Using Smart Phone Technology to Improve Daily Living Skills for Individuals With Intellectual Disabilities

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Using smart phone technology to improve daily living skills for individuals with intellectual disabilities

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Abstract

Background: Individuals with intellectual disabilities need continued supports in completing daily living tasks to increase the likelihood of achieving independence. Fortunately, research has shown that assistive technology, and particularly video prompting helps support independent living for individuals with intellectual disabilities.

Aims: This study investigated the efficacy of a highly customizable task analysis smartphone application in assisting three young adults with intellectual disabilities learn how to cook three different multistep recipes.

Materials & Methods: Three young adults with intellectual disabilities enrolled in a four-year postsecondary education program (PSE) participated in a multiple probe design across participants to examine the effect of a Task Analysis app on the participants' completion of three cooking tasks.

Results: In this present study, the use of video prompting to teach a daily living skill resulted in large and meaningful effect size gains of 99%–100% for all three participants, as measured by Tau-U.

Discussion: Video prompting is an effective instructional strategy which allows the user to self-prompt and manage their ability to successfully complete daily living skills. In this current study, video prompting made a substantial difference in the safety of participants.

Conclusion: The use of video prompting can decrease the reliance on others (e.g., teachers and caregivers), improve self-confidence of the user, and improve the user's level of autonomy.

Keywords

assistive technology, cooking skills, daily living skills, independent living skills, intellectual disabilities, single case

1 | INTRODUCTION

Independent living is an important facet of adult life. Individuals with intellectual disabilities often experience a combination of both intellectual and adaptive functioning deficits that impact conceptual, social and practical domains (Randall et al., 2020). These deficits can affect the individual's memory, attention, focus and the ability to perform multi-step tasks, which can hinder their ability to live...
independently. Consequently, because individuals with intellectual disabilities often need continued support in completing daily living tasks (self-care, cooking, cleaning and managing personal finances), achieving independence is often challenging (Bridges et al., 2020).

2 RATIONALE FOR TEACHING INDEPENDENT/DAILY LIVING SKILLS

Independent living skills are those needed to navigate one’s day to day life successfully. Daily living skills include activities of daily living (ADLs) and instrumental activities of daily living (IDALs). ADLs are meaningful, functional, personal care tasks such as eating, brushing one’s teeth, bathing and hygiene. IDALs include skills such as making meals, grocery shopping, and banking (American Occupational Therapy Association, 2014). It is important to teach ADLs and IDALs explicitly because 80% of individuals with intellectual disabilities have significant challenges completing these skills and they are considered essential to enhancing independence (Chiang et al., 2017; Parmenter, 1993). Several promising practices and instructional strategies that can help alleviate some of the barriers and help individuals with intellectual disabilities live independently include assistive technology, tasks analysis and prompting.

Assistive technology (AT) is an effective tool that can help individuals with intellectual disabilities complete daily living skills while decreasing their reliance on another person. AT includes any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified or customised, used to increase, maintain or improve the functional capabilities of a person with a disability. Previous research demonstrates that AT has enhanced independence and community participation for individuals with intellectual disabilities (Desideri et al., 2022; Owuor et al., 2018).

One popular and effective instructional technology for individuals with intellectual disabilities is video-based instruction (VBI) which uses words, pictures and actions to promote learning (Mayer & Moreno, 2003; Mechling, 2005). Video modelling and video prompting are two forms of VBI frequently used in special education (Kellem & Edwards, 2016; Rayner et al., 2009). In video prompting, participants view a video that depicts a sequence of steps. Following each step, researchers ask the students to execute what they saw in the video with researcher feedback if needed (Alberto et al., 2005; Cihak et al., 2006). Video prompting is an evidence-based practice with a large accumulation of research supporting its efficacy and value for addressing independent living skill deficits for students with disabilities (Bellini & Akullian, 2007).

In video modelling, participants watch a short video depicting a target skill, followed by a request to initiate what they saw in the video (Alberto et al., 2005). Participants can initiate the task shown in the video either immediately after the video ends (i.e., simultaneous video modelling) or after a specified period of time (i.e., delayed video modelling; Park et al., 2019). Video modelling is an effective instructional strategy because it allows the individual to view the task in its entirety and then complete the skill in the same way (Leblanc et al., 2003).

