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Stephanie J. Gardner
Susquehanna University

Pamela S. Wolfe
The Pennsylvania State University

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Teaching Students with Developmental Disabilities Daily Living Skills Using Point-of-View Modeling Plus Video Prompting with Error Correction

Stephanie J. Gardner, M.Ed.
Susquehanna University
514 University Avenue
Selinsgrove, PA 17870
gardners@susqu.edu

Pamela S. Wolfe, Ph.D.
The Pennsylvania State University
212A CEDAR Building
University Park, PA 16802
psw7@psu.edu

Abstract

A primary goal of instruction for students with developmental disabilities is to enhance their future quality of life by promoting skill acquisition which will enable them to live, function, and participate in the community. One instructional method that can help students with developmental disabilities improve independence in performing daily living skills is video prompting. This study investigated the effectiveness of a video prompting plus error correction procedure on skill acquisition when teaching daily living skills to four adolescents with mild and moderate developmental disabilities. A multiple baseline across participants design demonstrated that all four participants rapidly acquired dish washing skills upon introduction of the intervention. Future research should further explore the efficacy of error correction procedures used with video prompting and the impact that these procedures have on student learning and skill retention.

Keywords: developmental disabilities, autism spectrum disorder, video prompting, daily living skills, point-of-view model

Teaching Students with Developmental Disabilities Daily Living Skills Using Point-of-View Modeling Plus Video Prompting with Error Correction

Leading a safe, productive, and independent life continues to be one of the major concerns of parents for children with disabilities (Shipley-Benamou, Lutzker, & Taubman, 2002). This same concern can also be said to drive the instructional programs of many children with developmental disabilities (Cannella-Malone et al., 2011; Sigafoos et al., 2007; Van Laarhoven & Van Laarhoven-Myers, 2006). Independent functioning is a quality that is not only valued in our society, but one that is also is expected of individuals when they enter adulthood (O'Leary & Dubey, 1979). Earlier development of independence has been suggested to lead to a greater potential to thrive in domestic and job-related settings (Pierce & Schreibman, 1994). In addition, one's ability to independently perform daily living skills (e.g., functional, self-care, domestic) can contribute to a person's meaningful participation in society and overall quality of life (Carnahan, Hume, Clarke, & Borders, 2009). Instruction focusing on daily living skill acquisition has been one of the focuses of research done with individuals who have developmental disabilities.

A primary goal of instruction is to enhance students' future quality of life by promoting skill acquisition which will enable them to live, function, and participate in the community (Wolery, Jones Ault, & Doyle, 1992). Video prompting is one instructional method that can help children with developmental disabilities improve functional skill independence (Gardner & Wolfe, 2013). Video prompting is an instructional tool that is similar to video modeling (e.g., an entire skill sequence is shown and subsequently practiced in its entirety by the student) but involves showing video clips of short segments or steps of a skill sequentially (Cannella-Malone et al., 2006). Immediately after watching the video clip of a step, the student has an opportunity

to practice that target step and receive feedback before moving on to the next step in the sequence. Teaching daily skills through use of video has been stated as being both effective and efficient when teaching students with disabilities (Graves, Collins, Schuster, & Kleinert, 2005).

Bandura (1977) highlighted the fact that most behavior is learned through modeling or observing another person performing a given behavior. As has been described in social learning theory literature, behavior learned through this manner can then later act as a guide when individuals attempt to perform the targeted skill on their own. Some advantages of video technology used during instruction include: (a) consistency of instruction across several different instructors; (b) repeated practice opportunities of the videos over time; (c) reinforcing quality of video use and modes with which the video can be shown (e.g., laptop or iPad); and (d) opportunity for immediate feedback (Mechling, 2005). Additionally, some advantages of video prompting methodology also include the ability to break a skill down into its component parts and then teach those explicitly to mastery.

Video prompting has been gaining popularity when working with students with developmental disabilities, especially those with autism spectrum disorders (ASD). Researchers have successfully used video prompting methodology to teach a variety of daily living skills to students with developmental disabilities including self-help skills (Norman, Collins, & Schuster, 2001), domestic skills (Cannella-Malone, Sigafoos, O'Reilly, Edrisinha & Lancioni, 2006; Horn et al., 2008; Sigafoos et al., 2005; Van Laarhoven & Van Laarhoven-Myers, 2006) and cooking-related skills (Graves, Collins, Schuster, & Kleinert, 2005; Mechling, Gast, & Fields, 2008; Mechling, Gast, & Seid, 2009; Mechling, Gast, & Seid, 2010; Mechling & Gustafson, 2008; Sigafoos et al., 2007; Van Laarhoven, Kraus, Karpman, Nizzi & Valentino, 2010). In a recent review of the literature on use of video modeling and prompting to teach daily living skills,

point-of-view was the most frequently used perspective for video prompting, with third-person, or spectator perspective (i.e., most often an adult model) following closely behind (Gardner & Wolfe, 2013). More recently, researchers have also started to incorporate a variety of error correction procedures into video prompting interventions to help students learn new skills without practicing errors (Cannella-Malone et al., 2011; Cannella-Malone, Wheaton, Wu, Tullis, & Park, 2012; Goodson, Sigafoos, O'Reilly, Cannella, & Lancioni, 2007).

Cannella-Malone and colleagues (2011) incorporated an error correction procedure along with video prompting when comparing its efficacy to video modeling for teaching laundry and dish washing skills to seven individuals with severe disabilities. During the intervention phase when a participants' data exhibited a low or decreasing trend, error correction was instituted. This procedure involved the trainer interrupting the participant's error and directing them to watch the video a second time. If the student did not perform the step correctly after viewing the video again, the trainer completed the step correctly by providing a model. Results indicated that video prompting with error correction was more effective than video modeling for teaching new skills to participants. Video prompting resulted in more students achieving mastery of the skill while video modeling was reported to have no effect with five participants.

In another study, researchers compared the efficacy of video prompting with and without error correction when teaching three students with moderate to profound intellectual disabilities how to sweep and wash a table (Cannella-Malone et al., 2012). In the video prompting with error correction condition, error correction consisted of implementing a system of least prompts. If an error was made, first the video was shown a second time and then if the student continued to exhibit errors, a model prompt was instituted followed by an additional verbal prompt, and lastly if needed, a full physical prompt. Findings suggested that video prompting with error

correction was slightly more efficient than video prompting alone; two students met mastery criterion with the error correction condition and none met mastery criterion when video prompting alone was implemented.

