Use of static picture prompts versus video modeling during simulation instruction

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Abstract

The purpose of this study was to compare the effectiveness and efficiency of static picture prompts and video modeling as classroom simulation strategies in combination with in vivo community instruction. Students with moderate intellectual disabilities were instructed in the tasks of withdrawing money from an ATM and purchasing items using a debit card. Both simulation strategies were effective and efficient at teaching the skills. The two simulation strategies were not functionally different in terms of number of trials to acquisition, number of errors, and number of instructional sessions to criterion.

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Community-based instruction (CBI) is a best practice component of the education of students with moderate and severe disabilities. A key factor for successful implementation of CBI is scheduling. Brown et al. (1983) offered four options for scheduling instruction: (1) classroom-simulated instruction only, (2) in vivo instruction only, (3) consecutive instruction in which the student meets a predetermined performance criterion at school prior to community instruction, and (4) concurrent instruction in which instruction at school and in the community without first requiring skill acquisition during simulated instruction.

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There is research supporting the efficacy of using only classroom-simulated instruction (Shafer, Ingle, & Hill, 1986) and instruction only in vivo (Morrow & Bates, 1987; Sowers & Powers, 1995). However, either of these scheduling options presents concerns. For example, when using only classroom instruction, student community performances decreased resulting in the need for supplemental instruction (Morrow & Bates; Shafer et al.). When using only in vivo instruction, transportation, cost, and time may impinge on sufficient frequency and distribution of instruction (Cihak, Alberto, Kessler, & Taber, 2004). To maximize student performance, research suggests simulation instruction and in vivo instruction should occur concurrently (Branham, Collins, Schuster, & Kleinhart, 1999; Cihak et al., 2004; Haring, Kennedy, Adams, & Pitts-Conway, 1987; Matson & Long, 1986). Combination strategies provide experiences with naturally occurring antecedents, consequences, criteria, and contexts when in the community while also providing additional structured practice, as well as controlled opportunities to experience a wider range of stimuli with classroom simulation (Nietupski, Hamre-Nietupski, Clancy, & Veerhausen, 1986). The additional practice provided in a combined strategy may be increasingly essential, given the premium associated with practical constraints of time, transportation, and budget (Cihak et al., 2004).

1. Static picture and video prompts

Static picture prompts and video methods are simulation strategies used to represent natural stimulus conditions and response topographies associated with task performance in natural community settings. Picture prompts in conjunction with in vivo instruction were used successfully to teach functional living skills (Bates, Cuvo, Miner, & Korabek, 2001), vocational skills (Sowers, Verdi, Bourbeau, & Sheehand, 1995), and purchasing skills (McDonnell, Horner, & Williams, 1984).

Video modeling and video prompting are procedures used for simulated instruction in the classroom prior to instruction in the community. Video modeling uses a videotape of a model performing the steps of a task. In the classroom the student watches the video, discusses the video, and then engages in a simulated performance of the task. Following this simulation, the student is taken into the community to perform the task and where s/he receives direct instruction. Combined with in vivo instruction, video modeling was used to teach students with autism purchasing skills (Alcantara, 1994; Haring et al., 1987), conversational skills (Charlop & Milstein, 1989), and social initiation skills (Nikopoulos & Keenan, 2004). Students with developmental and behavior disabilities were taught grooming, laundry, and food preparation skills (Lasater & Brady, 1995). Morgan and Salzberg (1992) taught students with severe intellectual disabilities to request supervisor assistance when encountering a work related problem.

Video prompting is the use of a videotape of a model performing the steps of a task. However, the student is not shown the entire task; rather s/he is shown an individual step as needed. For example, as the student is performing a simulated task, a video-clip of an individual step may be used as a prompt for performance (e.g., what do you do first, what would you do next) or as a correction procedure (e.g., this is how you push the buttons). Unlike video modeling, video prompting incorporates both real-time sequence of behaviors.
and still-frames displaying a close-up image of the task steps. Branham et al. (1999), had students watch still-frames of a peer model performing each step of the task. Each time a student made an incorrect response, the student watched the relevant prompting video segment again. LeGrice and Blampied (1994) used video prompting to promote generalization of activating a computer and a video-camera across settings. A combination of video modeling and video prompting in conjunction with in vivo instruction was used to teach students with moderate intellectual disabilities vocational skills (Martin, Mithaugh, & Frazier, 1992) and self-help skills (Norman, Collins, & Schuster, 2001).