Most daily living skills involve multiple steps that historically required step by step instructions or prompting by instructors to complete a task (Post & Storey, 2002). Task analysis is an evidence-based practice that takes a complex task (e.g., doing laundry) and breaks it down into manageable steps (e.g., sort laundry into whites and darks, load clothes into the washing machine and add soap to the washing machine) that individuals can complete sequentially (McConomy et al., 2021). Tasks can be broken down into as many steps as needed based on a person’s ability, then the individual steps form links in a chain to complete a larger task (Snell & Brown, 2011).

2.1 Prior research

Prior research investigating the use of AT to teach cooking skills has shown promise, and continues to expand with the advancements in technology. Mechling, Gast, and Fields (2008) and Mechling, Gast, and Gustafson (2008) conducted a multiple probe across cooking tasks design to investigate the efficacy of video prompting using a portable DVD player to teach three young adults with intellectual disabilities to make a grilled cheese (28 steps), ham salad (17 steps) and hamburger helper (27 tasks). Results indicated that video prompting increased participants’ level of correct steps from 20% to 50% in baseline to 80%–100% after the intervention (Mechling, Gast, & Fields, 2008; Mechling, Gast, & Gustafson, 2008). Similarly, Mechling and Stephens (2009) compared picture-based cookbooks to video recipes with a portable DVD player using self-prompting when teaching individuals with intellectual disabilities to make hot chocolate (10 steps), ravioli (10 steps), broccoli (13 steps), chocolate pudding (13 steps), tuna (19 steps) and French fries (19 steps). Results indicated that video prompting led to a higher percentage of steps completed correctly for all participants than did static pictures. As technology continued to advance Mechling et al. (2010) later incorporated a personal digital assistant (PDA) with picture, auditory and video prompts to help three high school students with moderate intellectual disabilities complete three cooking recipes including hamburger helper (19 steps), ham and cheese sandwich (24 steps), and pizza (25 steps). Results found an immediate and abrupt increase in steps completed by all participants with the introduction of the PDA. The introduction of i-pod Nano led to Taber-Doughty et al. (2011) study with three high school students with mild intellectual disabilities completing twelve different multistep recipes with video modelling and video prompting. Results indicated that while video prompting raised performance from a baseline range of 42.8%–58.5% steps correct to 65%–73% during intervention, video modelling increased student success rates to 74.3%–87%. More recently, Shepely et al. (2018) used an iPod Touch to teach four participants with intellectual disabilities how to make macaroni and cheese (12 steps), and punch (11 steps). Results showed three of the four participants could self-instruct using video prompting at the conclusion of the study (Shepely et al., 2018).
The field of portable electronic devices (e.g., smart phones) has seen a large increase in technological innovation. Individuals with ID have benefited from these devices advanced features including touch screens, multimedia output and input capabilities. Current technologies are smaller, more affordable and have significantly increased data storage capability. In addition, these devices have the capability of providing different types of prompts (e.g., verbal and video) to assist individuals with varying levels of ID with completing a task instead of relying upon human support (Douglas & Uphold, 2014). Applications on portable devices offer a number of advantages such as quick operation, accessibility, and cost effectiveness, which have successfully assisted individuals with ID perform a variety of tasks independently, by providing structure and cues as well as assisting with task completion and decision making (Randall et al., 2021). Given the rapid pace of technological advances within smartphone technology and application development, it is critical to investigate the impact of modern mobile AT devices for teaching daily living skills to individuals with intellectual disabilities. Thus, the purpose of this study was to extend the research base for AT by assessing a self-managed video prompting strategy using a recently developed iOS Smart Phone Task Analysis App on an iPhone to teach multiple step cooking skills using a stove to three participants with intellectual disabilities.

