Abstract: The purpose of this study was to explore the effectiveness of video self-modeling (VSM) to teach chained job tasks to individuals with intellectual disability in community-based employment settings. Initial empirical evaluations have demonstrated that VSM when used in combination with other instructional strategies, are effective methods to teach chained tasks to individuals with intellectual disability. However, no study has investigated the effectiveness of VSM as a stand-alone intervention to teach chained tasks. In this study, the effectiveness of VSM alone to teach chained job tasks was first evaluated before the addition of other instructional strategies (i.e., instructor feedback and practice) to the VSM intervention package. Three adults with intellectual disability participated in this study. A within participant multiple probe design across targeted job tasks, replicated across the three participants, was used to evaluate the effectiveness of VSM in this study. All of the participants demonstrated increased task acquisition with the VSM intervention; however, the effectiveness of VSM alone, or in combination with feedback and practice, varied across participants and job tasks. Limitations of the study and implications for future research are discussed.

For many adults with intellectual disability, having a job is a significant stepping-stone in life. Aside from providing for a means towards independent living, the employment setting allows for the formation of meaningful friendships and community participation. Without a doubt, employment is an important factor to the quality of life of an adult with intellectual disability (Rusch & Millar, 1998). At a minimum, in order to obtain and maintain employment, adults with intellectual disability must be able to demonstrate their ability to acquire and maintain job skills with a certain level of proficiency and job independence. A substantial body of research has focused on strategies for teaching employment skills to individuals with intellectual disability (Test & Mazzotti, 2011). Many job skills (e.g., photocopying, food preparation, cleaning) are chained tasks that require an individual to perform a series of steps to complete the whole task or a work routine. Historically, systematic instruction has been commonly used to teach chained job tasks to adults with intellectual disability (Snell & Brown, 2011). With systematic instruction, a task analysis is first carried out to analyze and break the job task into multiple individual steps, then a prompting procedure (e.g., constant time delay, system of least prompts, simultaneous prompting) is used to teach the individual steps (e.g., Chandler, Schuster, & Stevens, 1993; Maciag, Schuster, Collins, & Cooper, 2000). In addition, antecedent prompts (e.g., picture, audio prompts) have been used to facilitate the acquisition of a complex job tasks by providing employees with prompts for each step of the task, and then teaching them to use the prompts independently to guide their own performance (e.g., Cihak, Kessler, & Alberto, 2007; Riffel et al., 2005).

More recently, with the advent of video technology, researchers have begun to explore the feasibility and effectiveness of video strategies, such as, video modeling, video prompting, and computer-based video...
instruction, for promoting the acquisition and maintenance of chained tasks (Mechling, 2005). Research using video technology with individual with intellectual and developmental disability has focused on teaching daily living skills (e.g., Goodson, Sigafos, O’Reilly, Canella, & Lancioni, 2007; Shipley-Benamou, Lutzker, & Taubman, 2002), and to some extent, employment skills (e.g., Allen, Wallace, Renes, Bowen, & Burke, 2010; Mechling & Ortega-Hurndon, 2007).

Video-modeling, in particular, has received much attention recently. Video modeling is the procedure where a participant watches a video demonstration of a skill and is then required to perform the skill at a later time. The video model is usually a same-age peer or a familiar instructor; however, subjective viewpoint videos, where the video recordings are made from the participant’s point of view or eye level, have also been used. Research evaluating the effectiveness of video-modeling with chained tasks typically included additional instructional strategies, such as, behavioral rehearsal and response prompting systems (e.g., Branham, Collins, Schuster, & Kleinert, 1999; Van Laarhoven, Zurita, Johnson, Grider, & Grider, 2009). The addition of other instructional strategies occurred either during the video viewing session or the performance observations, and, sometimes, both. However, video-modeling alone, without the addition of other instructional strategies, has also been found to be effective in teaching chained tasks (e.g., Mechling, Gast, & Gustafson, 2009; Shipley-Benamou et al., 2002).

Applications of video-modeling to chained tasks have been emerging, however, there has been limited demonstrations of using video-modeling in employment settings (e.g., Allen et al., 2010). One video strategy that has yet to be explored for teaching chained job tasks in employment settings is video self-modeling (VSM). Instead of observing a model perform a task on video, as in video modeling, VSM involves the process of repeated observation of oneself on edited videotapes that depict only appropriate or desired behaviors (Dowrick, 1991). The strongest theoretical basis for VSM is social learning theory (Bandura, 1969) that suggests that learning can occur by observing the behavior of others and the consequences they experience. In addition, according to social cognitive theory (Bandura, 1986), the closer the model resembles the observer, the greater the effect it will have on the target behavior. In VSM, since the observer is also the model, the anticipated effect on the target behavior and feelings of self-efficacy, should be theoretically enhanced (Bandura, 1986; 1997).

Although VSM has not been evaluated in employment settings with individuals with intellectual disability, VSM has been examined and found to be effective for a variety of training and therapeutic applications with diverse populations (such as children and adults with or without disabilities) and settings (including home, school and community settings) (e.g., Dowrick, 1999; Hitchcock, Dowrick, & Prater, 2003; Meharg & Woltersdorf, 1990). Research studies examining VSM have demonstrated its effectiveness with the following target behaviors: improving physical skills (e.g., Dowrick & Raeburn, 1995), teaching academic skills (e.g., Dowrick, Kim-Rupnow, & Power, 2006), reducing problem behaviors, and increasing prosocial skills (e.g., Buggey, 2005; Wert & Neisworth 2003).