In one last study, Goodson and colleagues (2007) evaluated the effectiveness of a video prompting procedure on table setting for four adults with developmental disabilities. After observing that three participants were not progressing with video prompting alone, an error correction procedure was implemented where first the video clip was shown a second time and then if the student was still not able to perform the step correctly, the trainer completed the step through modeling. Researchers reported participants were then able to quickly learn the new skills after the error correction procedure was added to the video prompting intervention.

Although an emerging evidence base exists for video prompting methodology, additional research is needed to not only establish the external validity of this approach (Goodson et al., 2007) but also to help establish this instructional procedure as an evidence-based practice. More specifically, research investigating the impact that video prompting with systematic error correction has on skill acquisition of daily living skills is very limited. Additionally, maintenance of skill acquisition should be assessed by future researchers. Not only does maintenance data show that students are able to continue their progress or skill performance over extended time periods when instruction has ended, but it can also guide interventionists or educators in providing additional follow-up instruction to help students work toward mastery criterion again. This study sought to expand upon the current research in this area by investigating the following research questions: (a) Is video prompting along with an error correction procedure an effective strategy for skill acquisition when teaching daily living skills to students with developmental disabilities?; (b) Does level of assistance needed (more intrusive

prompting) decrease over time?; and (c) Are students able to maintain skills learned at one and then two weeks post-intervention?

Method

The purpose of this study was to examine the effects of a video prompting intervention to teach students with developmental disabilities the skill of dish washing. Data were collected from direct observation of participants completing the steps in a task analysis. Additional social validity data were collected from interviews of participants regarding their opinion of the video prompting procedure. Data also were collected from the classroom teacher detailing her perceptions regarding the usefulness of the intervention.

Participants

Four adolescents, two male and two female, who had developmental disabilities participated in the study. All four participants attended a public middle school in central Pennsylvania and were receiving special education services through a learning support program. Participants were included in regular education classes between 57%-71% of the school day; the remaining instructional time was spent in a self-contained learning support classroom. Participants were selected to take part in the study because they: (a) were diagnosed as having either ASD or an intellectual disability (ID) by a licensed professional and had an individualized education plan (IEP); (b) had deficits in adaptive and/or daily living skills as identified by the classroom teacher; (c) were recommended by their educational teams as someone who would benefit from daily living instruction.

Participant files were reviewed to collect relevant information from IEPs on present levels of performance and educational goals and objectives. Participants had not received any formal instruction on dishwashing prior to the study; the teacher reported that participants

occasionally would assist with washing the dishes in the classroom but this was done in stations (e.g., washing, rinsing, drying, putting away) and its occurrence was not often. Below is a description of the participants. In order to maintain the confidentiality of participants, pseudonyms have been used.

Lily. Lily was a 13-year old girl in 7th grade with Down syndrome. According to her IEP, her primary diagnosis was ID with a secondary diagnosis of speech and language impairment. She received supplemental learning support services and participated in general education for 71% of her day with the support of a paraprofessional. Lily also received related services in occupational therapy and speech language therapy. She qualified for both alternate state assessments and extended school year services due to the significance of her needs. Although Lily's IEP goals focused primarily on academics (e.g., reading fluency and comprehension, math computation, sentence writing), her teacher expressed the need to build more functional skills into Lily's repertoire. In addition, Lily demonstrated significant adaptive delays based upon the *Vineland Adaptive Behavior Scales*, scoring lowest in the Daily Living domain (see Table 1). Lily's vision and hearing were both reported to be within normal range.

Kaitlin. Kaitlin was a 13-year old girl in 7th grade diagnosed with Other Health Impairment (OHI) (for Prader-Willi syndrome, speech/language impairment, and scoliosis) as her primary diagnosis and ID as her secondary diagnosis. She received supplemental learning support services and participated in general education classes for 57% of her day, with the support of a full-time paraprofessional for academic and behavioral support. Kaitlin's vision and hearing were both reported to be within normal range. She qualified for both alternate state assessments and extended school year services due to the significance of her needs. Kaitlin was selected by her classroom teacher as being in need of daily living skill instruction. Kaitlin

demonstrated extremely low adaptive behavior delays based upon her scores on the *Adaptive Behavior Assessment System*. She was rated in the extremely low range on school and home living skills on this assessment by her teachers, as well.

Matt. The third participant was a 14-year old, 7th grade African American male who had a primary diagnosis of ID and a secondary diagnosis of OHI. Matt's hearing was reported to be within normal range. He had low vision in his right eye due to a drooping eyelid but was able to accommodate for his vision difficulty by moving closer to something if he had trouble viewing it from a distance. Matt received supplemental learning support services and participated in general education classes for 57% of his day with the support of a paraprofessional. He qualified for both the modified version of the state assessment (PSSA-M) and extended school year services due to the significance of his needs. His teachers and parents had reported that he was in need of more practice with independence-related skills, including instruction in life skills. Matt demonstrated significant deficits in adaptive behavior as demonstrated by parent and teacher ratings on the *Adaptive Behavior Assessment System*.

Timmy. Timmy was a 14-year old 8th grade male diagnosed with Autism (primary) and a secondary diagnosis of ID. His vision and hearing were reported to be within normal range. Timmy received supplemental learning support services and participated in general education for 57% of the school day with the support of a paraprofessional. He participated in the regular state and local assessments, scoring in the below basic range in both math and reading. Timmy's parents had expressed concerns regarding his social and adaptive behavior deficits. Timmy demonstrated significant deficits in adaptive behavior as demonstrated by parent and teacher ratings on the *Adaptive Behavior Assessment System*; School/Home Living and Self-Care were

reported to be two of the highest areas of need on the teacher rating scale portion of this assessment.

Setting

A small, metropolitan school district in central Pennsylvania served as the setting for the study. The study was conducted in a middle school learning support classroom that served students with mild and moderate disabilities. The classroom had one wall devoted to kitchen space that included a stove, microwave oven, sink, and cabinets. Intervention sessions took place in front of a double-sided sink. Baseline and intervention sessions took place during a morning homeroom period three to four times per week for approximately 15 minutes per student across six weeks. The video clips were shown to participants on an iPad, which was positioned to the left of the sink and was operated by the instructor.

