Comparison of the Effects of Video Models With and Without Verbal Cueing on Task Completion by Young Adults With Moderate Intellectual Disability

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Abstract: This study compared the effects of video models with and without verbal cuing (voice over) on the completion of fine motor cooking related tasks by four young adults with moderate intellectual disability. The effects of the two modeling conditions were compared using an adapted alternating treatments design with an extended baseline, comparison, final treatment, and best treatment condition. Results indicated that video modeling with verbal cuing was more effective for three of the four students when evaluating independent correct performance of task steps.

Video technology, used to increase learning and to promote independence in students with disabilities, continues to receive positive support in the research literature with a growing amount of attention being devoted to its evaluation (Rayner, Denholm, & Sigafoos, 2009). While the use of video technology has been shown to improve the learning and independent functioning levels of students with developmental and intellectual disability and those with a diagnosis of autism spectrum disorders (ASD), questions still remain concerning which individual components or combinations of these components contributes to its effectiveness (Ayres & Langone, 2007; Rayner et al.). Isolation of different variables through comparative studies has been recommended in order to determine which characteristics are most effective when using video technology (Ayres & Langone).

Among the variables of interest when using video instruction is the use of verbal cues/prompts/directions being delivered while a student is watching a video recording (Rayner et al., 2009). These verbal cues are frequently used along with the visual demonstration of how to complete a task or component steps of a task. When creating the video model or prompt, these verbal cues are referred to as “voice-overs” in which the person recording the video (operating the digital video camera) or the person performing the task (video model) verbally provides directions or descriptions of how to complete the task (i.e., “put the skillet on the stove”) while demonstrating this step on the video recording. Voice-over has been included in a number of studies which have effectively used video models (presentation of an entire task via video followed by a student performing the task) (Mechling, Gast, & Gustafson, 2009; Mechling & O’Brien, 2010; Taber-Doughty, Patton, & Brennan, 2008; Van Laarhoven, Van Laarhoven-Myers, & Zurita, 2007) and video prompts (presentation of a component step or cluster of steps followed by a student performing the individual step) (Cannella-Malone et al., 2006; Grice & Blampied, 1994; Mechling, Gast, & Fields, 2008; Mechling, Gast, & Seid, 2009; Norman, Collins, & Schuster, 2001; Sigafoos et al., 2005; Van Laarhoven, Johnson, Van Laarhoven-Myers, Grider, & Grider, 2009; Van Laarhoven, Kraus, Karpman, Nizzi, & Valentino, 2010) to teach functional skills.

Likewise, no verbal cues or voice-over features have been effectively used with video modeling (Alcantara, 1994; Ayres & Langone, 2007; Cihak, Fahrenkrog, Ayres, & Smith, 2009). Among the variables of interest when using video instruction is the use of verbal cues/prompts/directions being delivered while a student is watching a video recording (Rayner et al., 2009). These verbal cues are frequently used along with the visual demonstration of how to complete a task or component steps of a task. When creating the video model or prompt, these verbal cues are referred to as “voice-overs” in which the person recording the video (operating the digital video camera) or the person performing the task (video model) verbally provides directions or descriptions of how to complete the task (i.e., “put the skillet on the stove”) while demonstrating this step on the video recording. Voice-over has been included in a number of studies which have effectively used video models (presentation of an entire task via video followed by a student performing the task) (Mechling, Gast, & Gustafson, 2009; Mechling & O’Brien, 2010; Taber-Doughty, Patton, & Brennan, 2008; Van Laarhoven, Van Laarhoven-Myers, & Zurita, 2007) and video prompts (presentation of a component step or cluster of steps followed by a student performing the individual step) (Cannella-Malone et al., 2006; Grice & Blampied, 1994; Mechling, Gast, & Fields, 2008; Mechling, Gast, & Seid, 2009; Norman, Collins, & Schuster, 2001; Sigafoos et al., 2005; Van Laarhoven, Johnson, Van Laarhoven-Myers, Grider, & Grider, 2009; Van Laarhoven, Kraus, Karpman, Nizzi, & Valentino, 2010) to teach functional skills.