Bates et al. (2001) suggest that, given that combinations of simulated and community-based instruction represent the efficacious arrangement for many learners, attention should no longer focus solely on whether simulated versus community-based instruction is more efficacious, but rather what is the efficacy of different instructional stimulations in combination with community-based instruction. The purpose of this study was to compare the effectiveness and efficiency of static pictures prompts and video modeling as classroom simulation strategies in conjunction with in vivo community instruction.

2. Method

2.1. Participants

Eight students participated based on the following: (a) middle school attendance, (b) age range from 11 to 15 years old, (c) level of cognitive functioning within the moderate range of mental retardation (IQ 40–55), (d) no sensory deficits, (e) no prior training with a debit card and automatic teller machines (ATM), (f) parental permission, and (g) verbal agreement to participate following being told of the study activities and viewing the materials. Table 1 presents student characteristic information.

2.2. Dependent and independent variables

The dependent variables were the percent of correct responses, number of errors, and number of sessions to acquisition using a debit card to withdraw $20 from an ATM

<table>
<thead>
<tr>
<th>Student</th>
<th>Chronological age</th>
<th>Years in school</th>
<th>IQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sora</td>
<td>13</td>
<td>10</td>
<td>42&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Percy</td>
<td>11</td>
<td>7</td>
<td>40&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Mike</td>
<td>11</td>
<td>8</td>
<td>48&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Joe</td>
<td>15</td>
<td>11</td>
<td>44&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Don</td>
<td>12</td>
<td>8</td>
<td>40&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Kym</td>
<td>14</td>
<td>11</td>
<td>55&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Ann</td>
<td>12</td>
<td>9</td>
<td>54&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Dawn</td>
<td>13</td>
<td>9</td>
<td>48&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> Wechsler Intelligence for Children (3rd ed.).<br><sup>b</sup> Stanford Binet.
and purchasing two items. The task analyses for both tasks were those used by Cihak et al. (2004). Both tasks required 12 steps, with comparable motor responses, and match-to-sample responses. The motor responses for both tasks included operating a machine and using a keypad. The independent variables were the use of either the static picture prompts or video modeling. Both simulation strategies were implemented in conjunction with CBI.

2.3. Settings

Students received both simulated instructional strategies in the school’s resource classroom. CBI occurred at a local grocery store. All students had prior experience at the store working on other CBI activities. The store was selected because of its convenient location and the availability of an ATM and debit card machine at the check-out register.

2.4. Materials

2.4.1. ATM

A Presto ATM was used to create the picture prompt album and videotape used for simulation, and used during CBI. Pictures of each step were taken with a digital camera. Pictures were 10 cm × 15 cm and in color. The video model was created using a Sony 72X Digital Zoom camera. Students watched the video on a 48 cm television/VCR. Students were required to insert the debit card into the ATM. The ATM consisted of 23 buttons and a monitor that prompts additional options. A keypad consisting of 12 buttons numbered zero through nine are written in black ink, and an “enter” button written in green, a “cancel” button written in red, and a “clear” button written in yellow. Next to the monitor, four buttons point to additional options on the screen. For instance, on the screen, a discriminative stimuli was written (i.e., would you like a recipe for this transaction). In addition, students were provided with a four-digit personal pin number (PIN) written on a 7 cm × 12 cm index card.

2.4.2. Debit machine

A Verifone PS-105633 was used to create the picture prompts album and videotape used for simulation, and during CBI. Pictures of each step were taken with a digital camera. Pictures were 10 cm × 15 cm and in color. A total of 18 buttons were on the machine. The video model was created using a Sony 72X Digital Zoom camera. Students watched the video on a 19-in. television/VCR. The 12 buttons consisted of zero through nine key pad with “clear” in red and “enter” in green. The numbers were color-cued white. Above the keypad, three buttons pointed to options on the screen, and the other three were checking/debit, credit, and EBT that were all color cued white. In addition, students were provided with a four-digit personal pin number (PIN) written on a 7 cm × 12 cm index card. Students were allowed to select any two items of a drink, snack, or fruit immediately after completion of a purchase.

2.5. Data collection

Event recording was used to record the number of steps each student correctly and incorrectly completed per trial during simulated instruction and CBI. Students participated
in two trials per session with a 15-min break between trials. Data were collected and reported on the students’ second trial for each session. The level of prompt required to complete a step was recorded. During breaks between trials, students worked on other objectives. The mean percent of correct student responses, the total number of errors to acquisition, and the number of sessions to criterion (i.e., two consecutive data points with 100% correct) were recorded during both types of simulated instruction.