VSM has strong potential for job skill training in employment settings. First, VSM research studies conducted with adults with traumatic brain injury in home settings (e.g., McGraw-Hunter, Faw, & Davis, 2006) and children with autism in school settings (e.g., Buggey, 2005; Wert & Neisworth, 2003) have shown strong maintenance effects and good generalization effects across novel tasks and across settings. Additionally, once a VSM video has been produced, it could be used to program for maintenance. Third, VSM interventions are unintrusive, and therefore may be a good match for inclusive employment settings. Except for time used to capture the videos, the VSM intervention itself may only require viewing a 2–5 minute video outside of actual work situation (Dowrick, 1991). Thus, if effective, the employee can learn new job skills without direct prompting from the instructor or job coach during actual work situations. This has the potential of reducing stigma and time needed for training on the job. Lastly, in studies where social validity assessment was conducted, participants evalu-
ated the intervention positively (e.g., Buggey, 2005; Cihak & Schrader, 2008).

Few studies have evaluated VSM with chained tasks but these studies have found that the VSM interventions were effective for promoting task acquisition (i.e., Cihak & Schrader, 2008; Lasater & Brady, 1995; McGraw-Hunter et al., 2006; Van Laarhoven et al., 2009). However, these research studies included other instructional strategies (e.g., behavior rehearsal, system of least prompts) as part of the VSM intervention package and they did not assess the effectiveness of VSM alone to teach chained tasks. Therefore, it was not known if VSM alone, without the addition of other instructional strategies, would be sufficient for task acquisition. While, in comparison, few studies have shown that video-modeling alone (e.g., Mechling et al., 2009; Shipley-Benamou et al., 2002), without the addition of other instructional strategies, can be effective in teaching chained task to children and young adults with disabilities, the number of demonstrations are limited.

The purpose of this study was two fold. The first purpose was to evaluate the use of VSM to teach chained job tasks to individuals with intellectual disability in employment settings. The second purpose was to continue to systematically explore the feasibility and effectiveness of using VSM alone or in combination with other instructional strategies to enhance effectiveness. The effectiveness of VSM alone was first evaluated by implementing VSM without any other instructional strategies. If VSM alone was not sufficient to increase acquisition of a chained task, instructor feedback was added to the VSM intervention. Finally, if VSM and feedback did not lead to task acquisition, the participants would practice the steps of the tasks during video viewing. Both instructor feedback and practice occurred only during video viewing session and not during the performance observations.

Method

Participants

Three adults (2 male and 1 female) with intellectual disability, receiving services from a university-affiliated supported employment program, participated in this study. The supervisors of the supported employment program nominated the participants, and the first author conducted further observations to determine if the nominated individual met the selection criteria. An individual was selected if he/she had: (a) regularly scheduled employment/job training participation, (b) the ability to model behavior observed on short video clips, and (c) no demonstrated aversion to viewing self on video.

Daniel was a 53-year-old male with mild intellectual disability and bipolar disorder. Daniel had good verbal and gross motor skills and was able to complete many tasks in his daily routines independently. At the beginning of the study, Daniel had been working part time at the thrift store as a part time janitor and merchandise associate for about one year. His job duties at the thrift store included sorting, arranging, and shelving merchandise, and simple janitorial tasks (e.g. sweeping, emptying the trash, cleaning the restrooms). Daniel was easily distracted and required regular prompts from his job coach to remain on-task. Daniel would often times lose his spatial orientation during some of his job tasks (e.g., sweeping the floor). For example, during his job task of removing empty hangers from a clothing rack, instead of continuously working and moving towards his right, he would go from right to left to right again, thus not progressing through the whole rack at a competitive rate. Daniel also required constant reminders from his job coach regarding appropriate social behaviors in the workplace. Daniel’s employment goals were to expand his work responsibilities and to improve his competitive work rate.

Jonathan was a 47-year old male with mild intellectual disability. Jonathan was living independently in his apartment with part-time supports from a life-coaching agency. He was capable of independently completing most of his daily living activities. At the beginning of the study, Jonathan had been working part time at a department store for about eight years. His job responsibilities included opening boxes of merchandise, tagging the items with security tags, displaying the merchandise, and janitorial tasks. His job tasks were performed mainly in the warehouse of the department store. He required only minimal assistance from his job coach to complete his job.
tasks. Jonathan’s employment goals were to expand his job responsibilities and to maintain his work performance rate.

Maria was a 28-year-old female with mild intellectual disability and autism. Maria was primarily receiving one-on-one job training from her job coach at the supported employment office. In addition, she was participating in job training experiences in the community including a thrift store. Maria had good verbal skills but she was shy and often appeared withdrawn in social situations. Although Maria was able to perform many of her job tasks, she tended to wait for prompts or assurance from her job coach before she proceeded with a task. Maria’s employment goals were to expand her work experiences, increase her independence at the job training settings, and secure a paid job.

**Settings**

*Instructional settings.* VSM sessions (i.e., video viewing and instruction) took place in a quiet area at the employment setting for both Daniel and Jonathan. For Maria, instruction took place in a quiet office space in the same building where the supported employment program was located. During instruction, only the instructor and the participant were present, with the exception of procedural fidelity checks at which times one additional observer was present.

*Performance observation settings.* Observations of the participant’s performance of the targeted job tasks were conducted in the relevant areas at the participant’s employment or job training setting. For Daniel, performance observations took place in the warehouse and the book room of the thrift store. For Jonathan, performance observations took place at the men’s fitting room and clothing department, shoe department, and the staff training room. For Maria, performance observations took place at the following places within the university building where supported employment program office was located: target office space, the hallways of the university building, and the photocopy room. During performance observations, only the job coach and the participant were present in the immediate vicinity except when interobserver agreement and procedural fidelity checks were being conducted at which times one additional observer was present. However, depending on the employment setting, other people (e.g., co-workers, customers) were occasionally present during performance observations.

*Videotaping settings.* Videotaping took place at the same settings where performance observations took place for each participant.

**Target Job Tasks**

Selected job tasks or routines were relevant to the participant’s employment or job training. To select the job tasks for training, the first author first obtained recommendations of potential target job tasks from the job coaches and supported employment supervisors. Then the first author observed the participant at his or her employment or job training setting to ascertain the participant’s current level of job performance. After that, the first author collaborated with the job coach and supervisors to finalize the job tasks for each participant.