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2010; Mechling & Gast, 2003; Murzynski & Bourret, 2007; Shipley-Benamou, Lutzker, & Taubman, 2002) and video prompting (Mechling & Seid, 2011) to teach functional skills to persons with ASD and moderate intellectual disability. It therefore remains unclear whether or not the inclusion of a verbal description is a critical component for task completion. Of particular interest is whether these cues are necessary for students with ASD and other intellectual disability who tend to be strong visual learners and weaker in the area of auditory learning (Quill, 1995). Results of a recent comparison study by West (2008) supports the theory that students with ASD are stronger visual learners. In that study it was found that three of four young students with ASD more effectively and efficiently transferred stimulus control from the instructor providing assistance to picture cues compared to verbal cues when prompting the functional skills of setting the table and setting up an art project. In addition to not being necessary for persons who are stronger visual learners, it may even be possible these verbal cues could be distracting to some students with a diagnosis of ASD or intellectual disability as they attempt to visually focus on the video model. The current study is in response to the recommendation of Rayner et al. (2009) who suggested that components of video modeling and video prompting, such as voice-overs and video perspectives, be further evaluated in the research. The purpose of this study was to evaluate performance of students with moderate intellectual disability on completion of fine motor, cooking related tasks when video models included verbal cues (voice-over) compared to completion of fine motor, cooking related tasks when the video models contained no verbal cues.

Method

Participants

Four students with a diagnosis of moderate intellectual disability participated in the study. Students were enrolled in a local school system transition program for young adults and ranged in ages from 19 to 22 years (Table 1). Students were imitative and screened earlier for fine motor skills such as turning, pulling, and cutting. All students had experience with computer based instruction and Wanda was a participant in a previous study evaluating the effects video models on a small PDA screen (Mechling & Gustafson, 2009).

Coleman was a 22 year, 1 month old male diagnosed with a moderate intellectual disability [IQ 52, Kaufman Brief Intelligence Test (K-BIT): Kaufman & Kaufman, 1990; Adaptive Behavior Composite Score 45, Vineland Adaptive Behavior Scales: Sparrow, Balla, & Cicchetti, 1984)]. Coleman communicated in complete sentences although he frequently replied with one or two word responses. He was more expressive when interacting with peers and when describing preferred activities (i.e., dancing, landscaping equipment). He was able to read and follow a daily agenda,
read functional words for meal preparation, restaurant menus, and grocery aisle signs. He could write legibly and complete basic information on job applications. He needed to increase his ability to write in small spaces and write his name in cursive. He was able to shop from a written list with assistance for less familiar items. He recognized coins and could count different combinations except quarters plus dimes. He could also count dollar bills to $50, but needed to learn to transition when counting from 59 to 60, 69 to 70 and so forth. He was able to read a calendar for information and used a personal calendar for time management. He rode the city bus and could locate three stops independently. He was independent in caring for his personal needs with some reminders to do so. He could prepare simple boxed meals in a microwave and his needs included use of additional kitchen appliances and planning and preparing a variety of meals.

Lionel was a 20 year, 10 month old male diagnosed with a moderate intellectual disability. His IQ test score was unattainable on the Stanford-Binet Intelligence Scales–Fourth Edition (Thorndike, Hagan, & Sattler, 1986). At age 5 years he obtained an age equivalence score of 13 months on the Bayley Scales of Infant Development (Bayley, 1993). His Adaptive Behavior Composite Score was 55 on the Vineland Adaptive Behavior Scales (Sparrow et al., 1984). He used single words and word approximations to communicate. He often said, “I don’t know” in response to questions. He was reported to be very quiet and did not initiate telling persons of his needs. He also used pictures to facilitate his expressive communication. He rarely made eye contact and frequently closed his eyes when spoken to or presented with a request. He could identify 19 words found on fast food menus and used a communication wallet with the words to order his meals when out in the community. He could also identify 26 community signs and point to information on his identification card when asked his name, address, and phone number. He could orally identify pictures of common grocery items and used a picture list to shop. His needs included navigation of aisles in the store and to continue work on survival reading skills. He could write eight of the ten letters of his first and last name. He could rote count and count objects up to five. He needed to increase his numeral identification skills and to use the skills functionally for tasks such as telling time with a digital watch and clock. He was learning to pay for purchases using large bills and to locate bus stops. He required physical assistance with his personal care needs including bathing and brushing his teeth and his needs included increasing his independent living skills. He walked slowly which presented difficulty when crossing streets and walking in the community. He could complete some household chores such as emptying a dishwasher, emptying the trashcan, and clearing the table. His needs included preparation of snacks and simple meals when supervised.