3 | METHODS

3.1 | Participants

Three young adults with intellectual disabilities enrolled in a four-year postsecondary education program (PSE) participated in this study. Selection criteria for the study required that participants (a) be a first year PSE student, (b) have a diagnosis of mild (IQ of 50–70) or moderate (IQ of 35–49) intellectual disabilities, (c) be capable of operating smartphone devices and applications for daily use, (d) be able to read a written list of directions and (e) consistently require assistance completing multiple step daily living tasks. University approved IRB consent was obtained from all students and their parents prior to participation in the study. All participant assessment scores (e.g., adaptive) were obtained through the students’ PSE program application which required an assessment be conducted within the past 3 years.

Ginny was a 21-year-old female Caucasian freshman in the PSE program. She had a full-scale IQ of 52 as measured by the Weschler Adult Intelligence Scale, 4th Edition (WAIS-IV) and an adaptive score of 72 as measured by the Adaptive Behaviour Assessment System, 3rd Edition (ABAS-3; practical independent living & daily living skills = 85, below average). Ginny had a diagnosis of a mild intellectual disability, a hearing impairment, a speech-language disorder (apraxia) and obsessive-compulsive disorder. According to the Ready Reading Diagnostic Assessment Ginny was able to read on a 1st grade level. Ginny had an identified allergy to dairy products, so for the course of the study she was provided with dairy free cheese and dairy free macaroni and cheese to ensure her safety.

Harry was a 20-year-old male Caucasian freshman in the PSE program. He had a full-scale IQ of 46 as measured by the Weschler Adult Intelligence Scale, 4th Edition (WAIS-IV) and an adaptive score of 73 as measured by the Vineland Adaptive Scale 3 with a daily living skills domain score of 81 which is moderately low. Harry had a diagnosis of moderate intellectual disability and Down syndrome and was able to read on a 1st grade level. His Weschler Individual Achievement Test (WIAT) composite reading standard score was 43 (+1%). Harry had no identified food allergies or intolerances.

Ron was a 20-year-old male Caucasian freshman in the PSE program. He had a full-scale IQ of 70 as measured by the Weschler Adult Intelligence Scale, 4th Edition (WAIS-IV) and an adaptive score of 85 as measured by the Adaptive Behaviour Assessment System, 3rd Edition (ABAS-3; practical independent living & daily living skills = 50, extremely low). Ron had a diagnosis of mild intellectual disability and autism and according to the Wide Range Achievement Test (WRAT) his reading level was assessed at the 3.6 grade level. Ron had no identified food allergies or intolerances.

3.2 | Setting

The postsecondary education (PSE) program was located at a rural public university in the Southeastern United States and provided an integrated course of study to develop the skills necessary to gain employment and live independently. All sessions took place in the participants’ on-campus apartments. Each four bedroom apartment is comprised of three PSE students and a traditional student who serves as an independent living assistant (ILA) responsible for supervising the PSE students during the evening and weekend hours. Each apartment has a full kitchen, including a refrigerator with freezer, full-size oven, full-size electric stove, microwave, cabinet space to store cooking materials and counter space for meal preparation.

3.3 | Materials and procedures

For baseline sessions, participants had a written list of instructions for each task, and all the materials needed to complete the cooking tasks. Materials included cooking utensils (e.g., pot, skillet and colander) and required food items (e.g., eggs and cheese). For training sessions, individuals had access to the TaskAnalysisLIFE app, and all the materials needed to complete the training task. For intervention and follow-up sessions, individuals had access to the app, and all materials needed for the task.

An iPhone with the TaskAnalysisLIFE app aided training and intervention sessions for the study. The app is downloadable for free from the Apple Store on any iOS-enabled device (e.g., iPhone and iPad). The app breaks down complex tasks into multiple steps by providing system task step prompts such as text prompts, audio prompts, video prompts and video models for each task. The app is fully customizable based on the needs of the user, and steps/videos can be edited as participants become proficient with tasks. The app provides system
specific procedural prompts including: (a) click, which turned the user's screen teal and forced the user to click on the step just completed before seeing the next step; (b) click prompt, which turned the user's screen teal and in addition provided a text prompt which forced the user to click on the step just completed before they could see the next step and (c) caution, which turns the users screen pink to alert users to critical safety steps (e.g., turn stove off). See Figure 1 below for more information. The researcher created all videos, used the click prompt for each step to ensure they were completed sequentially and used the caution prompt for safety (e.g., turning off the stove). Participants in this study used the app during all training, intervention and follow-up sessions.