Materials

The video prompting intervention focused on teaching the participants to wash dishes. The materials for washing dishes included a dish drain, washcloth, a dish towel, a drying rack, a bottle of dish detergent, a teaspoon, and three items to wash (a cup or mug, a plate, and a piece of silverware). A dish drainer was placed to the right of the sink with a towel lying over the side of it. A washcloth was hung in between the middle of the sinks and the bottle of soap, drain stoppers, and a teaspoon were all placed on the back side of the sink.

Experimental Design

A multiple baseline across participants design was used (Kennedy, 2005; Murphy & Bryan, 1980). The study consisted of three phases: baseline, intervention, and maintenance. Maintenance (i.e., follow up) sessions were conducted at one and two weeks after mastery criterion was met for an individual.

Procedures

Dependent measures. A task analysis for dishwashing consisting of 16 steps was developed with the assistance of the classroom teacher (see Table 2). The primary dependent variable for the study was the number of steps in the task analysis that were performed correctly. Two secondary dependent variables were the number of sessions required to reach criterion and the type of prompt required for correct performance on a given step (e.g., verbal/visual, model, physical). The level of prompt used was coded as verbal/visual (VP2), model (M), and physical (P). A correct response by participants was defined as completion of a step within 30 seconds of the video prompt for that step (Cannella-Malone et al., 2012). One exception to the time requirement for performing the steps was considered for Step 4 (i.e., Turn off water when sink is about ¼ full) since this step generally took longer than the others depending on the speed of the water coming out of the faucet.

An independent "correct" score meant that the participant performed the target step after watching the video prompt segment for a single time with no additional support. During the least to most prompting procedure, a verbal/visual prompt was recorded if the participant performed the target step completely after viewing the video prompt a second time. If the participant performed the target step completely after watching the video prompt a third time, but followed by a live model provided by the instructor, a model prompt was recorded. Lastly, if the participant needed to watch the video prompt a fourth time followed by physical assistance from the instructor, a physical prompt was recorded. Mastery criterion for the video prompting intervention phase was 15 out of 16 steps completed independently (i.e., after viewing the video prompt for that step just once) across four consecutive sessions.

Video prompt development. Each step of the task analysis was filmed using a Flip UltraHD video camera (8 GB, 3rd Generation). All clips were filmed from the performer's perspective, also known as point-of-view perspective (POV). At the beginning of each clip, a one-sentence voiceover instruction (i.e., verbal prompt stating the task analysis step that the participant was supposed to perform) was given simultaneously with a visual of the hands of the adult model completing the targeted step. Once the videos were created, the first author edited them using iMovie (Apple Corp, 2009). This procedure was used for each step of the task analysis, thus each video clip segment included a one-sentence voiceover instruction (e.g., verbal statement of the task analysis step) and a simultaneous visual. For the final step of the task analysis (i.e., use the towel to dry off the area around the sink), all of the steps (e.g., steps 1-15) leading up to the targeted step were shown in one combined video clip (essentially a video model of the whole sequence) in fast forward speed (i.e., so that the total length was approximately one minute), ending with the last step (i.e., targeted step) including the voiceover sentence. The authors chose this alternate format for viewing the final video prompt segment to enable the participant to see the entire task sequence (i.e., entire behavioral chain) at least one time through during an instructional lesson.

Baseline. During baseline, participants were taken to the classroom individually and directed to the sink area. Participants were asked to stand in front of the sink and received a verbal prompt to perform the skill (e.g., "Alright, (student), go ahead and wash the dishes"). The number of steps in the task analysis performed correctly (i.e., independently) was recorded. In baseline, no instruction was provided to participants on how to perform the skill; participants received typical classroom instruction (e.g., no formal instruction on dish washing). Baseline measurements were administered simultaneously to each participant for a minimum of five days

until stability in student performance was demonstrated through visual analysis of level and trend in the data (Sidman, 1960). Participants were introduced into the intervention phase in a staggered format (Kennedy, 2005). When a participant's data showed an increase of three steps (e.g., minimum) performed independently for two consecutive days when compared to the average of the last three baseline scores, the next participant was able to enter into the intervention phase.

Participants had to initiate the first step within 30 seconds and then subsequent steps within 30 seconds of the previous step correctly, to receive a correct response for performing a step in the task analysis. If a participant did not meet the time requirements, the session was terminated. If the participant performed a step out of order but it was included at a later point in the task analysis, he/she could still be marked as having a correct response. Any errors participants made were ignored (e.g., not corrected or commented on) and if a student asked the instructor a question about what to do, the instructor replied, "Just try your best" or "Just do what you normally do." At the end of the session, the participant was thanked for their participation, and had the opportunity to earn a classroom point for participation on their daily point card (part of the token economy established in their classroom). Participants then were returned to their classroom activity.

Intervention. Participants completed the dish washing task using video prompting with an embedded error correction procedure. Participants were positioned to stand in front of the iPad, located directly to the left of the sink. The instructor gave the verbal cue, "Watch this." A video clip was shown of the first step in the sequence (i.e., POV of putting the stopper in the sink with voiceover instruction of the task analysis step). After the participant watched the clip, the instructor gave the verbal prompt, "Now you do it." The participant was required to begin

performing the step within 30 seconds of the verbal prompt. If the participant correctly performed the skill, the instructor provided a general praise statement (e.g., "Good job, Kaitlin!" or "Nice work, Matt!") and directed the participant's attention to the iPad screen, while giving the verbal cue, "Watch this next step." After the participant watched the clip, the instructor gave the verbal prompt, "Now you do it." The same procedure continued throughout the remaining 15 steps when participants performed the step correctly.