Neville was a 21 year old male diagnosed with a moderate intellectual disability (IQ 39 Stanford-Binet Intelligence Scales–Fourth Edition; Thorndike et al., 1986; Adaptive Behavior Composite Score 39; Vineland Adaptive Behavior Scales: Sparrow et al., 1984). Neville communicated with one word and short phrases in both Spanish and English and he had a diagnosis of disfluency. His English was better understood in context and by those familiar with him. He was described as being easily distracted, inattentive, and impulsive. He also became easily irritated when other students touched him or looked at him and displayed non-compliant and aggressive behaviors in addition to saying inappropriate words and comments. He was able to identify approximately 15 survival signs in addition to recognition of menu words and logos. His needs included increasing his recognition of functional words and signs in the community. He could trace letters and circle pictures to indicate answers on a page, but was unable to write independently. He could rote count up to 10, but did not recognize numerals. He enjoyed cleaning and volunteered to assist with such tasks in his classroom. He was attentive and concerned about his appearance (i.e., became upset if his clothes became soiled) and often wore a tie to school. He was able to care for his dressing needs, but required assistance with brushing his teeth and shaving. His needs further included crossing streets safely, entering and exiting a city bus, locating items on shelves when directed to the correct aisle, and paying for purchases using a large bill. He
could follow a picture schedule and was working on obtaining ingredients to prepare recipes using picture cues. His needs also included operation of small appliances such as can openers and cutting utensils and preparing simple meal items.

Wanda was a 19 year, 7 month old female diagnosed with a moderate intellectual disability (IQ 44, Stanford-Binet Intelligence Scales–Fourth Edition: Thorndike et al., 1986; Adaptive Behavior Composite Score 58, Vineland Adaptive Behavior Scales: Sparrow et al., 1984). Wanda was able to communicate in complete sentences and use “slang” and current vocabulary used by her peers. She was able to read sight words and community signs and words and use text functionally (i.e., read menu words and order at restaurants). She could write her personal information and basic two and three letter words. She was able to use her spelling skills to compose grocery lists. She used a calculator to complete simple addition and subtraction problems for budgeting purposes. She could tell time on the hour and half hour and could use the skill for time management (i.e., arriving at a destination at a specific time). She was working on increasing her ability to independently cross streets with traffic lights. She was working on counting coin and dollar combinations to $20 and used the next dollar strategy for making purchases. Her needs included identifying the amount of a purchase by looking at the monitor or cash register. She was able to care for all of her personal care needs and enjoyed shopping for clothing. Her needs included sorting and independently washing and drying clothing. She could follow simple recipes with pictures and words using a microwave, stove, and oven. Her needs included increasing her ability to plan and prepare meals.

Tasks, Materials, Equipment, and Settings

Fifteen cooking related tasks were used in the study: five for use with video models with verbal cues, five for use with video models without verbal cues, and five for use as the control set. Eight of the tasks used in the comparison sets were selected from those used in the studies by Mechling and Gustafson (2008, 2009) which compared picture and video prompts on task completion by students with moderate intellectual disability and those with autism spectrum disorders. In those studies the tasks were paired across two sets by task similarity so that tasks assigned to each procedure required relatively equal skills. This procedure was used to select two additional tasks (set digital timer and spray the loaf pan) for the comparison sets and the five tasks used for the control set (Table 2). The two tasks for using measuring cups were also adapted from the Mechling and Gustafson procedures so that water was poured from a plastic container rather than a sink. Color coded stickers were placed on the vegetable peeler and cheese grater to cue students where to hold the equipment and different colored measuring cups were used to represent different sizes for measuring amounts of water. No other adaptations were made to the cooking materials and equipment. Prior to the start of the study students were assigned to one set for video modeling with verbal cuing and the alternate set for video modeling with no sound (Table 1). Tasks ranged from 2 to 6 steps per task (Table 2).