3.4 Experimental design and measures

The study employed a multiple probe design across participants to examine the effect of the Task Analysis app on the participants' completion of three cooking tasks (Ledford & Gast, 2018). The dependent measure for this study was the number of steps participants completed accurately as measured by a researcher-created checklist. The independent measure was the use of video prompting on the TaskAnalysisLIFE app.

3.5 Baseline

The baseline phase consisted of a minimum of five probes until reaching a stable pattern of performance (e.g., consistent trend without variability) (Kazdin, 2020; Kratochwill et al., 2010). Participants executed each task individually so they could not learn from each other or copy the behaviours of other participants. During baseline, participants had no access to or training on the app. Each participant received a written task analysis/list of directions and instructions to conduct the cooking task. The researcher gave a verbal prompt such as 'please use this written list of steps to make a cheese omelet' (See Table 1 for written task analyses). The researcher documented the number steps each was able to complete independently. Participants had 10 s to initiate each step of the task. If participants appeared confused or did not initiate a step, they were instructed to read the step again. Participants' steps were marked incorrect if they (a) did not initiate a step within 10 s after the second time they read the step, (b) attempted a step but completed it incorrectly or only did part of the step (e.g., did not spray the pan with cooking spray but did add the egg mixture). If, at any time, the researcher deemed the participant acting in an unsafe manner, potentially harming themselves or others, or damaging equipment, the researcher used discontinuance rules by thanking the

FIGURE 1 TaskAnalysisLIFE app prompting; prompting within the task analysis app.
participant for his or her time and immediately ending the task. The participant received credit for any steps completed prior to discontinuation and the participant was transitioned to the next task. The cooking tasks for this study were counterbalanced during baseline, intervention and maintenance phases (e.g., ABC, BCA and CAB) to ensure that participants did not repeat skill acquisition knowledge from previous sessions and had an equal chance of success on each task.

### 3.6 | Training

Once achieving a stable baseline of at least five points, participants received instruction on using the Task Analysis app on an individual basis. Each participant received two individual training sessions (20 min each) on the use of the app for approximately 40 min total. Training sessions were provided by the first researcher for all three participants who were naïve to the goals of the study, and had no prior instruction on the app. Once participants demonstrated they could use the functions of the app without assistance from the researcher, they were given an independent 10-item practice task analysis for making a peanut butter and jelly sandwich. The researcher demonstrated how to access each video in order, how to re-watch a video if needed, how to get out of a video (e.g., click ‘x button’), and ensured participants could independently move through the steps prior to intervention. Each video was filmed using the point-of-view perspective, which simply means the participants saw the researcher’s hands perform the task, but not the entire kitchen or the researcher (Spencer et al., 2015). The researcher also explained the purpose of the click prompt and the caution step for participants to be familiar with these prompts prior to intervention. The participants mastered the app at varying rates ranging from 10 to 20 min with an average of 15 min.

### 3.7 | Intervention

After completing training on the app, the first researcher selected participants to enter the intervention phase. Harry was selected to enter intervention first, because he had a stable baseline and demonstrated numerous safety concerns. Participants executed three separate cooking tasks which included cooking vegetables, making macaroni and cheese and making a cheese omelette using the app. Each session began with the researcher giving the participant the mobile device and providing a verbal prompt such as ‘please use the Task Analysis app to make macaroni and cheese’. During intervention, participants had 10 s to initiate a step. If participants failed to initiate a step within 10 s, they were instructed to re-watch the video. If participants struggled, appeared confused, or did not initiate a step after watching the video a second time, the researcher used additional prompts following a system of least prompts. The participants received a gestural prompt, verbal prompt and a physical prompt if necessary to help complete each step (e.g., ‘Let the water fully boil.’). Prompts were also given anytime the researcher noted that participants were being unsafe, could harm themselves or others, or damage equipment. Table 1 below shows the task analysis steps for cooking an omelette.

### 3.8 | Follow-up/maintenance

During the maintenance phase participants were asked to complete the three cooking tasks after not using the app for 1 week and then 3 months later following winter break, to determine whether they maintained the skills for a longer term. During maintenance, participants still had access to the app, and the researcher was present to deliver prompts as needed for safety.