Two chained job tasks were selected for Daniel (three job tasks were initially selected for Daniel but only two job tasks were targeted for instruction) and three chained job tasks were selected each for Jonathan and Maria. A task analysis was conducted to break each job task into smaller steps. Through discussions with the respective job coach and observations of each participant working at his or her employment or job-training site, the first author modified the task analyses based on the participant’s skill level. Table 1 provides the task analysis of the selected job tasks for each participant. The job tasks for the participants ranged from 9–15 steps.

**Dependent Measure and Recording Procedures**

*Percentage of steps completed correctly.* The primary dependent measure was the percentage of steps completed correctly on the task analysis for the job task or routine. A correct step was scored when the participant independently completed the step as operationally defined (See Table 1). An incorrect step was scored when the participant did not perform the step as operationally defined or did not respond within five seconds of the previous step or initial cue to begin. To determine the percentage of steps completed correctly for
Task Analysis of Job Skills for the Participants

<table>
<thead>
<tr>
<th>Daniel</th>
<th>Jonathan</th>
<th>Maria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Job Skill 1: Shoe Cleaning</strong></td>
<td><strong>Job Skill 1: Fitting Room</strong></td>
<td><strong>Job Skill 1: Conference Packet</strong></td>
</tr>
<tr>
<td>1. Pick up shoe cleaning spray*</td>
<td>1. Check every fitting room and remove all items*</td>
<td>1. Open up sample folder*</td>
</tr>
<tr>
<td>2. Spray once inside of both shoes*</td>
<td>2. Bring all items to the outside rack*</td>
<td>2. Open a new folder*</td>
</tr>
<tr>
<td>3. Pick up cloth*</td>
<td>3. Match clothing item (Item 1) to hanger by size*</td>
<td>3. Pick up a sheet of paper from each tray*</td>
</tr>
<tr>
<td>5. Place inside of other shoe</td>
<td>5. Match Item 2 to hanger by size*</td>
<td>5. Pick up a booklet*</td>
</tr>
<tr>
<td>6. Pick up shoe cleaning spray*</td>
<td>6. Hang Item 2 correctly</td>
<td>6. Place booklet in the correct pocket</td>
</tr>
<tr>
<td>7. Spray once on the front/top of both shoes*</td>
<td>7. Match Item 3 to hanger by size*</td>
<td>7. Pick up a CD*</td>
</tr>
<tr>
<td>8. Pick up cloth*</td>
<td>8. Hang Item 3 correctly</td>
<td>8. Place CD in the correct pocket</td>
</tr>
<tr>
<td>9. Wipe shoe exterior (front, sides, back)</td>
<td>9. Walk out of fitting room with all items*</td>
<td>9. Pick up a business card*</td>
</tr>
<tr>
<td>10. Wipe exterior of other shoe</td>
<td>10. Place item correctly on the rack</td>
<td>10. Paperclip business card to the pocket</td>
</tr>
<tr>
<td>11. Place shoes together*</td>
<td>11. Place item correctly on the rack</td>
<td>11. Place completed packet upright in the box</td>
</tr>
<tr>
<td>12. Take a rubber-band*</td>
<td>12. Find the correct rack for the 1st item*</td>
<td><strong>Job Skill 2: Paper Shredder</strong></td>
</tr>
<tr>
<td>13. Wrap rubber-band around both shoes</td>
<td>13. Place item correctly on the rack</td>
<td>1. Press button to turn shredder off (green light goes off)***</td>
</tr>
<tr>
<td><strong>Job Skill 2: Book Room</strong></td>
<td>14. Find the correct rack for the 2nd item*</td>
<td>2. Lift up the shredder cover</td>
</tr>
<tr>
<td>1. Pick up all misplaced items and place into the shopping basket*</td>
<td>15. Place item correctly on the rack</td>
<td>3. Remove all the paper clips and staples*</td>
</tr>
<tr>
<td>2. Walk (with the basket) to a specific corner of the bookshelf</td>
<td><strong>Job Skill 2: Shoe Storing</strong></td>
<td>4. Count 5 pieces of paper</td>
</tr>
<tr>
<td>3. Place basket on the floor by the bookshelf</td>
<td>1. Match a pair of shoes to its respective box (Pair 1)*</td>
<td>5. Put the stack of paper into the shredder</td>
</tr>
<tr>
<td>4. Place all books in the specific corner of the bookshelf</td>
<td>2. Place shoes correctly in the box</td>
<td>6. Repeat until the stack of paper has been shredded*</td>
</tr>
<tr>
<td>5. Walk (with the basket) to the CD &amp; cassette box</td>
<td>3. Match a pair of shoes to its respective box (Pair 2)*</td>
<td>7. Close the shredder cover</td>
</tr>
<tr>
<td>6. Place basket on the CD &amp; cassette box</td>
<td>4. Place shoes correctly in the box</td>
<td>8. Press button to turn shredder off (green light goes off)***</td>
</tr>
<tr>
<td>7. Place all CDs in the CD pile</td>
<td>5. Match a pair of shoes to its respective box (Pair 3)*</td>
<td>9. Open shredder door*</td>
</tr>
<tr>
<td>8. Place all cassette tapes in the cassette pile</td>
<td>6. Place shoes correctly in the box</td>
<td>10. Remove the container*</td>
</tr>
<tr>
<td>9. Walk (with the basket) to the video shelf</td>
<td>7. Find the correct area for Box 1 (match shoebox)*</td>
<td>11. Place container back into the shredder*</td>
</tr>
<tr>
<td>10. Place basket on the floor by the video shelf</td>
<td>8. Check the style of the shoe (open box to look at style)*</td>
<td>12. Place all shredded paper into the recycling bin*</td>
</tr>
<tr>
<td>11. Place all videotapes on the video shelf</td>
<td>9. Place Box 1 back into the correct shelf</td>
<td>13. Walk back to the room with the container*</td>
</tr>
<tr>
<td>12. Pick up all misplaced non-Book Room merchandise (clothing/shoes) and place items in the basket*</td>
<td>10. Find the correct area for Box 2*</td>
<td>14. Place container back into the shredder*</td>
</tr>
<tr>
<td>13. Walk (with the basket) to the back of the store</td>
<td>11. Check the style of the shoe*</td>
<td>15. Close shredder door</td>
</tr>
<tr>
<td><strong>Job Skill 3: Computer</strong></td>
<td>12. Place Box 2 back into the correct shelf</td>
<td><strong>Job Skill 3: Photocopier</strong></td>
</tr>
<tr>
<td>1. Left click &quot;intranet&quot; + press Enter*</td>
<td>13. Find the correct area for Box 3*</td>
<td>1. Enter 5 digit password (refer to notecard)*</td>
</tr>
<tr>
<td>2. Left click URL address bar*</td>
<td>14. Check the style of the shoe*</td>
<td>2. Touch &quot;ok&quot; on the screen*</td>
</tr>
<tr>
<td>3. Scroll down and click &quot;@@@.com&quot;*</td>
<td>15. Place Box 3 back into the correct shelf</td>
<td>3. Remove post-it-note from the original copy*</td>
</tr>
<tr>
<td>4. Left click &quot;Personal Information&quot;*</td>
<td><strong>Job Skill 3: Paper Shredder</strong></td>
<td>4. Place original copy facing up on the top loader*</td>
</tr>
<tr>
<td>5. Enter Login ID:*</td>
<td>1. Press button to turn shredder off (green light goes off)***</td>
<td>5. Enter &quot;# of copies&quot; on the keypad (refer to post-it-note for the #)*</td>
</tr>
<tr>
<td>6. Enter Pin:*</td>
<td>2. Lift up the shredder cover</td>
<td>6. Press start (green) button*</td>
</tr>
<tr>
<td>7. Left click &quot;log off&quot;</td>
<td>3. Remove all the paper clips and staples*</td>
<td>7. Take the original copy</td>
</tr>
<tr>
<td><strong>Job Skill 1: Conference Packet</strong></td>
<td>5. Put the stack of paper into the shredder</td>
<td>9. Press yellow and red keys simultaneously to end session</td>
</tr>
</tbody>
</table>