Video recordings were made using a Canon ZR 830 digital video camcorder and edited using Windows Movie Maker. Each video was then inserted onto a separate PowerPoint slide and saved by set. Three different PowerPoint programs were made for each set in order to present the video models in different orders. Each set of 5 tasks (with and without verbal cueing) were displayed on a Dell Latitude × 300 laptop computer with an 11in. screen. Video models were made using an adult model completing each task. Models were made by using close up angles of the adult’s hands completing the task. Verbal cues (voice-over) corresponding to the task (i.e., “put in”) were inserted while making the video recordings by the person operating the digital camera. During video modeling without verbal cueing the volume on the laptop was turned to mute. The duration of the videos ranged from 9s to 28s. During video modeling sessions, the laptop was placed on a desk in front of the student and the cooking related materials from all sets were placed to the right and left of the laptop. Materials were placed in the same location across sessions (i.e., cooking timers and measuring cups placed to the right of the laptop). The inves-
TABLE 2
Tasks and task steps

| Set 1                                                                 | Set 2                                                                 | Control Set
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grate block of cheese with hand grater</td>
<td>Peel carrot with vegetable peeler</td>
<td>Slice block of cheese with cheese slicer</td>
</tr>
<tr>
<td>1. Select correct tool</td>
<td>1. Select correct tool</td>
<td>1. Select correct tool</td>
</tr>
<tr>
<td>2. Place cheese on grating side, red dot up</td>
<td>2. Hold handle with blue dot up</td>
<td>2. Place slicer on cheese</td>
</tr>
<tr>
<td>3. Rub cheese on grate 1 time</td>
<td>3. Place carrot on flat side</td>
<td>3. Pull across 1 time</td>
</tr>
<tr>
<td>4. Rub cheese on grate 2nd time</td>
<td>4. Pull peeler across carrot 1 time</td>
<td>4. Pull across 2nd time</td>
</tr>
<tr>
<td>5. Rub cheese on grate 3rd time</td>
<td>5. Pull peeler across carrot 2nd time</td>
<td>5. Pull across 3rd time</td>
</tr>
<tr>
<td>Set digital timer to 3 minutes</td>
<td>Set dial timer to 5 minutes</td>
<td>Set second digital timer to 5 minutes</td>
</tr>
<tr>
<td>1. Select correct timer</td>
<td>1. Select correct timer</td>
<td>1. Select correct timer</td>
</tr>
<tr>
<td>2. Touch &quot;M&quot; 1 time</td>
<td>2. &quot;Turn timer to 5&quot;</td>
<td>2. Touch &quot;seconds&quot; 1 time</td>
</tr>
<tr>
<td>3. Touch &quot;M&quot; 2nd time</td>
<td>3. Stop on 5</td>
<td>3. Touch &quot;seconds&quot; 2nd time</td>
</tr>
<tr>
<td>4. Touch &quot;M&quot; 3rd time</td>
<td>4. Touch &quot;seconds&quot; 3rd time</td>
<td>4. Touch &quot;seconds&quot; 3rd time</td>
</tr>
<tr>
<td>5. Stop</td>
<td>5. Touch &quot;seconds&quot; 4th time</td>
<td>5. Touch &quot;seconds&quot; 4th time</td>
</tr>
<tr>
<td>Cut off each end of celery with knife</td>
<td>Snap off ends of asparagus</td>
<td>Cut green beans in half</td>
</tr>
<tr>
<td>1. Select knife</td>
<td>1. Select asparagus</td>
<td>1. Select knife</td>
</tr>
<tr>
<td>2. Select celery</td>
<td>2. Snap off end of 1 asparagus</td>
<td>2. Select green beans</td>
</tr>
<tr>
<td>3. Cut off one end of celery</td>
<td>3. Snap off end of 2nd asparagus</td>
<td>3. Cut 1st green bean in half</td>
</tr>
<tr>
<td>5. Stop</td>
<td>5. Stop</td>
<td>5. Cut 3rd green bean in half</td>
</tr>
<tr>
<td>Measure 1/3 cup water from container</td>
<td>Measure 1/8 cup water from container</td>
<td>Measure 1 cup water from container</td>
</tr>
<tr>
<td>1. Select correct measuring cup</td>
<td>1. Select correct measuring cup</td>
<td>1. Select correct measuring cup</td>
</tr>
<tr>
<td>2. Pour water to top of rim</td>
<td>2. Pour water to top of rim</td>
<td>2. Pour water to top of rim</td>
</tr>
<tr>
<td>Spray loaf pan with cooking spray</td>
<td>Grease loaf pan with stick of butter</td>
<td>Flour loaf pan</td>
</tr>
<tr>
<td>1. Spray 1st side of pan</td>
<td>1. Rub 1st side of pan</td>
<td>1. Sprinkle flour with spoon on 1st side of pan</td>
</tr>
<tr>
<td>2. Spray 2nd side of pan</td>
<td>2. Rub 2nd side of pan</td>
<td>2. Sprinkle 2nd side of pan</td>
</tr>
<tr>
<td>5. Spray bottom of pan</td>
<td>5. Rub bottom of pan</td>
<td>5. Sprinkle bottom of pan</td>
</tr>
</tbody>
</table>
The investigator sat to the right of the student and when present the reliability data collector sat to the right and behind the student and investigator.