If a participant failed to complete the target step within the given time limit or if they performed the step incorrectly, the instructor implemented an error correction procedure. This procedure involved using a system of least prompts hierarchy (i.e., verbal/visual, model, physical) (See Figure 1). When the participant exhibited an error right after being shown the video prompt for the first time, the instructor would immediately interrupt the error saying, "Sorry (student) that is not quite right. Here watch this again." The video clip was shown a second time to the participant and after the clip was done, the instructor said, "Okay (student) try it again." If the participant performed the skill correctly, the instructor provided a general praise statement and continued the procedure for showing the remaining video prompt steps in the skill sequence. However, if the participant exhibited an error after viewing the video prompt a second time within the error correction procedure, the model prompt was implemented. This involved the instructor again immediately interrupting the error saying, "Sorry (student) that is not quite right. Here watch this again." The video clip was shown a third time to the participant and after the clip was done, the instructor modeled the step and then said, "Okay (student) try it again." If the participant performed the skill correctly, the instructor provided a general praise statement and continued the procedure for showing the remaining video prompt steps in the skill sequence. However, if the participant exhibited an error after viewing the video prompt a third time within

the error correction procedure, the physical prompt was implemented. This procedure followed the same as the previous prompts, but after the video was shown for the fourth time, the instructor provided hand over hand guidance to physically assist the participant in completing the step. The instructor then provided a general praise statement and continued the procedure for showing the remaining video prompt steps in the skill sequence.

This procedure outlined was continued throughout the remaining video prompts in the task analysis sequence. At the end of the session, the participant was thanked and asked to return to their classroom activity. Mastery criterion for the intervention phase was performance of at least 90% of the steps in the task analysis (e.g., 15 out of 16 steps) at the independent level (i.e., after viewing the video just once) across four consecutive days.

Maintenance. Maintenance (i.e., follow up) sessions were conducted at one and two weeks post-intervention without using any video prompting. Procedures followed the same ones implemented in the initial baseline phase. If a participant's performance fell below mastery criterion reached in the intervention phase (i.e., 15 steps correct), two "booster" sessions were provided to participants. These sessions consisted of providing two video prompting intervention sessions to help participants maintain mastery criterion again. Booster sessions were then followed up one week later by a final maintenance check.

Interobserver Agreement and Treatment Fidelity

Interobserver reliability data were collected by a trained independent research assistant on the number of task analysis steps performed correctly during at least 25% (range 26-31) of the sessions in all phases of the study. The observer training lasted approximately one hour and consisted of reviewing the task analysis data sheet and showing her how to record a correct response, including the prompt level used with the participant. In addition, the training included

practice with scoring three sample videos. Agreement was calculated by dividing the number of agreements by the sum of agreements and disagreements and multiplying the quotient by 100 (Johnston and Pennypacker, 2009). Percentage of agreement on number of steps in the task analysis performed correctly and points earned were collected. Interobserver agreement was 98% for Matt, 94% for Timmy, and 93% for both Kaitlin and Lily.

Treatment integrity data also were collected during at least 25% (range 26 -31) of the sessions in all phases of the study. A second observer was given a checklist of the procedures for each session and after viewing the video for the session, marked off whether the steps were completed correctly or incorrectly. Treatment fidelity was calculated by dividing the number of procedural steps completed correctly by the total number of procedural steps and multiplying the quotient by 100. Treatment integrity across all sessions and phases was 100% for Kaitlin, 90% (range 70-100) for Lily, 96% (range 80-100) for Timmy, and 93% (range 75-100) for Matt.

Social Validity

Informal interviews were conducted with participants and their classroom teacher at the conclusion of the study. Three of the four participants indicated that they liked watching the videos to learn how to wash dishes. All participants stated that they enjoyed watching videos on the iPad. All participants except for one reported that the videos helped them learn. In addition, the four participants indicated they felt their dish washing skills improved. Lastly, two of the four participants stated they would like to watch more videos in the future to help them learn in school. The classroom teacher reported she felt the students were motivated to complete the sessions on most days and that the reinforcers used (e.g., praise, classroom points system, and choice of a school supply item given on a variable interval schedule) helped as well. Based upon her observations, she stated the use of video prompting was helpful for her students in learning

how to wash dishes and that the students improved in their ability to perform this skill. She indicated she would feel comfortable implementing this sort of intervention on her own and that it would be especially useful to use her paraprofessionals to keep consistency with instruction. Lastly, the teacher stated video prompting was something she would like to learn more about how to use and that it is a practice she would recommend to other professionals. Aside from the informal interview questions asked, the teacher also mentioned she was going to continue instruction utilizing the same task analysis. The primary investigator created a picture chart using still photos taken from the videos for the teacher to post above the sink for students and also provided the teacher with copies of all of the videos and data sheets made for the study at its conclusion.

Results

The results of this study demonstrated all four participants were able to learn the skill of washing dishes when video prompting with an error correction procedure was used. Students were also able to maintain their performance over time. Figure 2 shows the number of steps completed independently by Matt, Lily, Timmy, and Kaitlin. Table 3 shows the number and type of prompts needed for correct responding over time for each participant.

Number of Steps Performed Independently

Matt. Number of steps performed independently (i.e., after viewing the video a single time) for Matt is presented in the top graph of Figure 2. During baseline, Matt was able to correctly complete an average of two (range 2-3 steps) of the 16 steps from the task analysis for washing dishes and the trend of baseline data was stable over time. He was consistently able to place items in the drying rack and turn off the water when asked to wash the dishes during baseline sessions. A drastic increase in independent correct performance of steps was observed

when the video prompting (VP) with error correction intervention was introduced. An ascending trend was seen in the number of steps performed independently across intervention sessions. Results indicated that he completed an average of 14 steps, or 88%, correct (range 12-16 steps). Matt met mastery criterion of achieving at least 90% accuracy across four consecutive days within seven instructional sessions. Maintenance (i.e., follow-up) measures were conducted at one and two weeks after the intervention was ended. Matt was able to complete 15 steps correctly at one-week post-intervention and then 14 steps correct at two weeks post-intervention. He showed difficulty with correctly using the washcloth to wash all of the sides of each item (i.e., step 5). Since Matt's two-week maintenance check performance fell below mastery criterion (i.e., 15 steps correct), he was given two booster sessions, although his performance was still fairly consistent with intervention scores and considerably higher than previous baseline scores. Matt's performance increased to mastery criterion levels again when the booster sessions were held; he exhibited all 16 steps correctly on the first session followed by 15 steps during the second session. One final maintenance probe was conducted one week after the booster sessions were given; Matt was able to perform 15 steps correctly.

