each has potential disadvantages. The current research utilized a multiple probe design across tasks and replicated across participants in order to demonstrate the efficacy of an instructional video modeling technique to teach functional living skills to three children with autism. Five tasks were selected. Prior to the development of each training video, task analyses were created. Videotapes were developed from the participant's viewing perspective, that is, as the participant would be viewing the task. Instructional video modeling was effective in promoting skill acquisition across all three children and maintained during the postvideo phase and a 1-month follow up.

One of the most salient concerns of parents of children with autism, as well as parents of children with other disabilities, is whether or not their child will live a safe, productive, and independent life. Individuals acquiring independence early in life have more potential to thrive in domestic and vocational settings (Pierce & Schreibman, 1994). Increased attention has been focused on teaching children with disabilities functional behaviors such as daily living skills, which may include preparing simple meals, household chores, and getting dressed. The acquisition of these skills can decrease some of the burden placed on parents and caregivers due to the time and energy required to perform these tasks for the child. There is a vital need for teaching strategies that are specifically designed for individuals with autism to help foster their independence.

*Observational learning,* defined as a result of observing the behavior of a model (Bandura, 1968), constitutes an important learning and teaching strategy that has received a significant amount of attention in the literature. Learning through observation and imitation of others can account for the natural acquisition of behavior (Bandura, 1971) and the planned acquisition of skills through directed observation (Brody, Lahey, & Combs, 1978). The concept of observational learning through modeling was first introduced in the 1960s. Since Bandura and his colleagues' seminal work, abundant research has documented and extended the effects of modeling (Bandura & Menlove, 1968; Barry & Overmann, 1977; Buggey, Toombs, Gardener, & Cervitti, 1999; Charlop, Schreibman, & Tyron, 1983; Charlop & Walsh, 1986; Coleman & Stedman, 1974; Egel, Richman, & Koegel, 1981; Haring, Kennedy, Adams, & Pitts-Conway, 1987; Lutzker & Sherman, 1974). Studies on observational learning were originally focused on typical children, but soon this phenomenon was investigated in children with disabilities. For example, observational learning has been identified as an effective instructional component in the acquisition of early language (Egel et al., 1981; Goldstein & Mousetis, 1989; Lovaas, Beberich, Perloff, & Schaeffer, 1966), appropriate play skills (Elliot & Vasta, 1970), motor skill development (Baer, Peterson, & Sherman, 1967), self-help skills (Hall, Schuster, Wolery, Gast, & Doyle, 1972; Schoen & Sivil, 1989), sight words (Orlove, 1982), symbol recognition (Oliver, 1983), and vocabulary words (Hanley-Maxwell, Wilcox, & Heal, 1982). For individuals with developmental disabilities, learning through observation may be an especially important strategy because functioning in mainstream educational settings often demands skills that have not yet been learned (Buggey et al., 1999).

Advances in technology have afforded researchers the opportunity to expand on the concept of observational learning through modeling with individuals with develop-


Volume 4, Number 3, Summer 2002, pages 166–177

mental disabilities. One such technological advance has been the use of video as a tool to teach a wide variety of skills, including motor behaviors as in sport skill acquisition (Franks & Maile, 1991), appropriate sexual behaviors (Dowrick & Ward, 1997), conversation skills (Charlop & Milstein, 1989; Pierce, Sherer, Paredes, Kisacky, & Schreibman, 1999), vocational skills (Cavaiuolo & Gradel, 1990), social behaviors ( Kern et al., 1995; Taylor, Levin, & Jasper, 1999), and safety skills (Poche, Yoder, & Miltenberger, 1988). Video has also been effective in treating anxiety (Johnson, 1989), depression (Kahn, Kehle, Jenson, & Clark, 1990), stuttering, and selective mutism (Kehle, 1991).

Participants in video modeling research have varied from typically developing persons to individuals with severe disabilities. However, there has been limited attention regarding video intervention for children with autism who typically exhibit severe attentional (Courchesne et al., 1994; Pierce, Glad, & Schreibman, 1997), social (Pierce & Schreibman, 1995), affective (Hobson, Ouston, & Lee, 1988), language and communication (Rutter, 1978), and motivational deficits. Often these significant pitfalls make children with autism a challenging population to teach. Video modeling may be an effective instructional approach because it can counteract the effects of *stimulus overselectivity,* defined as an attentional deficit that involves the failure to utilize all of the important cues in an educational setting (Koegel et al., 1989). By minimizing attentional requirements, requiring the child only to look at a small spatial area (a television monitor), and to hear only the minimum necessary language, children are more able to direct their focus to relevant stimuli (Sherer et al., 2001). This procedure can increase independence by reducing the need for the presence of a skilled adult to promote learning. In addition, motivation may be enhanced because video viewing is a low-demand activity found in most children's homes and appears to be naturally reinforcing to children.

Some children with autism tend to excel in response to visual interventions. Through the use of activity schedules, Pierce and Schreibman (1994) successfully taught daily living skills to children with autism in unsupervised settings. There are also numerous accounts of special savant skills in children with autism, including memories for directions and special artistic abilities (e.g., O'Connor & Hermelin, 1990).