### 3.9 | Data analysis

The researcher conducted visual analysis on graphed data shown in Figure 2 to determine changes in level, trend, consistency, immediacy of the effect, variability and overlap (Kratochwill et al., 2010). To measure ES, researchers used an online calculator (Vannest et al., 2016) to compute Tau-U. Tau-U is a non-parametric approach that is calculated by integrating trend and overlap data (Parker et al., 2011). Tau-U allows a researcher to gain useful descriptive and inferential insights about their data by examining within-phase trend and across-phase differences (Brossart et al., 2018). Advantages of Tau-U include its (a) strong statistical power, (b) suitability to short data series, (c) congruency with visual analysis and (d) statistical control for trend in baseline data (Parker & Vannest, 2012). In Tau-U, scores that are 65% or lower indicate a weak or small effect, scores from 66% to 92% indicate a medium or high effect, and scores above 93% indicate a large or strong effect (Rakap, 2015).

### Table 1 Task analyses for cooking tasks.

<table>
<thead>
<tr>
<th>Making an omelette task analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Get two eggs and crack them into a bowl.</td>
</tr>
<tr>
<td>2. Check to make sure there are no shell pieces in your eggs.</td>
</tr>
<tr>
<td>3. Whisk the eggs with a fork until the mixture is all yellow.</td>
</tr>
<tr>
<td>4. Get a skillet, spray it with cooking spray and pour the egg mixture into it.</td>
</tr>
<tr>
<td>5. Put the skillet on a stove eye and turn the stove on medium heat.</td>
</tr>
<tr>
<td>6. Cook until the eggs set around the edge of the skillet and use a spatula to gently push the cooked egg near the center.</td>
</tr>
<tr>
<td>7. When the eggs are almost set on the surface, put cheese on half the egg.</td>
</tr>
<tr>
<td>8. Fold the eggs over so the cheese is in the middle and cook until the cheese is melted.</td>
</tr>
<tr>
<td>9. Using the spatula, put the omelette on a plate.</td>
</tr>
<tr>
<td>10. Turn off the stove.</td>
</tr>
</tbody>
</table>

**Materials:** Eggs, cheese, cooking spray, skillet, spatula, bowl, fork and plate.
3.10 | Interobserver agreement/reliability

In addition to the researcher, a special education doctoral student observed one-third of all baseline, training, intervention and follow-up sessions to ensure reliability in each phase. Measurement of the inter-observer agreement (IOA) percentage occurred for each study phase. The doctoral student had a copy of the reliability sheet during baseline and intervention phases to document which steps they observed were
completed correctly. IOA was calculated as the smaller number over the larger number divided by 100.

### 3.11 Fidelity of implementation

In addition to the researcher, a special education doctoral student observed one-third of all baseline, training, intervention and follow-up sessions to ensure fidelity. The doctoral student had a copy of the scripts to ensure they were read verbatim, and procedures were followed consistently.

### 3.12 Social validity

Social validity for participants was assessed using a 5-point smiley face Likert scale to determine whether students (a) enjoyed using the app, (b) thought the app was helpful, (c) would recommend the app to a friend and (d) felt more confident in their skills. Choices on the scale ranged from a score of 1 strongly disagree (frown) to a score of 5 strongly agree (smiley face). Adults with intellectual disabilities often used Smiley face Likert-type scales (Reynolds-Keefer et al., 2009). Although the participants in this study were able to read, this Likert scale was chosen due to its ease of understanding. Participants also responded to several researcher-created open-ended questions. Social validity was also completed with the freshman instructor responsible for teaching, supervising, and scheduling the participants. The instructor completed the Intervention Rating Profile-15 (IRP-15) which is a questionnaire used to obtain information that will aid in the selection of future interventions (Witt & Elliott, 1985). The IRP-15 asks 15 Likert-scale questions on a scale including strongly disagree, disagree, slightly disagree, slightly agree, agree, and strongly agree and is used to rate the intervention’s acceptability level in a score that ranges from 15 to 90, with acceptability of the intervention at 52.50 or higher.