Experimental Design

The study used an adapted alternating treatments design (AATD) with baseline, comparison, and final treatment conditions to compare the effects of video modeling with and without verbal cuing on the completion of fine motor cooking related tasks with four students (Wolery, Gast, & Hammond, 2010). The dependent variable was the percent of cooking related tasks completed independently. The two treatments were applied to different, functionally independent tasks, equated for response difficulty (Table 2) (Holcombe, Wolery, & Gast, 1994). Experimental conditions included baseline, with a verbal task direction (i.e., “Cut the celery”) being given for each of the three sets, followed by video modeling with and without verbal cueing and continuation of the control set (comparison condition). A final treatment condition was then applied to the control set followed by a final best treatment condition in which the superior treatment (video modeling with verbal cues) was applied to the tasks which did not receive verbal cuing during the comparison condition.

Sessions were conducted individually across all conditions and video models with and without verbal cues were counter-balanced across tasks and students to control for task difficulty (Table 1). The two sets of tasks were counterbalanced across two pairs of two students with moderate intellectual disability so that Set 1 was presented to one pair of students using video models with verbal cues and the second pair to students using video models without verbal cues (vice versa for Set 2). Counterbalancing the interventions within sessions was used to minimize the possibility of sequencing effects.

The baseline condition served to demonstrate student performance on the 15 tasks without video modeling and equivalence of performance on the two sets (Sindelar, Rosenberg, & Wilson, 1985). Inclusion of the control set, its intermittent measurement during the comparison condition, and the final treatment condition were included to assess possible multiple treatment interference (threat to internal validity), the effects of history and maturation, and to provide intra-subject replication. The final best treatment condition served to detect multitreatment effects by evaluating the best treatment (video modeling with verbal cues) in isolation and to determine if providing the superior treatment to the alternate set (video modeling with no verbal cues) would produce any change in performance.

Response Measurement and Data Collection

Data were collected individually across all sessions and conditions on the number of task steps completed independently correct by each of the four students. Students’ performance on each task step was recorded as correct or incorrect. Students were provided 3s to initiate each task after watching the video model or receiving the task direction (baseline) and 1min to complete all steps of the task. Incorrect performance was recorded for failure to complete a step correctly within 1min. No instructor prompts were provided during baseline or comparison sessions in order to evaluate the isolated effects of using video models with and without voice-over.