Only a few studies have investigated the effectiveness of video interventions for children with autism, the majority of which have focused on teaching social behaviors and increasing language skills. Charlop and Milstein (1989) taught three children with autism to make simple exchanges in conversation. Their research was systematically replicated by Taylor et al. (1999) to increase play-related statements in children with autism toward their siblings. Buggey et al. (1999) used video self-modeling as a tool to teach children with autism appropriate responding to questions.

Sherer et al. (2001) compared the efficacy of "self" versus "other" video modeling interventions to teach question-asking to children with autism. Two types of videos were introduced. The *self-as-a-model* video consisted of children viewing themselves as the videotaped model, whereas in the *other* modeling condition peer models were shown demonstrating the particular skill. There were no overall differences in rate of task acquisition between the two conditions. Anecdotal evidence suggested that participants who were successful with the video intervention had higher visual learning skills than children who were unsuccessful with this approach. In addition to language skills, Schreibman, Whalen, and Stahmer (2000) used a video priming technique to reduce or eliminate disruptive behaviors associated with transition situations for children with autism. Upcoming events or activities in which three children with autism exhibited challenging behavior were videotaped from the children's perspective (child eye level) and shown prior to the event in order to allow the children to predict the transition. The researchers posited that providing a means for making upcoming transitions predictable to the children might set the occasion for appropriate behavior in the difficult situations. In all instances, the video priming intervention resulted in decreases in the disruptive behavior and generalized across new transition situations. Haring et al. (1987) used videotaped typical models to promote replication of purchasing skills across settings in children with autism.

With the exception of Schreibman et al. (2000) in their research using video priming, research on video modeling for children with autism has utilized either competent peer models engaging in desired behavior or self-modeling defined as "a procedure in which people see themselves on videotapes showing only adaptive behavior" (Dowrick, 1983, p. 105). Although both methods have demonstrated their utility in creating skill acquisition, each has its potential disadvantages. If a typical child is used as a model, it may be difficult to enlist the consent of the parent because of understandable concerns (e.g., anonymity, time constraints, and potential intervention effects) as well as the participation of the child. Locating an age- and gender-matched model is also problematic, as is finding meaningful and affordable reinforcers for the model. In addition, the many uncontrollable variables may cause the filming of video segments to exceed the time scheduled, thereby risking a loss of interest or the availability of the child model.

The procedure in creating self-as-a-model videos involves maximizing the performance of the target child attempting a specific skill (with incentives, rehearsal, prompting, etc.) and later editing out errors and other distracting footage (Dowrick, 1999). The result, when successful, is a video segment of the subject engaging in the desired behavior. Understandably, this approach can be tedious and time-consuming, and it requires particular expertise with the use of videos.

The current research incorporated the technique used by Schreibman et al. (2000). The purpose of their research was to assess the effectiveness of a video priming procedure to reduce challenging behavior in young children with autism during difficult transition periods. The settings varied depending on the particular needs of the participant (e.g., grocery store, mall, pharmacy). Events or activities that had been difficult for the children were videotaped from the children's eye level and then shown prior to the event to help the children successfully perform the transitions. While filming each particular event, the experimenters carried the video camera through the transition setting to show the environment as the children would see it when progressing through the transitions (e.g., moving through the store and entering another setting). No models appeared in these videos, which was intended to control for the effects of a model teaching a skill rather than exposure to an antecedent event as a potential factor in treatment effects. This approach rendered unnecessary the use of a model or the cumbersome editing involved in creating successful tapes of the children demonstrating a desired skill. Thus, the purpose of the present research was to determine whether a video of a functional task filmed from the participant's point of view (child eye level), as if the participant was performing the skill, could produce skill acquisition in children with autism.

## Method

### PARTICIPANTS

Three children with autism participated. Each child was diagnosed based on the *Diagnostic and Statistical Manual of Mental Disorders–Fourth Edition* (*DSM-IV*; American Psychiatric Association, 1994) by licensed psychologists not associated with this research. All children were living at home with their parents at the time of this research. They were referred from an early childhood center preschool in a local school district. Participants were selected as a result of the first author's familiarity with them and the teachers' reports of their ability to sit and attend to a visual model for 5 to 10 minutes, follow one- and two-step directions, comprehend sequencing, and imitate simple fine and gross motor movements, and their propensity to choose videos as a preferred activity. Information about the children was gathered from direct observation and interviews with the participants' teachers. At the time of the research there were no current standard test scores available.

David was 5 years 3 months old. He displayed age-appropriate expressive and receptive language and generally spoke in full sentences. David did not typically engage in any significant challenging behaviors. He was able to follow three- and four-step directions and independently remain on task for up to 20 min during a preferred activity, and he frequently watched videos.

Danny was 5 years 5 months old and was able to receptively label up to 100 words. The majority of his expressive language was echolalic with two- or three-word sentences of spontaneous speech. Danny was able to follow two- or three-step directions and independently remain on task for up to 10 min during a preferred activity, and he frequently watched videos. He was reported not to engage in any significant challenging behaviors.