Note. * Critical step that will affect the performance of subsequent steps.
each participant, the number of correct steps was divided by the total number of steps in the task analysis and multiplied by 100%.

Performance observations. Data were collected on the dependent measure during performance observations of the participant at the participant’s employment or job-training site for the duration of time required for the completion of the job task or routine. Performance observations occurred once daily, at least four times per week consistent with the participant’s regular work schedule throughout all phases of the study. Each performance observation consisted of only one trial or one opportunity to engage in the task analysis. The job coach set up the relevant area for performance observations with materials for the job task before the session began. Performance observation procedures were held constant across all phases of the study. See Baseline 1 for performance observation procedures. During performance observations, the job coach observed the participant and recorded the steps completed correctly and incorrectly by the participant using a data sheet on a clipboard.

Observer and Observer Training

Three job coaches employed by the supported employment program served as the primary observers during performance observations. The job coaches were selected as the primary observers to reduce the intrusiveness of having multiple observers at the employment or job training setting. The primary observers were trained on the steps of the task analyses, definitions of correct responses for each step, and methods of recording. They were also provided with examples of task related and non-task related prompts, and they were trained on the correct protocol during data collection. During data collection, the primary observers were directed to only provide non-task related prompts (e.g., “Just try your best”) and not task-related prompts (i.e., prompt initiation of a step in the task analysis) to the participants. The use of role-playing in the performance observation settings was utilized for observer training. Each observer was required to meet a criterion of 90% interobserver agreement for the primary dependent measure for at least two consecutive practice sessions. The observer was also required to meet a criterion of 100% procedural fidelity for the procedures (i.e., not providing any task-related prompts for each step of the task analysis) during the job task for at least two consecutive practice sessions.

Experimental Design

A within participant multiple probe design (Gast & Ledford, 2010) across targeted job tasks, replicated across three participants, was used to evaluate the effectiveness of VSM alone and combined with feedback and practice to teach chained job tasks. The multiple probe design was selected to avoid possible reactive effects from frequently requiring the participant to perform the second job task during a prolonged baseline condition. The experimental phases of this design consisted of (a) Baseline 1, (b) Baseline 2 (baseline assessment after videotaping), (c) VSM alone, (d) VSM plus feedback (VSM 2), (e) VSM plus feedback and practice (VSM 3), and (f) Maintenance.

Experimental Conditions

Baseline 1. During Baseline 1, performance observations began when the job coach provided the participant with an initial cue to begin the task. A total observation method was implemented. The participant was allowed to complete the task until either (a) s/he indicated verbally that s/he was done with the task, (b) s/he stopped responding for 15s, or (c) s/he could not move on to the next step due to an incomplete critical step. Similar to a single opportunity probe (Brown & Snell, 2011), whenever the participant made an error on a step, the job coach did not correct the task materials to allow for further responses. The job coach did not provide any instructional feedback. When the participant performed a step correctly, the job coach marked the step as correct on the data sheet. To insure sufficient motivation for the participant to continue through the task analysis, the job coach provided intermittent general praise to the participant for staying on task. When the participant asked a question that was related to the job task (e.g., “What should I do now?”), the job coach provided a general
statement to the participant to continue on with the task (e.g., "just try your best").

If the participant made an error (i.e., did not complete the step as operationally defined), the job coach marked that step as incorrect, without providing any feedback on incorrect responses. If the participant made an error during a critical step (See Table 1), without providing any feedback on incorrect responses, the job coach marked that step and all following steps that were linked to the critical step as incorrect. At the end of the performance observation, the job coach thanked the participant for working but did not provide any specific feedback regarding task performance.