Lily. Lily's performance can be seen in the second graph from the top within Figure 2. During baseline, Lily performed three steps correctly (range 2-3) on average across eight sessions and the trend of her data remained stable across sessions in this phase. She was most often able to push the faucet from the wash sink over to the rinse sink and then place each item in the drying rack and turn off the water. When the VP intervention was introduced, Lily's performance quickly increased to 12 steps correctly performed and this trend continued as Lily was able to perform 14 steps correct on average (range 12-15). Lily achieved mastery criterion on the eighth VP session administered. Maintenance probes were given at one week and 1 ½

weeks post-intervention for Lily. This schedule was slightly different than the other participants due to a family vacation Lily attended followed by state testing which was being conducted, coinciding with the study needing to end. Lily was able to perform 15 steps and then 14 steps correctly on each maintenance assessment. Lily's errors made were not consistent with some of the errors she had previously made during VP sessions; she had difficulty with turning off the water in the wash sink when it was about ¼ full and then rinsing all of the soap off of each item before placing them into the drying rack. Since the latter performance fell below mastery criterion (i.e., 15 steps correct), Lily was given one booster session where she was able to correctly perform 15 steps independently. No additional booster sessions or maintenance probes were able to be conducted.

Timmy. Data showing Timmy's performance is located in the third graph from the top in Figure 2. During baseline, Timmy was able to perform two steps correctly on average (range 1-2) across 11 sessions and maintained a stable level of performance across baseline sessions. He was typically able to put soapy dishes in the rinse sink and hang the washcloth flat in the middle of the sinks. After introduction of the VP intervention, his performance rapidly increased to 13 steps correct and a steady, ascending trend was observed in the data as Timmy earned 15 steps correct on average (range 13-15). Timmy met mastery criterion after six VP sessions. Maintenance probes were conducted at one week and two weeks post-intervention. On the first maintenance probe, Timmy was able to perform 16 steps correctly, which was the highest score he had yet earned throughout any baseline or intervention phases. Two weeks after intervention, Timmy performed 15 steps correctly.

Kaitlin. Number of steps performed independently for Kaitlin is presented in the bottom graph of Figure 2. During baseline, Kaitlin was able to correctly complete an average of four

(range 3-6 steps) of the 16 steps from the task analysis for washing dishes across 11 baseline sessions and the trend in her data was decelerating over time. Due to the fact that she was absent as the previous participant (Timmy) had reached stability criterion in the VP phase, Kaitlin was given one last baseline assessment when she returned from being ill to indicate her still stable baseline before she was introduced to the intervention. During baseline, Kaitlin was consistently able to rinse all of the soap off of items, place items in the drying rack, and turn off the water. After the VP intervention was introduced, a marked increase in Kaitlin's scores was observed. She met mastery criterion in just four days, maintaining a stable performance of 15-16 steps correct across these four consecutive sessions. The skill that she once needed a model prompt to complete was when measuring 1 teaspoon of dish soap and pouring it into the sink. Kaitlin was administered just one maintenance probe since the study was set to end due to state testing beginning. She performed 13 steps correctly during this final maintenance probe.

Number of Type of Prompts Needed for Correct Responding

Specific data on number of type of prompts needed for correct responding for all participants can be seen in Table 3. Student data was not included in the table if they did not meet time requirements for an independent correct response to be recorded or if after viewing and scoring the session afterwards, it was noticed that the student performed a step incorrectly but the instructor did not catch it during the lesson and treated it as a correctly performed, independent step in error.

Matt. During the VP phase, as Matt's independent responses averaged around 14 steps correct (e.g., with no additional prompts needed), the number of prompts needed to correctly performed a step also decreased. Number of verbal/visual and model prompts steadily decreased across intervention sessions; no physical prompts were needed.

Lily. The number of independent responses by Lily increased over time across VP sessions (12-15 correct). Verbal/visual prompts decreased across sessions, as did model prompts needed. Lily most often needed model prompts to turn off the water when the sink was ¼ full and when using the washcloth to wash all of the sides of each item.

Timmy. Timmy's ability to complete targeted steps without the need of additional prompts (i.e., error correction procedure) increased over time, as the number of verbal/visual, model, and physical prompts steadily decreased. During the last three sessions, Timmy was not able to earn full credit for washing all of the sides of each item (e.g., Step 5), but this was due to not finishing the skill in the set amount of time rather than due to incorrect performance.

Kaitlin. Kaitlin was able to perform the targeted steps with high levels of accuracy (e.g., between 15 and 16 steps correct) throughout the intervention phase. As the number of independent responses remained fairly high as well as stable across sessions, the number of more intrusive prompts needed (e.g., verbal/visual or model) decreased to none by the fourth session.

Discussion

All four participants in the study acquired dish washing skills after the introduction of the video prompting intervention. Each participant exhibited large and rapid increases in the number of steps completed independently after the intervention was applied and a functional relation between implementation of the intervention and student skill acquisition can be suggested as demonstrated through the multiple baseline design. All participants were able to reach mastery criterion (i.e., at least 90% accuracy for 4 consecutive sessions) in relatively few (less than 10) sessions. Three out of four participants maintained performance at 1-week post-intervention and one out of three participants maintained performance at 2-weeks post-intervention.

The results of this study add to previous research that supports the use of video prompting to teach daily living skills to students with developmental disabilities (Graves, Collins, Schuster, & Kleinert, 2005; Mechling, Gast, & Fields, 2008; Norman, Collins, & Schuster, 2001; Mechling, Gast, & Seid, 2010). In addition, the findings also add support for the effectiveness of systematic error correction procedures used within a video prompting intervention for daily living skill acquisition (Cannella-Malone et al., 2012; Goodson et al., 2007; Van Laarhoven et al., 2010). The present intervention used elements of applied behavior analysis and evidence-based practices for students with developmental disabilities including: (a) using a modified systematic error correction procedure; (b) praising the participants upon completion of each step; and (c) providing instruction on each step in the behavioral chain as well as showing the entire sequence of skills once through during an instructional session. Point-of-view modeling was also utilized in this intervention, adding to the evidence base for the effectiveness of interventions using this perspective (as compared to spectator perspective) when teaching new behaviors, especially daily living skills, through video technology (Cannella-Malone et al., 2006 & Van Laarhoven et al., 2010). Given the positive outcomes of using other perspectives when video modeling (e.g., self-modeling, peer modeling), future research may want to compare the efficacy of these other perspectives to point-of-view perspective when using video prompting to teach daily living skills (Hitchcock, Dowrick, & Prater, 2003). .