Amy was 5 years 1 month old. Her receptive language consisted of approximately 100 words; her expressive language was emerging. Amy was able to follow one- and two-step directions and independently attend to task for up to 7 min during a preferred activity, and she displayed no significant challenging behaviors. Amy also frequently watched videos and would consistently choose to watch them as her reinforcer during training sessions.

### SETTING

The research was conducted in an assessment room (4.5 ft by 8.5 ft). The room contained a child-sized chair, a small table, an adult-sized chair, and a toy/supply cupboard. A VHS recorder and a 21-inch color television monitor were brought into the room during the intervention condition. All replication probes were conducted in the participants' homes.

### RESEARCH DESIGN

A multiple probe design (Horner & Baer, 1978) across tasks, replicated across participants, was used to evaluate the effect of the instructional video modeling (IVM) intervention. A multiple probe design is used to demonstrate a functional relationship between an independent variable and the acquisition of a successive approximation, or chain sequence (Horner & Baer, 1978). Intermittent probes provide an alternative to continuous baseline measurement when such measurement during extended multiple baselines may prove reactive or impractical, or when a strong a priori assumption of stability can be made (Horner & Baer, 1978). For each of the subjects, data were collected during baseline, intervention, replication probes, post-treatment, and 1-month follow-up.

### TASKS AND MATERIALS

Prior to the research, after receiving a notice outlining the proposed research, parents of the children enrolled in the participating preschool who expressed interest in helping their children participate were sent an overview of current research on video modeling as well as a consent form explaining the details of the proposed research. To help establish content validity, the skills presented in the research were selected by referencing the *Carolina Curriculum for Preschoolers with Special Needs* (Johnson-Martin, Attermeier, & Hacker, 1990) for skills determined to be developmentally appropriate for each child to learn. A list of these skills was then presented through a content validation survey to the child's teacher, on-site school psychologist, and occupational therapist for validation. Finally, the parents of each participant were given a list of the developmentally appropriate daily living skills and asked to identify three specific skills they believed would be functional for their child to learn, and that were not previously taught or scheduled to be taught.

A total of five tasks were selected for the three children. The tasks for Danny were making orange juice, preparing a letter to be mailed, and setting the table. For David, the tasks were cleaning a fish bowl and setting the table. The tasks for Amy were feeding her cat, putting a letter in a mailbox, and setting the table. Only two tasks were selected for David because his parents had difficulty identifying tasks that he did not already know how to complete.

All videos were filmed using a Sony Hi-8 camera on compatible tape stock. The materials used for the training videos were as follows:

1. Making orange juice: electric juicer, cut oranges, and a small glass
2. Preparing a letter to mail: note paper, envelope, and sticker
3. Putting the letter in the mailbox: envelope and Blues Clues™ mailbox
4. Pet care: 2 plastic bowls, dry cat food and container, and plastic cup filled with water
5. Cleaning a fish bowl: fish net, plastic fish, fish bowl, pitcher with clean water, and a small empty plastic tub
6. Table setting: place mat, napkin, fork, knife, spoon, and cup

The reinforcer received for successful completion of tasks for David and Amy was candy; Danny received access to a favorite battery-operated toy.

Prior to the development of each training video, a task analysis was created identifying and describing in detail the specific behavioral steps and sequence needed for successful acquisition of the selected tasks. The task analyses were created to represent the objectives and sequence for training and the operational definition of correct responses for recording and reliability purposes. During baseline, responses were considered correct if they conformed to the description of the steps on the task analysis. A step completed out of sequence was considered incorrect only if it inhibited the successful completion of the task.

## INSTRUCTIONAL VIDEO MODELING VIDEOS

Videotaped segments of each task were recorded. Each individual task performed by the primary researcher was videotaped as the participant would be viewing the task. This was accomplished by holding the camera in a set position (over the shoulder of the adult model) allowing for only the hands of the model and necessary materials to be visible in the camera lens. For example, for the task of mailing a letter the tape showed only the hands of a model completing each step as described on the task analysis (such as folding the paper, placing the paper in the envelope, closing the envelope, putting the sticker on the envelope to seal it closed, opening the mailbox, placing the letter inside, closing the mailbox, and pulling up the handle). At the beginning of each task, a narrator's voice was heard on the videotape giving the instruction: "Here is everything your friend needs to [task]. When I say "go" I want you to watch your friend [task]. Ready, go." With the desire to facilitate initial attending to the training video, a 5-s animated video segment of the child's favorite cartoon was dubbed with the same instruction as in the training tape and then inserted at the beginning of the instructional video displaying the task.

## BASELINE

Baseline data were collected over a 2-week period. Participants were taken out of their classroom by the researcher at times convenient to the teacher; however, three visits per week of at least 20 min were required for participation. Sessions typically ran approximately 15 to 20 min. Baseline data were collected prior to the intervention phase to assess task performance in the absence of IVM. The baseline procedure involved bringing the child into the assessment room and having the child sit in a child-sized chair in front of a small table. The experimenter then placed the items on the table in front of the child. During each session the experimenter provided the following statement: "[Name], here is everything you need to [task]. When I say "go" I want you to [task]. Do the best you can." This procedure was repeated at the start of each baseline session. Sessions were terminated when the subject ceased to engage in the appropriate behaviors needed to complete the task after 60 s and responded affirmatively (i.e., nodding head or verbally indicating) to the experimenter's question, "Are you finished/all done?" During baseline, praise was provided for attending behaviors only.