**Creation of the video.** After Baseline 1 and prior to Baseline 2, in order to create the video for training, the participant was videotaped performing all the steps of the job task at his or her employment or job training setting using two different sets of materials for the job (e.g., different shoes for shoe cleaning). The video clips were then edited and two final edited videos were created for each job task for each participant.

**Videotaping.** A Flip Ultra™ camcorder, Canon PowerShot A570 IS digital camera, and tripod were used during videotaping. During videotaping, as the step was being videotaped, the first author and job coach directed the participant to perform each step of the job task. In order to prevent exposing the participant to the correct sequence, which may have influenced participant’s performance in the subsequent baseline phase, videotaping of each step did not follow the correct sequence in the task analysis. Additional narrations for the completion of each step in the task analysis were recorded with the participant separately.

For each step of the task, multiple video clips were shot to allow the researchers the flexibility of choosing the clearest video clips to be used in the final edited video. In addition, the multiple video clips with different exemplars also provided for variation in the final edited videos. The variation of materials shown in the different final edited videos was intended to reduce participant’s boredom and increase generalization of the skill. Additional video clips of the participant introducing himself or herself, smiling, and shots of the supervisor thanking the participant for a job well done were also videotaped. These video clips were added for aesthetic and motivational purposes.

**Video editing.** The iMovie HD6 software was used for video editing. During video editing, any incorrect or extraneous steps or verbalizations from the participant, job coach and the first author were edited from the video. Narrations of the correct steps were added to the video. Background music at a low volume was added to the video. Two final edited videos for each job task were created. The videos were formatted into a DVD movie and burned onto a DVD+R. Video editing took around 10 to 20 hours for each set of videos. Two doctoral students in special education evaluated the final edited videos and determined that all the steps of the task were present and clearly observable. When needed, more editing was done to improve the clarity of the videos.

**Edited videos.** A final edited video began with the participant stating the job task that s/he would be doing. Then the video showed clips of the participant performing each step of the task while the steps were being narrated simultaneously. In between natural segments of the task analyses in the video, a black screen with a number indicating the segment number was shown for several seconds. The video ended with a clip of the supervisor thanking the participant for a job well done. Throughout the video, background music at a low volume was audible. The two final edited videos of each job tasks were similar in length. The final videos ranged in length from 1 min 23 sec (i.e., Photocopier video for Maria) to 5 min 18 sec (i.e., Fitting Room video for Jonathan) because some job tasks, such as routines, took longer to complete.

**Baseline 2.** Performance observations during Baseline 2 were conducted exactly as in Baseline 1. The purpose of the Baseline 2 was to determine whether there was a change in performance in completing the job task after making the video. If the first three data points in Baseline 2 were similar to or lower than the data obtained in Baseline 1, VSM alone was implemented. If the data obtained in Baseline 2 showed an increase when compared with the data obtained in Baseline 1, then Baseline 2 continued until the performance stabilized.
VSM alone. In this intervention phase, the participant was asked to watch a video created in the prior phase. The video was presented on a Philips 7-inch screen portable DVD player. The first author conducted the instructional sessions. Instructional sessions took place once daily, at least four days a week. The instructor alternated the two final edited videos, thus the participant would watch each final edited video on alternate instructional sessions. During each instructional session, the participant would watch a video once, and immediately after viewing the video, the participant was given a choice to watch the video again. Within each instructional session, the participant watched the video at least once, and at the most three times.

At the end of the instructional session, the instructor directed the participant to perform the job task just as s/he had seen on the video. Immediately after the instructional session, the job coach observed the participant perform the job tasks during the regularly scheduled work routine. Performance observation procedures were conducted exactly like Baseline 1.

VSM alone procedures continued until the participant was able to correctly and independently complete 90% of the steps in the task analyses for three consecutive performance observations. If the participant achieved criterion with VSM alone, the Maintenance phase followed and further intervention phases were not implemented.

VSM plus feedback (VSM 2). If the participant reached a stable trend with no improvement demonstrated, then a second phase of the intervention, VSM 2, was initiated.

During each VSM 2 session, the instructor directed the participant to watch the video. For each step of the task analysis that the participant was able to perform independently during the previous performance observation, the instructor provided praise to the participant for performing the step correctly. For steps that the participant performed incorrectly during the previous performance observation, the instructor first provided feedback using procedures described in VSM 2. Then the instructor requested the participant to demonstrate the step that was shown on the video. If the participant performed the step correctly, the instructor provided specific verbal praise. If the participant was not able to model the step, the instructor modeled the step for the participant. After because it can get very dirty inside the shoe.”), and (c) questioned the participant on the step completed in the video clip. If the participant provided the correct answer, the instructor provided specific verbal praise. If the participant was not able to provide the correct answer, the instructor provided the correct answer.

At the end of the whole video, the instructor asked the participant if s/he would like to watch the video again. If the participant chose to watch the video again, the instructor replayed the whole video again. The procedures for the first viewing were implemented in the second viewing. The participant watched the video at least once and at most three times during each instructional session.

Immediately after the VSM 2 instructional session, performance observation procedures were conducted exactly like Baseline 1. VSM 2 procedures continued until the participant was able to correctly and independently complete 90% of the steps in the task analysis for three consecutive performance observations. If the participant achieved criterion with VSM 2, the Maintenance phase was conducted and VSM3 was not implemented.

VSM plus feedback and practice (VSM 3). If the participant reached a stable trend with no improvement demonstrated, then a third phase of the intervention, VSM 3, was initiated.