Baseline Procedures

During baseline, each student was presented with the opportunity to attempt completion of each task independently. Each student’s ability to complete the 15 fine motor cooking related tasks was evaluated over three baseline sessions or until data stabilized prior to the use of video modeling (Wolery et al., 2010). Each session consisted of one trial per task and consisted of delivery of a task direction (i.e., “Grate the cheese”) followed by a 3s allotment for the student to initiate the task and 1 min. to complete the task steps. All three sets of materials were placed on the table to avoid process of elimination through use of target items (Mechling & Gustafson, 2008; 2009). Students received nonspecific verbal praise on the average of every third task (VR3) for general attending, attempts to perform tasks, and correct responses. Tasks were presented in blocks by set, however the order of the blocks varied across sessions.
Video Modeling, with and without Verbal Cueing (Voice-Over) Procedures

At the beginning of each session students sat in front of the laptop computer and the instructor delivered a task direction identical to the ones used during baseline and advanced the PowerPoint program to the first slide which delivered the video model. Each session consisted of one trial for each of the five fine motor cooking related tasks with voice-over and one trial for each of the five fine motor cooking related tasks without voice-over. Trials were presented in blocks by set. Sets were counterbalanced across days. The student was given 3s to initiate each task and 1min to complete the task steps. Failure to initiate the task, failure to complete the task steps in 1min, or incorrect performance of the task steps within 1min, resulted in the instructor presenting the next video model. Reinforcement was delivered identically to the baseline condition. The control set was conducted in the same manner using only verbal task directions and was presented intermittently throughout the comparison condition. Video modeling procedures continued for a minimum of six sessions or until data stabilized (no change in the number of task steps performed correctly) on two consecutive sessions across both procedures or until 100% correct performance was achieved on a set.

Final Treatment Procedures

Upon completion of the comparison condition, the fine motor cooking related tasks from the control set received video modeling with the superior treatment (verbal cuing) for 3 sessions. Procedures were identical to those used in the video modeling comparison condition except only the control set of tasks was evaluated using video modeling with verbal cues.

Best Treatment Procedures

Following the Final Treatment condition the Best Treatment condition served to evaluate possible multitreatment effects by applying the superior video treatment alone and measuring its effectiveness with the alternate set of tasks (Holcombe et al., 1994). During the Best Treatment condition, the single more effective intervention (video modeling with verbal cues) was applied to the alternate set for three sessions and procedures were identical to those used during video modeling comparison condition.

Reliability

During the study, the first author conducted all baseline and video modeling sessions and the second author collected reliability data. Reliability data on the dependent measure was collected on 33% of all baseline, video modeling comparison, final treatment, and best treatment sessions. Interobserver agreement was calculated by dividing the number of agreements on each step by the number of agreements plus disagreements and multiplying by 100. Mean interobserver agreement across all sessions was 98.9% (range = 95.7–100).

The reliability data collector also collected procedural fidelity data on independent variables which included: (a) instructor delivering the general task directions; (b) instructor presenting the correct video model or control set; (c) all materials present on the table; (d) waiting the appropriate amount of time for task initiation; (e) waiting for the appropriate amount of time for completion of task steps; (e) no delivery of prompts or cues; and (f) delivery of reinforcement. Reliability was calculated by dividing the number of correct variables by the total number of assessed variables and multiplying by 100 (Billingsley, White, & Munson, 1980). Mean procedural fidelity agreement was 99.8% (range = 98.6–100). All instructor procedural errors occurred in the category of not providing any prompts or cues. The instructor pointed to the screen one time when the student was distracted and replayed the video model on four occasions when the student was distracted or did not wait for the video to completely play. These were interpreted as providing a prompt.

Social Validity

At the conclusion of the study, results were shared with the classroom teachers (n = 3) and they were asked if they thought it would
be easier to develop video modeling programs with or without voice-over, what types of video modeling they would prefer to use, and whether they thought that video modeling would be an effective tool in their classrooms.

Results

The combined scores across the four participants showed a difference in performance in favor of video modeling with verbal cues: mean = 72.8% correct with verbal cues; mean = 61.8% correct without verbal cues. The percentage of task steps completed correctly for each set of five cooking related tasks, by individual students across each condition, is presented in Figures 1 and 2. Baseline data for each student remained low across the three sets of tasks prior to the comparison condition. Coleman was the only student who was able to complete more than 13% of task steps within one session. He consistently completed 21.1% of the five tasks assigned to the video modeling with verbal cue set.