## INSTRUCTIONAL VIDEO MODELING INTERVENTION

During intervention sessions, as in the baseline condition, the child was seated in a small chair facing a small table that contained all the items needed to complete the target task. However, in this condition an audiovisual cart containing a 21-inch television monitor and VCR was brought into the room and placed in front of the table and chair where the child was seated. Once the child sat in the chair, the child was told that a video would be shown. As in the study by Schreibman et al. (2000), the video of the target task was shown to the child one time only.

After the video was completed, the monitor was turned off and the child was immediately presented with the same instructions as in baseline. Similar to baseline, praise was provided for attending behaviors only. Praise for attending behavior held constant across all conditions. Once criterion was reached, which consisted of 100% acquisition on all steps of a task, reinforcement in the form of praise paired with either candy or access to a preferred toy was provided. Probes of the untrained tasks were conducted each session prior to the presentation of IVM.

Guidelines for scoring completed and incomplete tasks were as follows: After viewing the training video the child was given the initial instruction to complete the task. If the child did not make any attempt to initiate the task within 60 s of the instruction, a second prompt was provided. Then, if no initiation was made within another 60 s, materials were removed and all steps were considered incomplete.

Procedural modifications were made for Amy during IVM conditions because she became distracted by excessive noise from children playing outside the assessment room during her scheduled intervention time. Modifications consisted of lowering the position of the television monitor to approximately eye level and adding a gestural prompt to cue Amy where to focus her attention during and after the video presentation. Modifications were not carried out during replication probes in the child's home.

### REPLICATION PROBES

Replication probes were conducted in the homes of the children to assess skill performance during baseline, IVM, no-video phase, and the 1-month follow up. Attempts were made to replicate the setting and delivery of intervention in the school setting. The room in the child's home where baseline and video viewing occurred depended on which room contained a television monitor, a VCR, and a table. For all three children, baseline and IVM took place in the child's living room.

### POSTVIDEO PHASE AND FOLLOW-UP SESSIONS

A no-video phase and 1-month follow-up session was conducted for each task once criteria for skill acquisition were reached in order to assess whether behavior change was maintained without the presentation of the video. As in baseline sessions, the children were provided with the materials and the instructions to complete the task.

### OBSERVATIONAL RECORDING SYSTEM AND INTEROBSERVER RELIABILITY

All sessions (baseline, intervention, replication probes, no-video phase, and follow-up sessions) were recorded on videotape. While viewing the tapes, trained observers naive to the purpose of the study used a task analysis data sheet to record the steps completed for each task. The data sheets contained a column with each step needed to complete the task and a column that indicated whether a step was completed or not completed.

If the child began the sequence of steps to complete a task and became distracted (not engaging in the task) for longer than 60 s, the task was terminated and the remainder of the steps were scored as incomplete (Steed & Lutzker, 1997). Criterion levels for responding were two instances of 100% correct responding on a task. Reinforcement in the form of praise was not delivered on these occasions.

### RELIABILITY

Interobserver agreement was obtained for a minimum of five (one third) of the sessions for each child. Observers were trained until they reached 80% reliability with the experimenter on video examples of a typical child performing the target tasks. Training consisted of the observers' viewing and scoring the tape, during which feedback was provided by the experimenter, and finally, scoring the tape independently to access agreement with the experimenter (Charlop & Milstein, 1989). Each session was recorded through videotape and then observed at a later time by a trained observer for scoring purposes. Observers were trained by watching and scoring a tape of a typical child performing all the steps of the task analysis of each skill to 100% criterion as well as a tape of a child performing the skill with errors. Interobserver agreement was calculated by dividing the total number of agreements for each step on the task analysis by the number of agreements plus disagreements and multiplying the total by 100%, yielding a percentage of agreements. Interobserver agreement for David ranged from 98% to 100%, and for Danny and Amy it ranged from 96% to 100%.

## Results

Instructional video modeling was effective in promoting skill acquisition across all three subjects and maintained during the no-video phase and 1-month follow-up. Results for the three children are shown in Figures 1, 2, and 3. With the introduction of the video intervention, all three children's correct responding increased dramatically. Danny and David reached acquisition quickly across tasks, whereas Amy required situational modifications in order to reach acquisition criterion. To test for the effects of the additional prompting procedures on Amy's responding rate, modifications were withheld for two data points across the first two tasks (mailing a letter and table setting) and systematically added during the third sessions. Responding was consistent across both tasks. During the last