As noted previously, an error correction procedure was used that included a three-tiered prompt hierarchy in which the video prompt was shown each time following a student error. The addition of the video prompt at each step of the prompt hierarchy during error correction was also implemented to allow for additional opportunities, or exposure to, the video of the targeted step and thus an additional instructional cue. A verbal/visual (i.e., video prompt shown a second

time), model, and physical prompt were used during error correction procedures. When errors were made during the intervention, students most often needed the assistance of a verbal/visual prompt (e.g., 15 instances) followed by model (e.g., 14 instances) then physical (1 instance) prompt. The need for additional prompting, as well as the need for more intrusive prompt levels used, decreased across instructional sessions as students had more opportunities to view and practice the steps of washing dishes. It would be useful to gain further knowledge on the type of prompt levels needed during error correction, as this procedure has been suggested to be one of the characteristics of effective interventions for learners with more significant disabilities (Browder & Cooper-Duffy, 2003). Particular students may still be successful in acquiring a skill with fewer prompt levels provided while others may need additional prompts. This was evident in the data collected during this study on the number and type of prompts provided to students to help them correctly perform a given step. Lily needed the most intrusive prompts over time, reaching mastery criterion last; she was also diagnosed with a moderate intellectual disability whereas her peers in the study were diagnosed with mild intellectual disabilities. It may be the case that students who have more significant needs will benefit from error correction procedures involving more prompting levels, such as the system utilized in this study. In addition to using a system of least prompts, other response prompting methods such as graduated guidance, where assistance is provided to an individual as needed and then faded immediately upon correct completion of the behavior (Wolery & Gast, 1984), would warrant future research in the area of video prompting.

It was not possible to single out the effect of the error correction procedure specifically because it was embedded in the intervention as a whole. However, it can be argued that the video prompting intervention, which included the vital component of error correction, resulted in

positive skill acquisition. By including the error correction procedure, participants were able to learn a behavior chain accurately as detailed in the task analysis without error. A gauge of good instruction for students with intellectual disabilities is that they accurately acquire a given skill. After accuracy (and subsequent mastery) has been achieved, the aim is that fluency can be reached with a skill, enabling an individual to perform the skill with more automaticity and overall independence. Although an instructor is needed when using an error correction procedure, this becomes necessary as one does not want students practicing errors. Additionally, students may have also learned the chain faster with the error correction procedure added than if they were provide instruction without it. Since this variable was not directly assessed, it would be something for future researchers to isolate and measure. Researchers have noted the importance for individuals with developmental disabilities to learn new skills through errorless prompting so they do not have to unlearn errors (Cannella-Malone et al., 2012). Determining which components of error correction procedures play a more salient role in student skill acquisition would be important to add to the literature on video prompting, and more specifically on how to most effectively promote student accuracy through error correction procedures. Future research investigating the efficacy of various error correction procedures in teaching daily living skills with video prompting would greatly benefit the field, as this has rarely been investigated in the research literature on video prompting.

Explicit instruction procedures posit that specific and immediate feedback should be given to individuals for each successful step in the completion of a task, one of the characteristics of effective, explicit instruction (Archer & Hughes, 2010; Rosenshine, 1987). This component of explicit instruction was systematically applied in this study. Additionally, other elements of explicit instruction included sequencing skills logically, breaking skills down

into component parts, use of clear and concise language, provision of guided practice, requiring frequent student responses, monitoring student performance closely, delivery of lesson at a brisk pace, and providing multiple practice opportunities (Archer & Hughes, 2010). Per explicit instruction tenets, students should also be given specific feedback on their performance (Barbetta, Heward, Bradley, & Miller, 1994; Rosenshine, 1987) and in the skill acquisition stage of learning, feedback should follow each response (Heward, 2009). In this study, reinforcement (e.g., praise) was provided to participants on a continuous schedule for every correct response exhibited in the task sequence. The provision of contingent and immediate praise reflects previous research indicating that praise delivered contingent upon student performance results in increased gains in student behavior as well as academic skills (Hasazi & Hasazi, 1972; McAllister, Stachowiak, Baer, & Conderman, 1969).

An additional element of the present video prompting intervention was that the entire task sequence was shown to participants before they viewed the final step of instruction. Specifically, a single video depicting all of the previous steps in a fast forward speed (approximately 1 minute in length) was shown to participants immediately before viewing the final step in the task sequence (i.e., use the towel to dry off the area around the sink). The authors chose to incorporate this feature to permit the participants to view the entire behavioral chain in sequential order at least once during an instructional session with the goal of improving student acquisition and maintenance. The authors did not find any results from studies where a video model was shown before the video prompts were used, but some researchers have suggested that showing an entire skill sequence might assist the learner with integrating the separate steps more efficiently (Cannella-Malone et al., 2006). Also, given the ultimate goal of the learner being able to successfully complete the entire skill sequence, the authors felt that providing them with an

explicit model of what that whole process looks like would be beneficial to the learners in addition to providing instruction in each individual step through video prompting. Individual steps as performed through a total task presentation format done in this study may not be as abstract to learners then. This method of showing an entire sequence of skills is what is typically done in the evidence-based practice of video modeling. With that being said, a possible limitation of this study is that students were required to watch already mastered skills over time, possibly inhibiting their efficiency and fluency with performing the skill sequence. Also, recent research and literature reviews do indicate superiority of video prompting over video modeling when teaching daily living skills to individuals with autism (Cannella-Malone et al., 2006; Cannella-Malone et al., 2011; Gardner & Wolfe, 2013). Given the effectiveness of student acquisition in this study, which included a video model component along with video prompting, future research on the effectiveness or necessity/efficiency of this added feature would benefit the existing literature on video prompting methodology.