When video modeling with and without verbal cues was introduced in the comparison phase, Wanda and Coleman’s performance improved considerably when using video models with verbal cues. Their performance also showed improvement when using video models without verbal cues although the level of change was not as abrupt. Coleman reached 100% accuracy with the verbal cue set on his second session and Wanda likewise reached 100% accuracy when using video models with verbal cues on her fourth instructional session. Overall, Wanda’s mean performance was 91.3% correct when using video modeling with verbal cuing and 75.4% correct without verbal cuing. Coleman’s mean performance was 98.3% when using video modeling with verbal cuing and 71.3% without verbal cuing. During the Best Treatment condition, when verbal cuing was applied to the alternate set of tasks that did not receive verbal cuing during the comparison condition, Coleman’s performance remained high (discounting any multitreatment effects on performance during the Comparison condition) and he was able to complete 100% of the task steps. He was unable to complete one step (stopping while grating the cheese) before delivery of the video model with verbal cuing. During the Best Treatment condition Wanda’s performance also remained high and she completed two additional steps (stopping while grating the cheese and rubbing one side of the loaf pan).

Although Lionel and Neville showed improved performance with the introduction of video modeling, the change was not as abrupt and each experienced a gradual change in his level of performance. Lionel was able to complete up to 60.9% of the task steps using video modeling with verbal cuing on his last two sessions and Neville’s best performance was 52.2% correct when no verbal cuing was provided. Overall Lionel’s mean performance when using video modeling with verbal cuing was 52.7% correct and 46.4% correct when using video modeling without verbal cuing. He also experienced overlapping data paths during the Comparison condition. Neville was the only participant whose mean performance was greater when using video without verbal cuing (48.6%) compared to video modeling with verbal cuing (32.6%). During the Best Treatment condition, introduction of verbal cues had no effect on Lionel’s performance with the set of tasks that did not receive verbal cuing during the comparison phase and Neville completed one additional step on the first session and then reverted back to his previous level of performance on the tasks.

Final Treatment

Performance when completing the control set tasks remained low throughout the Baseline and Comparison condition although Coleman completed up to 40% of the five task steps prior to introduction of video modeling with verbal cues. The other three students were unable to complete more than 8% of the task steps prior to introduction of video modeling. When video models with verbal cues were added to the set during the Final Treatment condition, all participants showed an improvement in performance therefore strengthening the internal validity of the study.

Social Validity

All three teachers reported that they felt it would be easier to develop voice over video
Figure 1. Percentage of steps performed independently correct by Coleman and Lionel across all conditions. Open circles represent video with verbal cues; open squares represent video without verbal cues; open triangles represent the control set. Open squares in the Best Treatment condition represent application of verbal cues to the set of tasks not receiving verbal cues during the Comparison condition.
Figure 2. Percentage of steps performed independently correct by Neville and Wanda across all conditions. Open circles represent video with verbal cues; open squares represent video without verbal cues; open triangles represent the control set. Open squares in the Best Treatment condition represent application of verbal cues to the set of tasks not receiving verbal cues during the Comparison condition.
recordings, that they preferred to use video modeling with voice over recordings, and that they thought video with voice over recordings would be more effective when teaching their students.

**Discussion**

The purpose of this study was to compare the effects of video modeling with and without verbal cuing (voice over) on the completion of cooking related task steps by four young adults with moderate intellectual disability. Effectiveness was measured by comparing the individual and combined percentages of task steps completed independently. Both video interventions were effective in increasing independent completion of task steps across all four participants, but video modeling with verbal cues seemed to be more effective for three of the participants. Neville was the only participant who completed more task steps correctly when using video modeling without verbal cues. Additionally, when verbal cues were introduced to this set during the Final Treatment condition, he completed one additional step correctly, but he was unable to maintain that level of performance over the next two sessions. Similarly, although Lionel completed a higher percentage of task steps with verbal cues, the addition of verbal cues during the Final Treatment condition produced no change in his performance. These individual outcomes demonstrate that individual differences in student characteristics, including ability level, may play an important role in determining components of video instruction that may be more critical to some learners. Nick and Lionel each exhibited lower cognitive abilities than Wanda and Coleman.