During each VSM 3 session, the instructor again directed the participant to watch the video. In addition, the instructor had the necessary materials for performing the task in the instructional setting. If the actual task materials were not available, simulation materials (e.g., photographs) were used. For steps that the participant performed independently during the previous performance observations, the instructor provided behavior specific praise. For steps that the participant performed incorrectly during the previous performance observations, the instructor first provided feedback using procedures described in VSM 2. Then the instructor requested the participant to demonstrate the step that was shown on the video. If the participant performed the step correctly, the instructor provided specific verbal praise. If the participant was not able to model the step, the instructor modeled the step for the participant. After
modeling the step to the participant, the instructor directed the participant to practice the step. The instructor then provided the participant another opportunity to practice the step one more time. The instructor repeated the same procedure with each step in the task analysis for which the participant was observed having difficulty or making errors during the previous performance observations.

At the end of the whole video, the instructor asked the participant if s/he would like to watch the video again. If the participant chose to watch the video again, the instructor replayed the whole video again. The procedures for the first viewing were implemented in the second viewing.

At the end of the VSM 3 session, the job coach observed the participant performing the job tasks during the regularly scheduled work routine. Performance observation procedures were conducted exactly like Baseline 1. VSM 3 procedures continued until the participant was able to correctly and independently complete 90% of the steps in the task analyses for three consecutive performance observations or until a stable trend was observed. If the participant achieved criterion with VSM 3 intervention, the Maintenance phase was conducted. If the participant did not achieve criterion performance, the intervention was terminated.

Maintenance. To assess maintenance effects of the intervention, after the participants met the training criterion for three consecutive performance observations, maintenance probes were conducted for three consecutive performance observations. Then delayed follow-up probes were conducted at one, two and four weeks following the immediate maintenance sessions. During maintenance and delayed follow-up performance observations, the participant performed the job tasks under Baseline 1 condition (i.e., without viewing the video and without feedback).

Reliability and Procedural Fidelity

Following the same procedures and criterion as in the primary observer training, secondary observers, naïve to the purposes of the study, were trained to conduct performance observations to establish interobserver agreement on the dependent measure. Interobserver agreement checks were assessed on at least 30% of the total performance observations and at least once in every condition for each participant for each job task. Interobserver agreement was calculated using point-by-point agreement and dividing the number of agreements by the number of agreements plus disagreements multiplied by 100. The interobserver agreements for Daniel, Jonathan, and Maria were 98.8% (range, 84.6–100%), 98.3% (range, 80–100%), and 97.7% (range, 77.8–100%) respectively.

Procedural fidelity data were collected by a second observer to determine if the procedures were implemented accurately and consistently across participants. Procedural fidelity data were collected for VSM sessions and performance observations. Procedural fidelity during VSM sessions was to determine whether the instructor adhered to the planned protocol during instruction. Procedural fidelity during performance observation was to determine if the job coaches adhered to the correct data collection protocol and procedures. Procedural fidelity checks were conducted during at least 25% of the sessions in each VSM phase. The procedural fidelity scores for VSM sessions averaged across the participants and tasks during VSM alone, VSM 2, and VSM 3 were 100%, 100%, and 94.0% (range, 80–100%) respectively. Procedural fidelity checks during performance observations were conducted during at least 30% of the sessions in each phase. The procedural fidelity for job coaches across all performance observations was 100%.

Results

Figures 1–3 show the data for each participant. Overall, the results showed idiosyncratic patterns across the three participants. Furthermore, the effects of VSM alone and/or in combination with other instructional components also varied across different tasks for each participant.

Percentage of Steps Completed Correctly

Daniel. Figure 1 presents the percentage of steps completed correctly across two job tasks for Daniel.
**Shoe Cleaning.** During both Baseline 1 and 2 sessions, Daniel correctly completed 0% of the steps in the Shoe Cleaning task analysis. The implementation of VSM alone resulted in an almost immediate change in the level of performance with a mean percentage of steps correctly completed of 23.8%, however, no increasing trend toward criterion was evident. Following the implementation of VSM 2 (i.e., VSM plus feedback), visual analysis suggested virtually no increase in level and trend of the percentage of steps correctly completed. During VSM 3 (i.e., VSM plus feedback and practice), Daniel’s highest performance level increased to 46.2% correct. However, the VSM 3 data were variable and indicated decreasing trend in steps completed. Since Daniel did not achieve criterion, maintenance data were not collected.

**Book Room.** During Baseline 1 and 2, the respective mean percentages of steps correctly completed by Daniel for the Book Room task analysis were 4.7% and 7.7%. With VSM alone, Daniel’s performance did not indicate any change in the level or trend of the task acquisition over Baseline 2. However, when VSM 2 was implemented, an immediate change in level and trend were evident and his performance eventually stabilized at 61.5% correct. With the implementation of VSM 3, Daniel achieved 100% steps completed correctly in two sessions and achieved criterion with another seven sessions. Daniel continued to show high performance for the immediate and delayed maintenance sessions.

**Fitting Room.** During Baseline 1, Jonathan correctly completed an average of 4.5% of the steps in the Fitting Room task. After the videotaping sessions, Jonathan’s performance showed an increase to an average of 34.2% steps correct during Baseline 2 but the data were variable (range, 0–73.3%). With the implementation of VSM alone, Jonathan’s initial performance was variable; however, after five sessions of VSM alone, Jonathan completed 100% of the steps correctly. After another four sessions, his performance stabilized and criterion was achieved. Immediate and delayed maintenance sessions indicated that Jonathan maintained the Fitting Room task at high levels (range, 86.7–100%).

**Shoe Storing.** During Baseline 1 and 2, the respective mean percentages of steps correctly completed by Jonathan for the Shoe Storing task analysis were 20.0% and 17.8%. Following
the implementation of VSM alone, Jonathan’s performance was variable but his task acquisition eventually stabilized at a higher level (40.0%) compared to Baseline 1 and 2 sessions. With the implementation of VSM 2, Jonathan immediately reached criterion. After VSM 2 was withdrawn, Jonathan’s performance remained at high levels (range, 84.6–100%) for the immediate and delayed maintenance sessions.