Lastly, social validity data were collected at the completion of the study through informal assessment measures (i.e., interview/questionnaire). Results from the informal interviews conducted with participants indicated that they generally enjoyed the video prompting instruction and felt that their skill level increased over time with instruction. In addition, the classroom teacher highly valued the intervention and the outcomes achieved by her students. Although the classroom teacher did not directly implement the intervention, she was present in the classroom, observing a majority of sessions. Prior to the study, the teacher noted that she rarely had time to systematically practice daily living skills with her students due to scheduling and a primary academic focus of instruction. This study provided an example where 15 minutes or less of instruction a day given to students on a daily living skill could have a significant effect on their

adaptive skill development and overall independence. In addition, the procedures used in this study could be easily replicated by a paraprofessional as well.

Although the results of this study provide strong support that video prompting with error correction is an effective tool for teaching daily living skills to students with developmental disabilities, some limitations exist. One limitation was that the schedule of reinforcement was not thinned due to time constraints. Another limitation was that a maintenance phase was not conducted in full for all four participants. One participant (i.e., Lily) was leaving on an extended vacation so only one maintenance probe was administered. State testing was beginning for students and the classroom teacher asked that the study end. Matt and Timmy were able to have both maintenance probes and necessary booster sessions completed, however Kaitlin (who scored below mastery criterion at 13 steps correct on her first maintenance probe) was not able to participate in booster sessions. Also due to time constraints, generalization measures were not conducted. Future research should incorporate generalization probes. One final limitation was the lack of prompt fading procedures. This study did not include any fading procedure in which to gradually remove the support of the videos over time. Although this study along with several others (i.e., Sigafoos et al., 2005; Shipley-Benamou, Lutzker, &Taubman, 2002) have shown that video prompts can be withdrawn seemingly without affecting student performance, a gradual fading procedure would likely decrease prompt dependency and aid in generalization

The findings of this study support the use of video prompting methodology to teach daily living skills to students with developmental disabilities. Four adolescents with mild to moderate developmental disabilities were able to rapidly acquire dish washing skills after the introduction of a video prompting intervention that included a systematic error correction procedure; three of the participants were able to maintain the skills learned. Future research should continue to build

the support base for video prompting methodology. Researchers should strive to conduct high quality studies because video prompting has the potential to be an evidence-based practice for individuals with developmental disabilities, as was seen in this study. Lastly, future research must further explore the efficacy of error correction procedures and the impact that these procedures have on student learning and retention of skills over time. Results from this study indicated that video prompting along with an error correction procedure positively impacted skill acquisition, allowing students to avoid learning errors and maximize their independence in accurately and efficiently being able to perform such vital daily living skills.

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Table 1

Participant Adaptive Behavior and IQ Scores

Name	Adaptive Behavior Composite	Full Scale IQ/IQ Composite
Lily	65 (significantly delayed) (Vineland Adaptive Behavior Scales)	43 (extremely low) (Stanford-Binet)
Kaitlin	53/57 (extremely low) (Adaptive Behavior Assessment System)	62 (extremely low) (Wechsler Nonverbal Scale of Ability)
Matt	55/52/68 (extremely low) (Adaptive Behavior Assessment System)	62 (extremely low) (Kauffman Brief Intelligence Test)
Timmy	58/89/57 (extremely low to low-average) (Adaptive Behavior Assessment System)	63 (extremely low)/ 46 (Kauffman Brief Intelligence Test)/ (Wechsler Intelligence Scale for Children)

Table 2

Task Analysis Including Video Clip Durations

Task Analysis Step	Duration
1. Put the stopper in the sink and turn to seal shut	11 s
2. Turn on the warm water (use both hot and cold faucets)	7 s
3. Measure 1 teaspoon of dish soap and pour into sink	13s
4. Turn off water when sink is about ¼ full	6s
5. Use the washcloth to wash all of the sides of each item	33s (steps 5 & 6 combined)
6. Put soapy dishes in the rinse sink	
7. Pull the stopper out of the soapy sink	5s
8. Turn on the warm water	7s
9. Rinse some of the soap out of the sink	11s
10. Rinse out the washcloth and squeeze all of the water out of it	8s
11. Hang the washcloth flat in the middle of the sinks	7s
12. Push the faucet over to the rinse sink	5s
13. Rinse each item until all of the soap suds wash off	24s (steps 13 & 14 combined)
14. Place each item in the drying rack	
15. Turn off the water	4s
16. Use the towel to dry off the area around the sink	8s
Video clip of entire sequence shown at the end (fast forward speed)	1 min 2s

Table 3

Number and Type of Prompts Needed for Correct Responding Across VP Intervention Sessions

Sessions→	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Matt	15- I 1 -VP2 0- M 0- P	12- I 3- VP2 1- M 0- P	13- I 3- VP2 0- M 0- P	15- I 1- VP2 0- M 0- P	15- I 1- VP2 0- M 0- P	15- I 1- VP2 0- M 0- P	16- I 0- VP2 0- M 0- P	
Lily	12- I 3- VP2 1- M 0- P	13- I 1- VP2 2- M 0- P	14- I 0- VP2 2- M 0- P	14- I 0- VP2 2- M 0- P	15- I 0- VP2 0- M 0- P	15- I 0- VP2 1- M 0- P	15- I 0- VP2 0- M 0- P	15- I 0- VP2 1- M 0- P
Timmy	13- I 0- VP2 1- M 1- P	14- I 0- VP2 2- M 0- P	15- I 1- VP2 0- M 0- P	15- I 0- VP2 0- M 0- P	15- I 0- VP2 0- M 0- P	15- I 0- VP2 0- M 0- P		
Kaitlin	15- I 0- VP2 1- M 0- P	16- I 0- VP2 0- M 0- P	15- I 0- VP2 0- M 0- P	16- I 0- VP2 0- M 0- P				

Notes. I= Independent correct response; VP2= verbal/visual prompt; M= model prompt; P= physical prompt.