Further, it appears that certain task requirements involving variables such as amounts of time (i.e., stir for 10s, wait 1 min) or number of repetitions (i.e., grate 3 times, cut 4 beans) may be better represented by video models which include verbal cues. In the current study Coleman and Wanda were unsuccessful in completing the steps involving number of repetitions (grate the cheese 3 times, grate the carrot 3 times) until the verbal cue (“one, two, three, stop”) was added during the Best Treatment condition.

Although the current study is a preliminary attempt to isolate components of video technology, a recognized limitation of the study is the number of participants and that each had a diagnosis of moderate intellectual disability. This limits the generalizability to other students with moderate intellectual disability and other disability groups such as those with autism spectrum disorders. Further, different results may occur when verbal cuing is examined with younger students.

Another question raised by the results of the study concerns task requirements. The fine motor cooking related tasks in this study were evaluated and matched across sets based on level of difficulty. In addition, sets were counterbalanced across video modeling interventions and pairs of students (Table 1) to control for effects of task difficulty. Table 3 provides an analysis of the percentage of errors committed across each task by the four participants. Results indicate that the tasks were matched across the two sets by relatively similar levels of difficulty; however some pairs (types of tasks) presented more difficulty to students. Coating the loaf pan accounted for 29.5% of the errors followed by use of tools to grate the cheese and carrots (27.8%) and setting a digital and analog timer (23.7%). Cutting and snapping off the ends of the celery and asparagus (15.9%) and measuring liquids (1.2%) resulted in the least amount of committed errors. These results have implications for further research examining components of video modeling in relationship to types of tasks with differing motor and/or cognitive challenges.

Although there is an increasing amount of information supporting use of video technology as an instructional tool for persons with disabilities, researchers are just beginning to address the isolation of video variables in order to determine which components are most effective with different learners. This study was an early attempt to determine the extent to which verbal cuing is a critical component for delivering instruction through video technology. While the results suggest its importance with young adults with moderate intellectual disability, much more research is needed in this area.
**References**


### Table 3

Error analysis. Percentage of errors across participants for each fine motor cooking related task

<table>
<thead>
<tr>
<th>Set 1</th>
<th>Percent Error</th>
<th>Set 2</th>
<th>Percent Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spray loaf pan with cooking spray</td>
<td>14.5</td>
<td>Grease loaf pan with stick of butter</td>
<td>15</td>
</tr>
<tr>
<td>Grate block of cheese with hand grater</td>
<td>14.5</td>
<td>Peel carrot with vegetable peeler</td>
<td>13.3</td>
</tr>
<tr>
<td>Set digital timer to 3 minutes</td>
<td>12.7</td>
<td>Set dial timer to 5 minutes</td>
<td>11.0</td>
</tr>
<tr>
<td>Cut off each end of celery with knife</td>
<td>9.2</td>
<td>Snap off ends of asparagus</td>
<td>8.7</td>
</tr>
<tr>
<td>Measure 1/3 cup water from container</td>
<td>0</td>
<td>Measure 1/8 cup water from container</td>
<td>1.2</td>
</tr>
</tbody>
</table>

**TABLE 3**

Error analysis. Percentage of errors across participants for each fine motor cooking related task

- Spray loaf pan with cooking spray: 14.5%
- Grate block of cheese with hand grater: 14.5%
- Set digital timer to 3 minutes: 12.7%
- Cut off each end of celery with knife: 9.2%
- Measure 1/3 cup water from container: 0%

- Grease loaf pan with stick of butter: 15%
- Peel carrot with vegetable peeler: 13.3%
- Set dial timer to 5 minutes: 11.0%
- Snap off ends of asparagus: 8.7%
- Measure 1/8 cup water from container: 1.2%


Received: 24 February 2011
Initial Acceptance: 21 April 2011
Final Acceptance: 25 May 2011