2.6. Design

An alternating treatments design was used to examine the differential effects of static picture prompts and video modeling on the acquisition of each student. Static picture prompts and video modeling were counterbalanced to reduce carryover effects across students and tasks. Table 2 presents the instructional strategy and task for each student.

2.7. Experimental procedures

2.7.1. Baseline/probe procedures

Baseline procedures occurred in the community setting. Students were provided with the materials needed to complete the targeted tasks prior to beginning the trial. The experimenter instructed the student to complete the task by saying either “Withdraw $20 from the ATM” or “Purchase grocery items with a debit card.” No additional instructions, prompts or feedback were provided. If the student did not respond after 15 s, they were asked if they were finished. The probe was discontinued if the student confirmed their completion of the task. The probe also was discontinued after a minute of non-response.

2.7.2. Video modeling procedures

During simulation instruction with video modeling students watched a video tape of a close-up demonstration of the target task. First, students were shown two video boxes. On each box was a picture of the machine used in the video. Students were then asked to visually scan and select the picture indicating the task to be performed. Once the correct task was identified, task materials were provided, and the teacher started the video tape. The video for use of a debit card to withdraw cash was 7 min and 35 s. The video for

Table 2
Student per treatment and task

<table>
<thead>
<tr>
<th>Task</th>
<th>Student/treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Static</td>
</tr>
<tr>
<td>Withdrawing $20</td>
<td>Don</td>
</tr>
<tr>
<td>Dollars</td>
<td>Kym</td>
</tr>
<tr>
<td></td>
<td>Ann</td>
</tr>
<tr>
<td></td>
<td>Dawn</td>
</tr>
<tr>
<td>Purchasing two-items</td>
<td>Sora</td>
</tr>
<tr>
<td></td>
<td>Percy</td>
</tr>
<tr>
<td></td>
<td>Mike</td>
</tr>
<tr>
<td></td>
<td>Joe</td>
</tr>
</tbody>
</table>
purchasing items was 8 min and 12 s. The teacher verbalized the motor response (e.g., “Press arrow to withdraw from checking” or “Press the red debit button”) and pointed to the student to cue them to restate the response as the video demonstrated the task. Only the teacher’s arm and hand were shown demonstrating the video sequence of both tasks.

2.7.3. Static picture procedures

During simulation instruction with static pictures a picture prompt album was used. Students were shown two albums, on each was a picture of the machine used depicted in the album pictures. Once the correct album was identified and task materials were provided, the teacher opened the picture album and stated the first motor response (i.e., “I’m inserting the debit card into the ATM or I’m swiping the debit card.”). The teacher displayed each pictured step continuously for 38 s for withdrawing cash and 41 s for purchasing items. The duration of exposure was computed by dividing the total length of time to show the entire task for video modeling by the number of task-analyzed steps. After describing the motor response, the teacher pointed to the student to cue them to restate the response.

2.7.4. Community-based instruction procedures

During a CBI session students performed two trials of each task sequence. A least-to-most prompt hierarchy was used until the student performed the correct response without assistance. A 3-s interval between each prompt level was implemented. The least-to-most prompt hierarchy consisted of the following levels across instructional trials: (a) verbal prompt (e.g., “Do you see where the writing is?”), (b) gesture (e.g., pointing to the discriminative stimulus), and (c) gesture plus verbal explanation (e.g., pointing to the discriminative stimulus and providing a verbal explanation). CBI was scheduled 90 min after students participated in simulated instruction. Follow-up probes were collected two weeks after the acquisition phase. Follow-up probes occurred in the community where the students were initially trained.

2.8. Inter-observer agreement and procedural reliability

Inter-observer agreement data and procedural reliability were collected simultaneously by the investigator and classroom teacher. Inter-observer and procedural reliability data were collected during 25% of baseline, static picture prompts and video modeling conditions. Observers independently and simultaneously recorded the number of steps the student performed independently and the required prompt and response time. Inter-observer agreement was calculated by dividing the number of agreements of students’ responses by the number of agreements plus disagreements and multiplying by 100%. Inter-observer reliability ranged from 90 to 100%, with a mean of 98% agreement. The mean inter-observer reliability agreement for each student across treatments and phases was Sora, 100%; Percy, 96%; Mike, 99%; Joe, 100%; Don, 97%; Kym, 98%; Ann, 96%; and Dawn 97%.