### 4 RESULTS

#### 4.1 Harry

During the baseline phase (e.g., using the written list), Harry struggled with a variety of steps across all cooking tasks, including cooking vegetables (mean steps correct = 12%; range 0%–20%), omelettes (mean steps correct = 16%; range 10%–30%) and macaroni and cheese (mean steps correct = 14%; range 0%–30%). Harry’s baseline performance showed moderate variability with an increasing trend across all three tasks. During baseline, Harry had tasks discontinued for safety and required physical prompts to ensure his safety. He tried to slide a pan from a hot eye to a cold eye twice and lean across it when the directions stated to move food with a spatula, and tried to pour water into the colander instead of a pot and place it on the stove. Harry was able to learn how to use the task analysis App after one session of training. During intervention, Harry improved his ability to cook by following the video prompts successfully, and was able to produce fully cooked vegetables (mean steps correct = 98%; range 90%–100%) and a fully cooked omelette (mean steps correct = 98%; range 90%–100%), and macaroni and cheese (mean steps correct = 75%; range 70%–80%). Tau-U for Harry was 100% which indicates that this intervention had a large or strong effect. During intervention, Harry did not require any prompts for safety. He did require one gestural prompt to turn on the correct stove eye, four verbal prompts to let the water fully boil for macaroni, and to add both types of vegetables to the pan. A timer was also set to give Harry a visual for how long the noodles needed to cook. During the follow up sessions several months later Harry was able to maintain his skills (mean steps correct = 95%; range 90%–100%).

#### 4.2 Ron

During baseline (e.g., using the written list), Ron’s performance showed high variability, and he struggled across all tasks, including making cooking macaroni and cheese (mean steps correct = 50%; range 30%–70%), vegetables (mean steps correct = 33%; range 10%–40%) and omelettes (mean steps correct = 50%; range 20%–70%). During baseline Ron had 5 safety concerns (e.g., turning on wrong stove eye and leaning over hot eye). Ron also had some fine motor issues with opening the cheese slices, but these were not counted against him. Ron entered intervention second and was able to learn how to use the Task Analysis App after one session of training. On the first intervention session, Ron was able to fully cook the vegetables (mean steps correct = 100%), but struggled with the omelette (mean steps correct = 94%; range 70%–100%), and macaroni and cheese task (mean steps correct = 98%; range 90%–100%). By the third intervention session, Ron was able to score a perfect 10 on all three recipes. Tau-U for Ron was 99%, which indicates that this intervention had a large or strong effect. Ron did not display any safety concerns during the intervention phase while using the app. However, he did require two gestural and four verbal prompts (e.g., wait for water to boil). During the follow up sessions several months later Harry was also able to maintain his skills (mean steps correct = 96%; range 90%–100%).

#### 4.3 Ginny

During baseline (e.g., written list), Ginny had a difficult time across all cooking tasks, including cooking macaroni and cheese (mean steps correct = 10%; range 0%–10%), vegetables (mean steps correct = 10%; range 0%–10%) and omelettes (mean steps correct = 18%; range 0%–40%). Ginny displayed three safety concerns during baseline session (e.g., turning on the wrong stove eye and trying to lean over it to cook). Ginny was also able to learn how to use the task analysis App after one session of training. During the first intervention session, Ginny was able to fully cook the vegetables and execute each step (mean steps
correct = 100%). She was able to complete all of the steps except one for preparing an omelette (mean steps correct = 92%; range 90%-100%), and macaroni and cheese (mean steps correct = 96%; range 80%-100%). Tau-U for Ginny was 100% which indicates that this intervention had a large or strong effect. During intervention, Ginny did not require additional prompts for safety, but required four verbal and six physical prompts (e.g., temperature control of stove) to be able to fully cook all three recipes. During the follow up sessions several months later Ginny was also able to maintain her skills (mean steps correct = 95%; range 90%-100%).

### 4.4 IOA/reliability/fidelity

During baseline, 33% of sessions were observed and reliability was 95% (range 85%-100%) across the two observers. During training, 33% of sessions were observed and reliability was 100% across the two observers. During intervention, 33% of sessions were observed and reliability was 92% (range 80%-100%) across the two observers. During follow-up, 33% of sessions were observed, and reliability was 100% across the two observers. Procedural fidelity was 100% across all study phases.