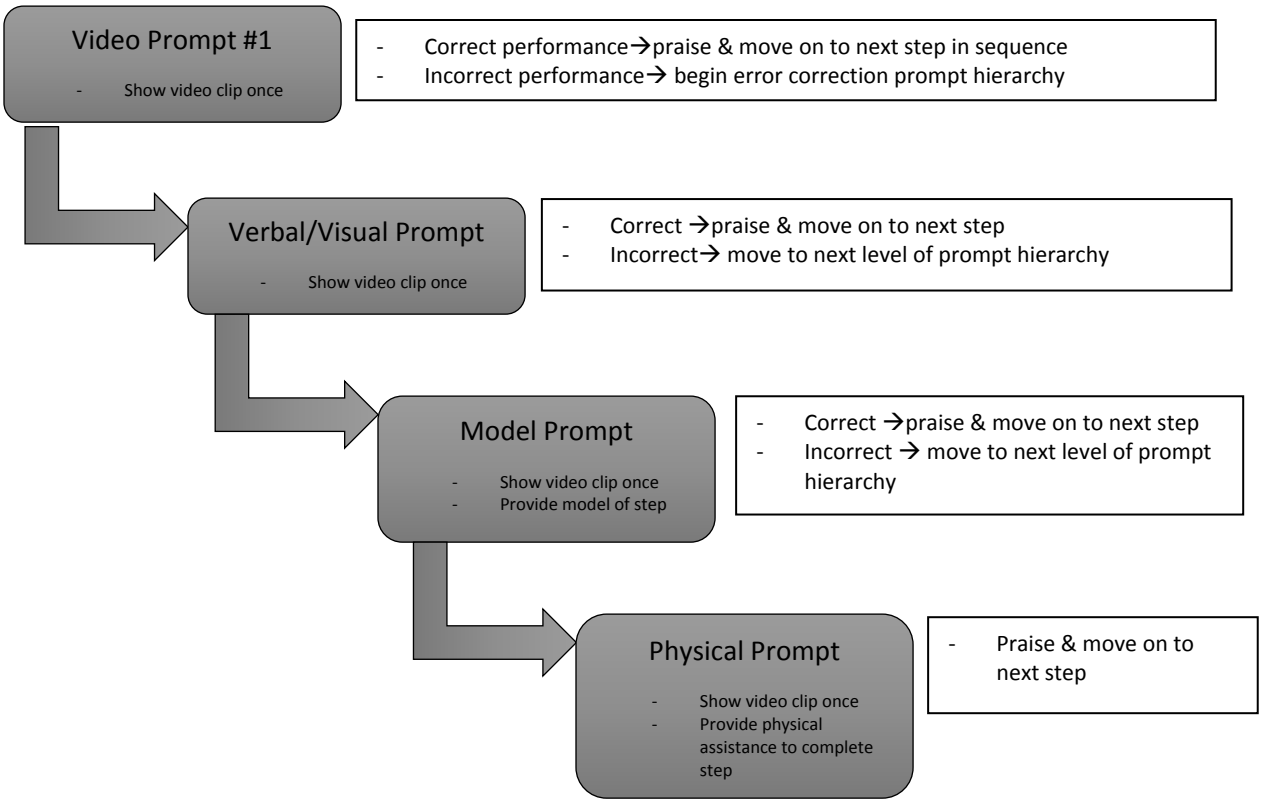

Figure 1. **Flow chart of the systematic error correction procedure used in the video prompting intervention.**

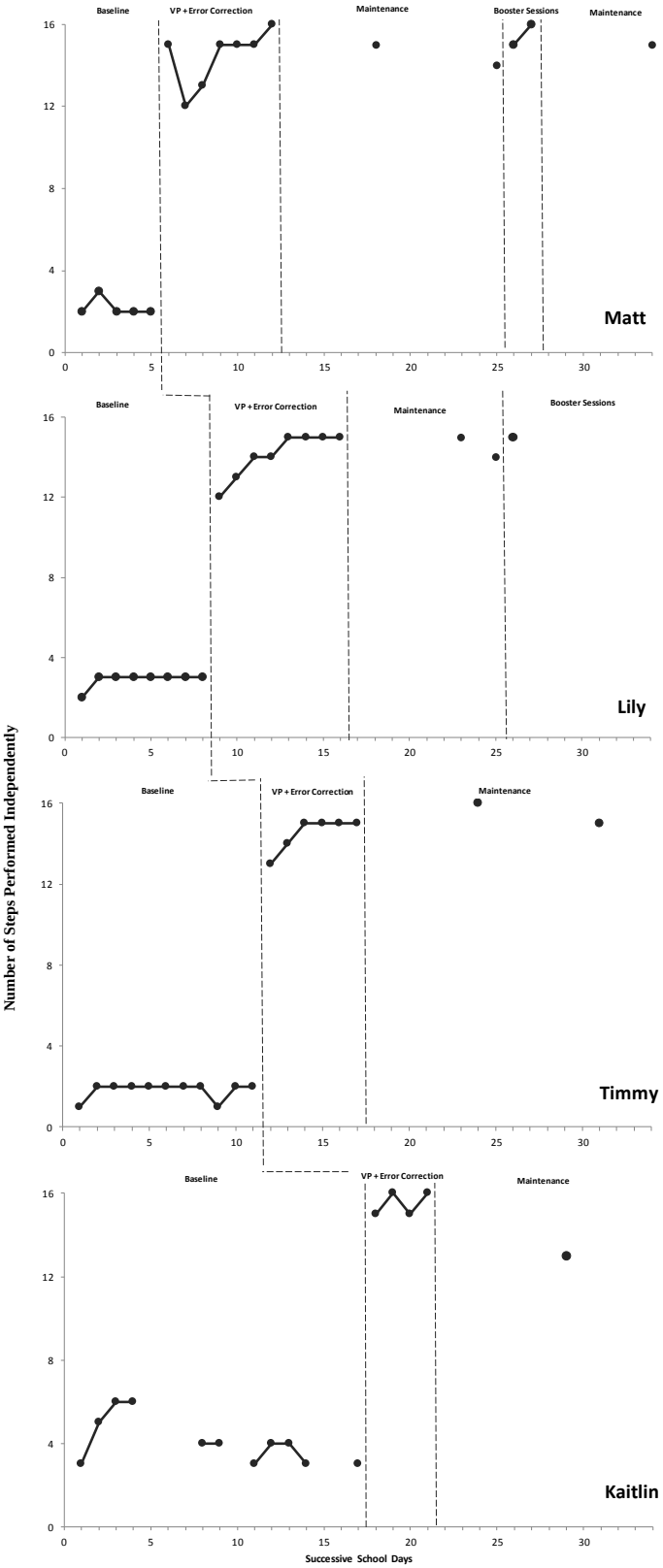

Figure 2. **Number of steps performed independently for Matt, Lily, Timmy, and Kaitlin**