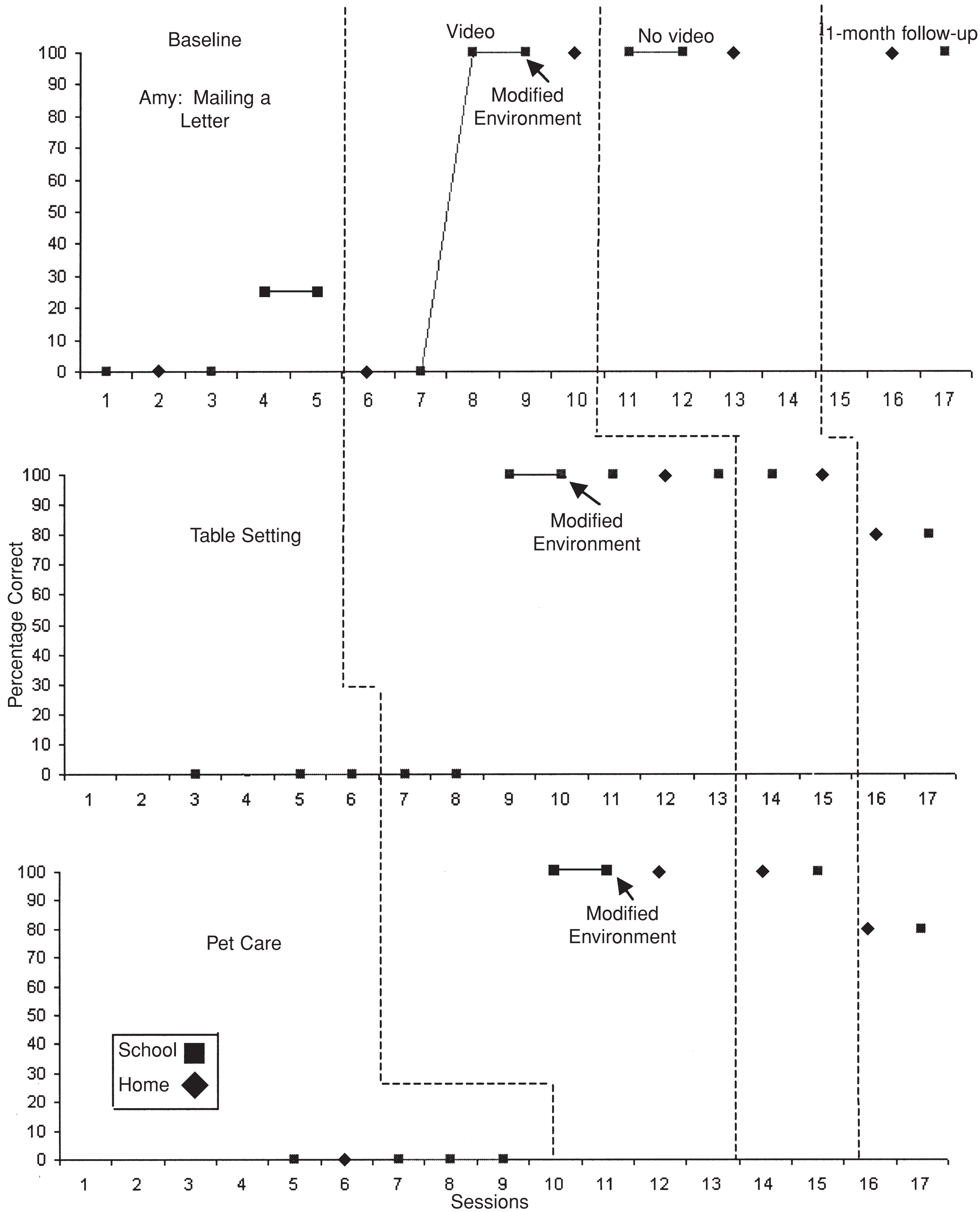


**Figure 1.** Percentage of correct responding for Amy across baseline and intervention conditions.

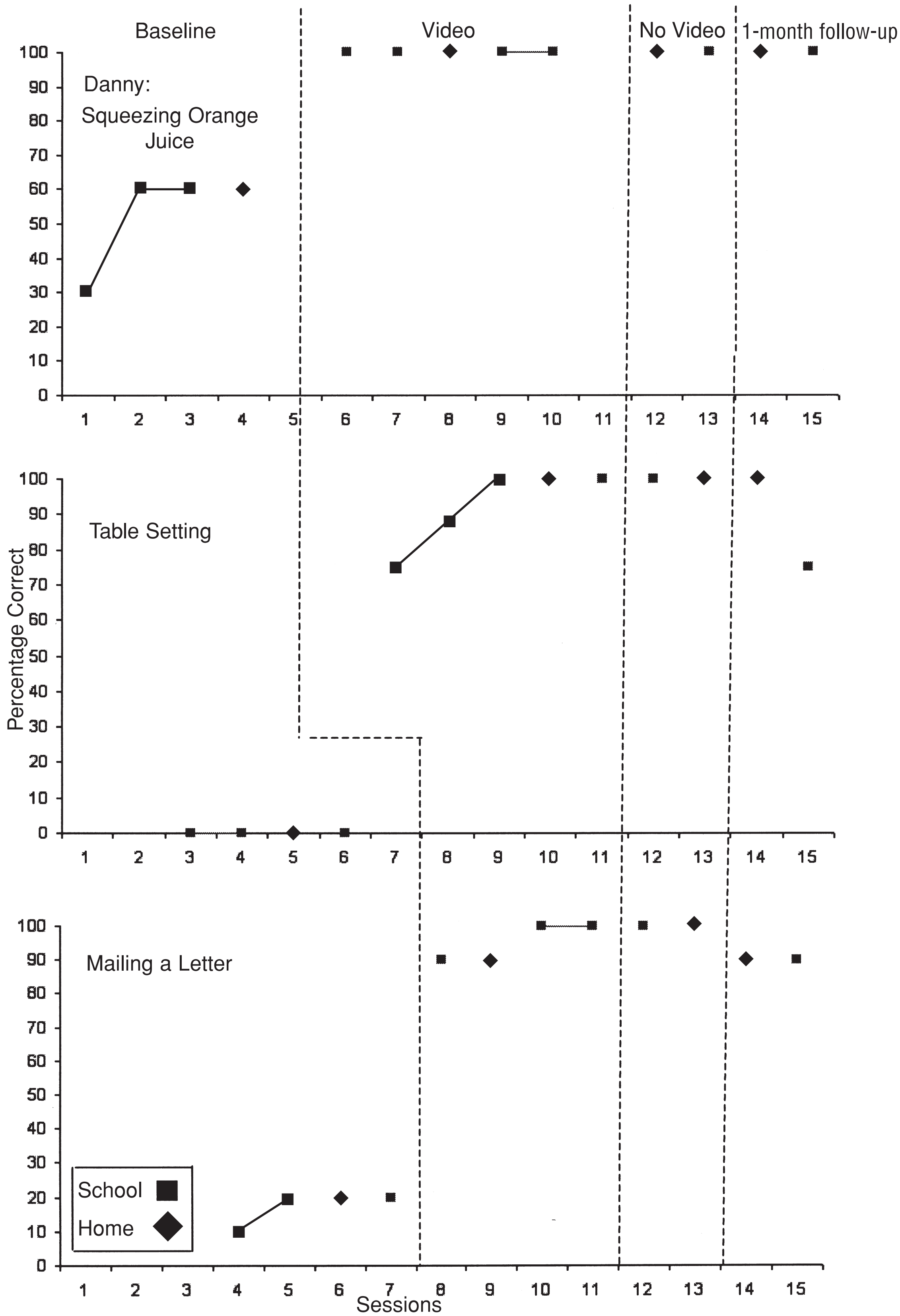


**Figure 2.** Percentage of correct responding for Danny across baseline and intervention conditions.

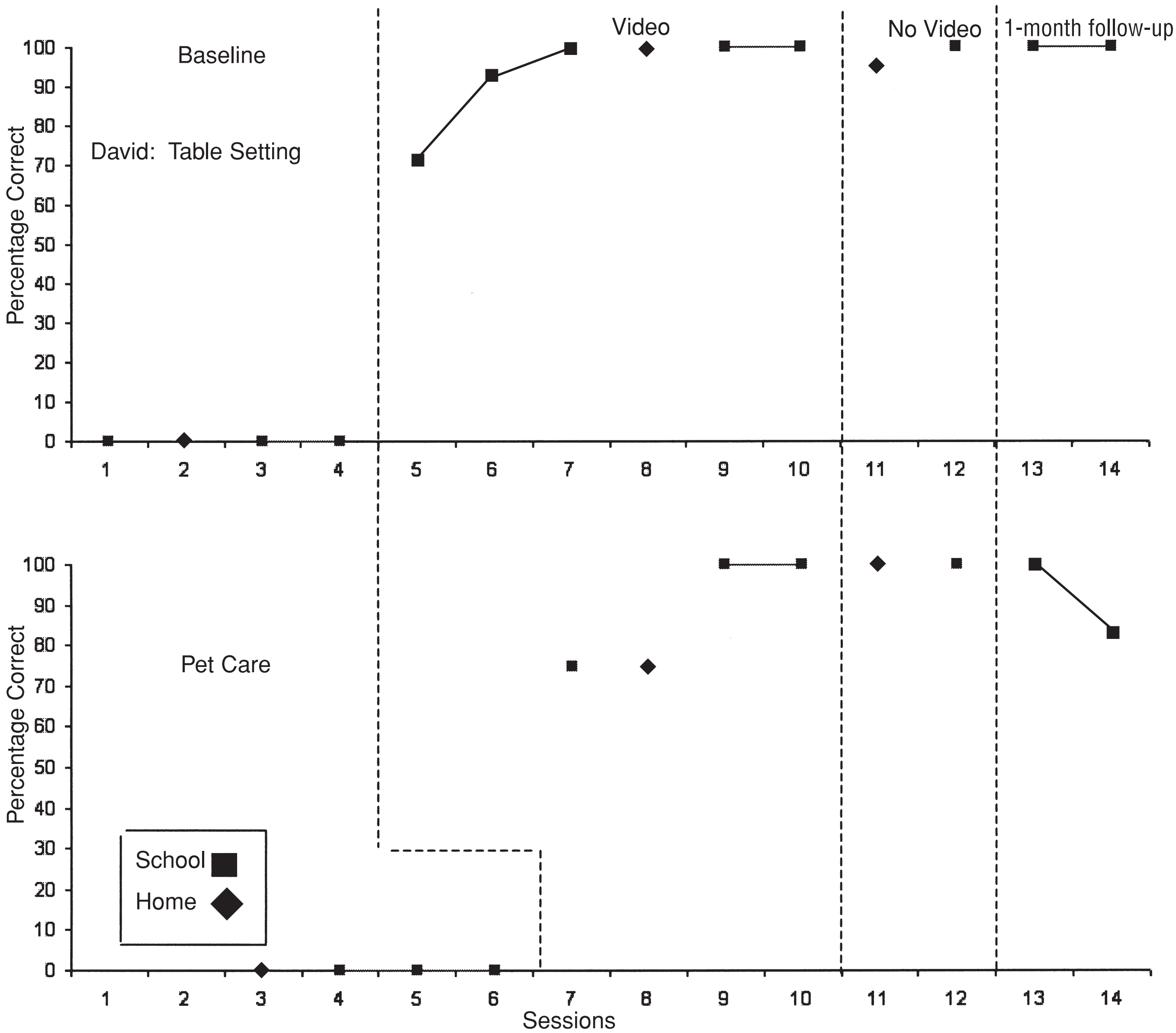


**Figure 3.** Percentage of correct responding for David across baseline and intervention conditions.

task (pet care), the modifications were introduced immediately during the video phase, which resulted in an increase to 100% in correct responding. Because of the limited time allotted for the intervention, testing the effects of a prompt fading procedure for Amy was not possible.

### VIDEO, NO-VIDEO, AND 1-MONTH FOLLOW-UP

The children did not perform all of the steps in the task analyses correctly prior to the video intervention. For Danny, appropriate responding increased from a mean of 23% across all three behaviors during baseline to 100% during the video and no-video condition across all three tasks once 100% correct responding was reached. David's correct responding increased from a baseline of 0% across tasks to an average of 94% during the video intervention, no-video phase, and 1-month follow-up. Baseline for Amy remained below 20% across all three tasks and reached a plateau at 100% after the video intervention and during the no-video phase. Her correct responding held steady at 100% for two tasks and leveled at 80% for the third task during 1-month follow-up.