Procedural reliability measures checked the teacher’s correct use of simulation instruction, prompting hierarchy, and response time. The teacher was trained using an itemized checklist that listed the task-analyzed steps of each task and the level of prompt.
The teacher was considered successfully trained after completing 100% of the checklist for three consecutive trials. The procedural agreement level was calculated by dividing the number of observed teacher behaviors by the number of planned teacher behaviors and multiplying by 100%. Procedural reliability ranged from 93 to 100%, with a mean of 99%. The mean procedural reliability agreement for each student across treatments was Sora, 99%; Percy, 98%; Mike, 96%; Joe, 100%; Don, 100%; Kym 99%; Ann, 100%; and Dawn, 98%.

3. Results

The results for all eight students are shown in Figs. 1 and 2. All students acquired and maintained the skills necessary for using a debit card for withdrawing $20 dollars from an ATM and for purchasing two-items. For seven of the eight students, both static picture prompts and video modeling simulation combined with CBI were found to be equally effective and efficient. Percy performed better when static pictures were used for simulated instruction. Overall, student means during the static picture simulation indicated that the percent for student acquisition was slightly greater. Students demonstrated fewer errors and reached criterion in fewer instructional sessions during static picture use compared to video modeling. The percentage of correct student responses, errors, and number of sessions across simulated instructional strategies is presented in Table 3.

3.1. Within instructional treatments

3.1.1. Sora

The mean percentage during baseline was 0% for purchasing items and 4.8% (0–8%) for withdrawing cash. The mean percentage of steps completed correctly for purchasing with static pictures increased to 84.6% (67–100%) and to 84.2% (58–100%) for withdrawing cash with video modeling. Sora also made 13 errors (static) and 20 errors (video) and required 7 (static) and 11 (video) sessions to reach criterion. Overall, Sora performed slightly better and more efficiently during instruction with static pictures.

3.1.2. Percy

The mean percentage during baseline was 0% for purchasing items and 3.2% (0–8%) for withdrawing cash. The mean percent of steps completed correctly for purchasing items with static pictures increased to 82.6% (58–100%), and to 72.3% (8–100%) for withdrawing cash with video modeling. With static pictures and video modeling, Percy made 19 and 40 errors and required 9 and 12 sessions to reach criterion, respectively. Percy performed better and more efficiently during static picture instruction.

3.1.3. Mike

The mean percentage during baseline was 0% for purchasing items, and 3.2% (0–8%) for withdrawing cash. The mean percent of steps completed correctly for purchasing with static pictures increased to 87.2% (67–100%), and to 81.8% (67–100%) for withdrawing cash with video modeling. With static pictures and video modeling, Mike made 20 and 24
errors and required 13 and 11 sessions to reach criterion, respectively. Mike performed slightly better during static picture instruction and more efficiently during video modeling.

3.1.4. Joe

The mean percentage during baseline was 6.8% (0–17%) for purchasing items, and 1.6% (0–8%) for withdrawing cash. The mean percent of steps completed correctly for purchasing items with static pictures increased to 91.7% (83–100%), and to 86.2% (75–100%) for withdrawing cash with video modeling. With static pictures and video modeling,
Joe made 7 and 10 errors and required 7 and 6 sessions to reach criterion, respectively. Joe performed slightly better during static picture instruction and more efficiently during video modeling.

3.1.5. Don

The mean percentage during baseline was 36.6% (33–42%) for withdrawing cash and 15.2% (0–25%) for purchasing items. The mean percent of steps completed correctly for withdrawing cash with static pictures increased to 91.0% (75–100%), and 92.9%
Don made 11 and 6 errors and required 10 and 7 sessions to reach criterion, respectively. Don performed slightly better and more efficiently during video modeling.

3.1.6. Kym

The mean percentage during baseline was 1.6% (0–8%) for withdrawing cash, and 0% for purchasing items. The mean percent of steps completed correctly for withdrawing cash with static pictures increased to 80.8% (67–100%), and to 86.8% (58–100%) for purchasing with video modeling. With static instruction and video modeling, Kym made 27 and 19 errors and required 10 and 11 sessions to reach criterion, respectively. Kym performed slightly better with video modeling and more efficiently with static pictures.

3.1.7. Ann

The mean percentage during baseline was 0% for withdrawing cash and for purchasing items. The mean percent of steps completed correctly for withdrawing cash with static pictures increased to 93.8% (83–100%), and to 90.2% (67–100%) for purchasing items with video modeling. With static pictures and video modeling, Ann made 3 and 6 errors and required 4 and 5 sessions to reach criterion, respectively. Ann performed slightly better and more efficiently during instruction with static pictures.