Computer. During Baseline 1 and 2 sessions, Jonathan correctly completed 0% of the steps in the Computer task. The implementation of VSM alone did not increase Jonathan’s performance above baseline level. With the implementation of VSM 2, Maria demonstrated minimal increase in performance to a mean of 5.1% steps correct. With the implementation of VSM 3, Maria showed rapid task acquisition and she achieved criterion in 15 sessions. Maria maintained the task at high levels (range, 90.9–100%) during the immediate and delayed maintenance sessions.

Conference Packet. During Baseline 1 and 2, Maria correctly completed 0% of the steps in the Conference Packet task. The implementation of VSM alone did not increase Maria’s performance above baseline level. With the implementation of VSM 2, Maria demonstrated minimal increase in performance to a mean of 5.1% steps correct. With the implementation of VSM 3, Maria showed rapid task acquisition and she achieved criterion in 15 sessions. Maria maintained the task at high levels (range, 90.9–100%) during the immediate and delayed maintenance sessions.

Paper Shredder. During Baseline 1, Maria’s performance averaged at 5% steps correct. After videotaping, Maria’s performance decreased and remained at 0% correct for the three Baseline 2 sessions. With the implementation of VSM alone, there was no change in the level or trend of Maria’s correct completion of the task analysis. Maria showed an immediate increase in task acquisition with the implementation of VSM 2. Maria achieved 86.7% correct in 10 sessions, which was close to criterion performance. Since Maria did not
achieve criterion, VSM3 was implemented, but further intervening with VSM 3 did not result in an increase in her level of performance. During immediate and delayed maintenance sessions, Maria maintained the Paper Shredder task at high levels.

Photocopier. During Baseline 1 and 2, the respective mean percentages of steps correctly completed by Maria for the Photocopier task analysis were 0% and 13.3%. The implementation of VSM alone did not result in any change in the level or trend of Maria’s performance. When VSM 2 was implemented, Maria correctly completed an average of 31.5% of the steps in the task analysis. The implementation of VSM 3 did not result in any change of her level of performance. Since Maria did not achieve criterion for the Photocopier task, maintenance data were not collected.

Discussion

In summary, while the results of the current investigation demonstrated that VSM can be effective in teaching new job tasks to adults with intellectual disability, the results did not provide conclusive evidence of the effectiveness of VSM alone or in combination with feedback and practice for the three participants in this study. The effects of the various VSM conditions varied across participants and across job tasks. All the participants, however, achieved criterion performance with one of the three VSM phases, except for Daniel with the Shoe Cleaning task and Maria with the Photocopier task who approached mastery.

Only Jonathan achieved criterion (i.e., 90% steps completed correctly for three consecutive sessions) for the Fitting Room task with VSM alone. With VSM alone, some increase in performance was observed, but not to criterion level, for Daniel with the Shoe Cleaning task and Jonathan with the Shoe Storing task. For Maria with all three job tasks and Daniel with the Book Room task, VSM alone did not increase performance above Baseline 2 level.

With the addition the VSM2 (e.g., VSM plus feedback) and VSM3 (VSM plus feedback and practice), improvements in task performance were noted for certain participants and tasks over the VSM alone condition; however, not all participants reached criterion and even with the addition of the last VSM3 component, and substantial improvements over

![Figure 3. Percentage of Steps Completed Correctly Across Three Job Tasks for Maria](image)
the previous VSM2 condition did not occur for some participants and tasks.

There are several possible reasons for the variation in the effectiveness of VSM alone or in combination with feedback and practice across participants and job tasks. First, the participant’s previous experience with the job task itself may impact task acquisition using the VSM interventions. This may have been the case for Jonathan for the Fitting Room task, as it appeared that the simple exposure to the task during video creation produced caused an increase in performance during the second baseline, and criterion performance with VSM alone. It is interesting to note the participants in the studies by Lasater and Brady (1995) and McGraw-Hunter et al. (2006) had some initial level of proficiency in the tasks they were taught using the VSM intervention package. This could suggest that in order for VSM alone to have immediate and strong effects, the individual may require at least a moderate level of experience to the task being taught through the VSM video. The learning curve may be too steep for VSM alone if the individual has no or only minimal prior experience with the target job task.

Second, task complexity may be a factor in the success, or the lack of it, of the VSM intervention. The differences in the chosen job tasks for the participants may have led to some job tasks being more difficult than others. For example with the Computer and Photocopier tasks, with the multiple icons on the computer screen in the Computer task and multiple buttons on the keypad and touch-sensitive screen on the photocopier in the Photocopier task, completing one step did not necessarily present the beginning of the next step as clearly as in the Book Room or Paper Shredder tasks. Both these tasks posed difficulties for the participants who performed at mastery or near mastery levels for their other two tasks. In studies that found video-modeling alone to be effective, the chained tasks were relatively less complex. Mechling and colleagues (2009) used 10–20s videos to teach three fire-extinguishing skills that consisted of 3–6 steps each. While Shipley-Benamou and colleagues (2002) did not report the length of their videos, they investigated video-modeling with simple chained tasks, such as, making orange juice and table setting, and they found video-modeling alone effective for teaching these skills to children with autism. This may suggest that both VSM and video-modeling may be better suited to some tasks more than others.

Third, the participants’ history of job task performance, support needs, and degree of prompt dependency may have influenced acquisition of new job tasks. The level of independence at the work place varied across the three participants.

Fourth, the videos themselves may have had influences on the effectiveness of the VSM intervention. The VSM videos also included these recommendations by Mayer and Moreno (2003) to reduce cognitive load: (a) offloading, by using narration instead of visual words in the video; (b) segmenting, by allowing some time between successive segments of the video; (c) signaling, by adding arrows to focus on essential parts of the video; and (d) synchronizing, by presenting visual and auditory materials simultaneously. Even though these recommendations were incorporated to some extent in the VSM videos, the degree of clarity across steps in the videos could potentially be a factor in the success of the VSM videos.