### REPLICATION PROBES

For Danny, replication probes during baseline ranged between 0% and 60% and increased to a mean of 100% during treatment and no-video phase. One-month follow-up ranged from 75% to 100% across all three tasks. Replication probes for David increased from 0% to a mean of approximately 100% during treatment and no-treatment phase across tasks. Replication probes for David were not collected during 1-month follow-up for the second task because of scheduling conflicts with his family. Amy's correct responding increased to 100% across all three tasks during treatment and no-video condition and remained steady at 100% for two of the three tasks during 1-month follow-up.

## Discussion

The purpose of this research was to assess the effect of an instructional video modeling technique in facilitating learning in three children with autism. There was a clear demonstration that for the children in this research, correct responding on acquisition tasks greatly improved after video viewing. Consistent with prior research, the data suggest that video is a useful medium for accomplishing positive behavior change in this population (Charlop & Milstein, 1989; Lonnecker, Brady, McPherson, & Hawkins, 1994; Pierce et al., 1997; Schreibman, Whalen, & Stahmer, 2000). The presentation of the instructional video modeling intervention resulted in rapid skill acquisition for Danny and David. The increase for Amy instantaneously occurred once appropriate modifications and gestural prompts were added to increase attending behavior. Amy's responding initially remained at baseline levels during the video phase across the first two tasks. Amy became easily distracted by environmental factors not associated with the research (children playing outside the intervention setting) and was unable to attend to the video screen. Once modifications were made to increase her attending, Amy's correct responding increased significantly.

To date, only a handful of studies have investigated the effectiveness of video interventions for children with autism. The present research is meant to extend the video modeling literature to include teaching functional living skills to children with autism. Results from this research demonstrated support for the existing literature on video modeling for this population. The potential benefits of using the IVM technique as a teaching tool for the children in this research were many. IVM appeared effective in increasing attending behaviors by reducing overselectivity of specific cues by systematically directing the children's focus to relevant stimuli. The success of IVM may have been accomplished by minimizing the attentional demands, requiring the children to look only at a small spatial area (a television monitor) and to hear only the minimum necessary language (Pierce et al., 1999). Motivation to attend and learn from the videos seemed to have been enhanced by the low demand of video viewing and the apparently natural reinforcing properties of videos to children with autism. The technique was meant to capitalize on visual learning strengths that are often found in children with autism as well as the strength in visual learning reported on previous assessments for the children in the present research. The likely cost savings were achieved by filming each video from the child's perspective and from the resultant circumvention of challenges customarily associated with creating tapes using self or typically developing peers as models by filming each video from the children's perspective. If systematic replication added to the generality of this procedure, IVM could serve as a supplement to direct teaching, thereby significantly and efficiently augmenting instructional efforts.