3.1.8. Dawn

The mean percentage during baseline was 1.6% (0–8%) for withdrawing cash, and 0% for purchasing items. The mean percent of steps completed correctly for withdrawing cash with static pictures increased to 79.3% (50–100%), and to 86.8% (67–100%) for purchasing items with video modeling. With static pictures and video modeling, Dawn made 15 and 8 errors and required 6 and 5 sessions to reach criterion, respectively. Dawn performed slightly better and more efficiently during instruction with video modeling.
4. Discussion

Both static picture prompts and video modeling, in combination with CBI, were effective and efficient at teaching students with moderate mental retardation functional community skills. Although minor individual differences emerged, static picture prompts and video modeling were not functionally different in terms of number of trials to acquisition, number of errors, and number of instructional sessions. Four of the eight students (Sora, Mike, Joe, and Ann) performed slightly better during static picture prompts and made fewer errors. One student (Percy) performed moderately better when static pictures were used in conjunction with CBI. Static picture prompts also was found to be slightly more efficient for four of the eight students (Sora, Percy, Kym, and Ann). Although Mike and Joe averaged more correct responses with static picture prompts, they acquired the skill more efficiently with video modeling. The data for Don, Kym, and Dawn indicated video modeling was more effective. Video modeling also was more efficient for Don and Dawn.

These findings confirm those in previous investigations that found simulation instruction combined with CBI as effective when teaching functional skills to students with moderate disabilities (Cihak et al., 2004; Matson & Long, 1986; McDonnell et al., 1984). This study also verified that when picture prompting is combined with CBI, students with moderate disabilities acquired and maintained functional skills (Bates et al., 2001; Cuvo & Klatt, 1992). Additionally, this study further verified video modeling as an effective instructional approach for teaching functional skills to students with moderate disabilities (Branham et al., 1999; Cuvo & Klatt, 1992).

Individual student difference did occur. Percy acquired purchasing skills moderately better with static picture prompts than video modeling. Moreover, static picture prompts were more efficient. Conversely, during video modeling, his acquisition performance was the lowest among the students, he made the most errors, and he required additional instruction sessions than his peers. During video modeling and CBI, Percy appeared to be more distracted by irrelevant stimuli in the classroom and community environments compared to his peers. Percy often required additional verbal prompts to stay on task during instructional sessions. A student’s ability to discriminate between relevant and irrelevant stimuli, maintain attention to task, and avoid distracting environmental stimuli may be a benefit of static picture prompts. This finding may be the case because the individual picture allows for focus on only the relevant feature, does not show environmental distractions, and does not have attention diverting motions. When student characteristics include high distractibility, difficulty maintaining attention, poor discrimination ability, and minimal experience with CBI, then static pictures may be the better strategy compared to video modeling. Additionally, research is needed to examine such individual student characteristics. Specifically, a student’s inability to maintain attention to task and to avoid irrelevant stimuli may suggest advantages of picture prompting and video prompting rather than continuous video model.

Several limitations of this study may have affected the overall results and interpretations. First, this study was conducted with students who had minimal prior experiences with CBI. Students without previous community experiences may require more intense instruction to acquire targeted skills. Second, all tasks involved
a match-to-sample strategy. Although motor responses were necessary for task completion, the PIN was provided. Additional instructional sessions may be required when these numbers are not provided to students.

Further research, in which larger numbers of teachers are involved is needed to look into the question of social validity and how teacher preference may influence instructional effectiveness and efficiency. In this study there was only one teacher. The teacher reported that he preferred to use video modeling rather than static instruction because it was easier to prepare the materials. The teacher reported that making the video modeling materials required less teacher preparation time. To make the videotape, the teacher simply recorded the steps of the task and then could readily use the video material. For static instruction, photographs of each step of the task was needed, then the pictures had to be cropped, printed, and organized in the picture album prior to beginning instruction. Instructional costs for both materials were similar as the digital camera, video camera, paper, and videotapes were already available through the school’s media center department. If there continues to prove to be no significant difference between these simulation strategies then teacher preference and student preference become primary variables for choosing between them.

Future research is also needed to verify the results of this study and to continue to explore various types of simulation and CBI arrangements. Specific aspects should include a full range of simulated instructional options. Cuvo and Davis (1983) outlined a continuum of simulation materials including artificial, simulated, and modified-natural materials and settings. Additionally, future research should replicate these results across different tasks (e.g., discrete versus chained; self-help versus leisure), instructors (teacher, paraeducator, peer, parent), ratios of time spent in simulation and in the community, and the simulation setting (e.g., classroom, school cafeteria, home living suite).

References