Although the outcomes were variable, this study contributes to the literature in several ways. First, there are relatively few empirical evaluations of video-based interventions with individuals with intellectual and developmental disability (Wehmeyer, Palmer, Smith, Parent, Davies, & Stock, 2006) and an even smaller number of studies that examined the effectiveness of VSM with chained tasks. Although a few research studies have demonstrated the effectiveness of video-modeling alone to teach chained tasks (e.g., Mechling et al., 2009; Shipley-Benamou et al., 2002), thus far, no study has evaluated the effectiveness of VSM alone (i.e., without additional instructional strategies) to teach chained tasks. This study made an important contribution as it found that, with the exception of Jonathan with the Fitting Room task, VSM alone was not sufficient for job task acquisition for three adults with intellectual disability. The findings of this current study suggest that VSM alone may not have been the sole contributor to the effectiveness VSM intervention packages in previous VSM studies which taught chained...
tasks (Cihak & Schrader, 2008; Lasater & Brady, 1995; McGraw-Hunter et al., 2006; Van Laarhoven et al., 2009).

The second contribution of this study is in the area of job skills training with adults with intellectual disability. Surveys have found that one of the top barriers to employment of individuals with disability is the lack of experience and skills training (Bruyère, 2000; Loprest & Maag, 2001). The current study suggests that, while VSM alone may be a weak intervention, VSM when combined with other instructional components is a promising alternative to traditional in-vivo job training in employment settings. Although the findings were variable, all the participants were able to demonstrate generalization, by demonstrating job tasks learned during VSM sessions to actual situations at the job site. Recall that during performance observations, no instruction or feedback of any kind was provided. This is a welcomed finding that may support the continued exploration of VSM or the use of VSM interventions to supplement in-vivo training of job tasks in employment settings.

The third contribution of this study is that the variable outcomes suggest that there may be multiple influences on performance that must be considered beyond VSM training. The success of VSM interventions may be influenced by any number of the following factors: (a) previous experience with the job task; (b) task complexity; (c) participant’s work performance ability (e.g., level of independent work performance, level of prompt dependency); and (d) the clarity of the videos, each of which requires further investigation before statements can be made about the general effectiveness of VSM for chained tasks.

Although this study raises numerous questions for future investigations, the findings should be interpreted within the context of several potential limitations. First, the use of single opportunity probes during performance observations (Brown & Snell, 2011) may have underestimated participants’ performance. Because no remediation of task steps took place, the participants were not able to continue after making an error on a critical step, and thus the performance observation did not allow performance on all possible steps.

Second, the absence of corrective feedback during performance observation may have inevitably reinforced the participants’ incorrect responses or decreased the participants’ motivation to respond. This may have led to the participants requiring more instructional sessions to unlearn previous incorrect steps. Since corrective feedback was not immediately provided (i.e., the feedback was provided during the next instructional session), the effectiveness of the feedback may have been reduced (Barbetta, Heward, Bradley, & Miller, 1994).

Third, the lack of uniform means for controlling task difficulty across job tasks for each participant and across participants limits the interpretation of the results of the effectiveness of VSM. Because the participants worked, or received job training, in different employment settings, the targeted job tasks for each participant were job tasks relevant to each employment setting. While targeting these relevant job tasks for intervention was beneficial for the participants as it increased their job repertoire in their respective employment or job training settings, this variation in the targeted job tasks may have led to greater variability in task acquisition. It also made comparisons between job tasks for each participant difficult. Since different job tasks were chosen for each participant, replication of the research design across participants was not successfully conducted.

The use of VSM and video modeling for teaching chained task is emerging, but more investigation is needed before we can conclude with confidence for whom and what skills VSM and video modeling should be used. One potential avenue would be to standardize the task analysis across multiple participants, so that the effectiveness of VSM alone may be better examined by controlling tasks and video differences. Of course, this would not eliminate individual differences, but with control over task difficulty, effects on participant characteristics may be better illuminated.

Another approach for future research would be to examine the effectiveness of VSM with tasks of varying complexity to determine if VSM is more suited for certain tasks. Future researchers may want to examine the effectiveness of VSM for shorter tasks. Furthermore, instead of presenting the entire VSM video
for a longer task, several shorter video clips of a longer task could be presented to the individual with intellectual disability, to reduce the attentional and retentional demands on the individual. This area of research would be closely in line with, and would be guided by, current research in video prompting to teach chained task (e.g., Mechling & Stephens, 2009; Sigafoos et al., 2005).

Future research should examine the effects of adding in-vivo feedback and prompting procedures in addition to VSM to determine if the in-vivo feedback and prompting has an additive component to VSM or if in-vivo training alone was sufficient for job task acquisition. This is important in order to develop an effective and efficient job skills training package for individuals with intellectual disability. Furthermore, this may determine if VSM videos enhance acquisition in any way thus, settling the issue of whether the additional resources spent on videotaping and video editing adds an additional instructional or cost benefit.

Another approach for future research is in determining whether the use of other models, instead of self, in the videos could lead to better outcomes. Current studies in this area have found that certain individuals perform better with VSM and others, video modeling (e.g., Cihak & Schrader, 2008; Van Laarhoven et al., 2009). This is an important area of future research, as it has to do with the cost effectiveness of the video intervention. If video modeling is found to be effective and preferred by individuals with intellectual disability for employment skills training, it may be more cost effective to produce a generic job task video for all individuals, instead of producing a different video of each individual.

In summary, as one of the first studies to explore the use of VSM for teaching chained tasks and its applicability for employment settings, this study provides some initial evidence that VSM can be effective, but at the same time, raises numerous issues ripe for future investigations. Clearly this study suggests that VSM alone has limited effectiveness, but it has the potential to promote the acquisition of job tasks, without in-vivo instruction, when used in combination with other instructional components. Future research is needed to investigate optimal conditions in which VSM may be effective and beneficial in the workplace.

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