Instructional video modeling is a child-friendly, highly reinforcing medium that combines salient components of how research suggests some children with autism may learn. That is, information is presented in manageable components (Lovaas et al., 1981); information is presented visually (Pierce et al., 1999); attention is maximized by the removal of irrelevant stimuli (Ford & Mirenda, 1984); individuals are motivated to attend (Browder, Schoen, & Lentz, 1986); behavior is modeled prior to behavioral performance, which is suggested by the priming literature as a way to manipulate antecedent events or set up establishing operations by previewing future events, making them more predictable (Schreibman et al., 2000); and, finally, during the intervention phase the individual is given an opportunity to practice and receive feedback (Miltenberger, 1997). Results demonstrate that replication in the home setting proved effective, which suggests that generalization may be possible, offering significant opportunities for teachers and parents.

## Limitations and Future Research Suggestions

Although instructional video modeling appears to be effective, some practical issues may affect its use, including access to video equipment and the time required for video preparation. Each video used in the present research was prepared in one session, the longest of which was 20 min. However, other visual strategies (e.g., picture schedules) also require preparation time. Another limitation involved in the production of the videos stems from filming from the participants' perspective. Given the desire to minimize extraneous stimuli on the videos (e.g., showing more than just the hands of the model), it may be necessary to select tasks that have minimal spatial requirements and limited gross motor movements. Another possible drawback from using this IVM technique relates to the lack of exposure to typical peers involved in the modeling process. The benefit of utilizing typical peers as models is that this often creates opportunities for socialization or social benefits in addition to modeling effects. This may represent a deficiency of IVM, as opposed to in vivo modeling techniques, in general.

A significant feature, which may have contributed to the success of the present research, was the prerequisite skills required for participation in the research. Prior to the intervention, all three children demonstrated an ability to imitate a model, attend to a preferred task for up to 5 minutes, and follow one- and two-step directions, and they were reported to possess strengths as visual learners. Many individuals with autism may not display the same rapid acquisition rates as the participants in this research if they are unable to demonstrate prerequisite skills. The tasks selected for each of the children in this research were modified to fit the particular child's skill ability. Thus, it is recommended that future research systematically replicate this procedure with children having more diverse entry level skills. IVM may only be an effective teaching tool for children with autism who demonstrate these skills.

Limitations of the present research also include the short duration of the follow-up phase. Therefore, maintenance as well as replication of skills across settings and contexts within the children's natural environment remains uncertain. It would be beneficial for future research to extend the amount of time between intervention and follow-up. In addition, the materials used in the videos were the same as those presented to the children during training, replication probes, and follow-up conditions. This may have contributed to the efficacy of the video intervention and may have inhibited replication of skills if a variety of materials were used across settings and phases. It would be beneficial in future research to supply the children with a variety of materials resembling those on the videos as well as materials actually used in the children's home in order to facilitate replication.

It remains unclear whether the animated segments presented prior to the training videos were necessary to establish the children's attending to the subsequent video training segments. Future research might focus on a component analysis of the effects of the videos with and without the dubbed cartoon segments. In addition, future investigation might include a comparative analysis of the various video modeling techniques, such as utilizing typical peer models, self-as-a-model, and IVM, to examine their comparative effects on skill acquisition in children with autism.

Reinforcement in the form of praise paired with tangibles was delivered to the children once criterion was reached. It is possible that the positive effects of IVM occurred partly as a result of increased social reinforcement upon successful task completion. Future research should attempt to isolate these variables in order to determine the effectiveness of IVM on behavior without the use of extrinsic reinforcement.

The present research was particularly concerned with the social validity of the acquisition tasks. To help establish social validity, the parents of each participant were given a list of daily living skills and asked to identify three specific skills they believed would be functional for their child to learn. It was posited that the acquisition of these skills would help to decrease some of the burden placed on parents and caregivers by the time and energy required to perform these tasks for the child. To expand on the social validity of the research, it is suggested that future research present the parents with a checklist during a postintervention phase in order to test the perceived value and functionality of the skills learned by the children. Also worthy of future investigation would be an examination of whether the use of IVM can create a generalized learning ability in utilizing video as a tool to acquire skills.

The results of this seminal research suggest that IVM may offer a positive and relatively simple intervention for children with autism. Certainly, this method offers several advantages over traditional interventions used for children with autism, and it fits well with the 1997 Individuals with Disabilities Education Act requirements for positive behavioral supports (Buggey et al., 1999). IVM is technologically friendly and can readily be learned by parents, teachers, and clinicians. It also has the benefit of relatively rapid results. There is a vital need for teaching tools that are specifically designed for individuals with autism to help foster their skill acquisition through typical modalities. IVM appears to be an option deserving of future investigation because of its child-friendly and cost- and time-efficient properties.

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## AUTHORS' NOTE

*We are grateful for the assistance of the staff and families of the Sunrise Early Childhood Center for their support in mak-*

*ing this research possible. We also wish to thank Olivier Benamou for his patience and expertise in developing and creating the training video segments.*

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