### 4.5 Social validity

On the social validity Likert scale, all three participants indicated five (agreed a lot) that they (a) liked using the app, (b) it taught them new skills, (c) it was easy to use, (d) they would use the app again and (e) recommend it to a friend. When asked what they liked best about the app Harry said it was easy to use. On the open-ended questions, Ron indicated that he enjoyed using the app to learn new recipes, while Ginny indicated she enjoyed using the app to cook. In addition to the participants, the instructor provided a high rate of acceptability awarding 86 of 90 potential points on the Intervention Rating Profile 15 (Witt & Elliott, 1985), mentioning the only negative aspect was that it can be time-consuming to create the intervention up front (e.g., recording the videos).

### 5 DISCUSSION

In this present study, the use of video prompting to teach a daily living skill resulted in large and meaningful effect size gains of 99%-100% for all three participants, as measured by Tau-U. During baseline, participants were not capable of cooking any of the recipes to completion, and demonstrated various safety concerns which resulted in discontinuation of tasks. However, with the introduction of video prompts, all three participants were able to fully cook their recipes safely. All three participants were able to learn how to self-prompt through the steps to cook, thus increasing their overall independence and autonomy in performing the requested tasks. The video prompting setup used this study was well-suited for both the tasks and participants. This setup was of value to the participants, because they could use a cell phone like any other college student to complete their tasks, instead of using large or outdated technology as was seen in previous studies. The built-in features of the app helped facilitate success by ensuring that participants completed the steps in order and followed protocols for safety.

### 5.1 Kitchen and cooking safety

One of the most important aspects of teaching cooking is ensuring the safety of participants. Prior studies have investigated the use of video prompting and a system of least prompts to teach kitchen and cooking safety skills. Mechling, Gast, and Fields (2008) and Mechling, Gast, and Gustafson (2008) used video prompting to teach participants with moderate intellectual disabilities how to extinguish cooking-related fires with flour, the lid of a pot, and a fire extinguisher, and found that participants could successfully complete the tasks in a safe manner. In this current study, video prompting made a substantial difference in the safety of participants. During baseline, all three participants demonstrated safety concerns while cooking. All three students turned on the wrong stove eye and leaned across it to try and cook which could have resulted in burns. In addition, one student pulled a pan of hot food toward himself while cooking which could have resulted in burns. Additionally, during baseline all three participants made uncooked or undercooked foods, which could make them sick if consumed. The videos showed them exactly how to perform the steps successfully, and the researcher stood right beside them to ensure they followed the steps correctly, were safe, and to deliver additional prompts when necessary. The findings of this study further demonstrate the efficacy of video prompting in teaching cooking skills and keeping participants safe.

### 6 LIMITATIONS

Study results should be interpreted with understanding of the following limitations. First, given there were only three participants, the findings of this study are not generalizable to the larger population of individuals with intellectual disabilities. In addition, there was a lack of diversity given that none of the freshmen minority PSE students required assistance completing multiple step daily living tasks. Second, the participants included in this study were already able to use their smartphone devices for daily use, so the results of this study are not generalizable to the larger population of young adults with intellectual disabilities who may not be proficient in using mobile technology. Another limitation is that the level of intensity and type of support needs for independent living/domestic skills were not fully known for the participants since they were all freshman new to the program. Lastly, Harry demonstrated a slight increase in performance prior to entering intervention.
7 | IMPLICATIONS AND FUTURE RESEARCH

Video prompting is an evidence-based practice with a large accumulation of research supporting its efficacy and value for addressing independent living skill deficits for students with disabilities (Bellini & Akullian, 2007). Findings of this current study are important for special education teachers, inclusive post-secondary instructors, direct support professionals, and caregivers of individuals with intellectual disabilities, as it further demonstrates the efficacy of using video prompting to teach cooking skills. The use of video prompting fits well within a functional curriculum and can be used by special education teachers to teach a myriad of skills. Additionally, video prompts are customizable based on the individual needs of the learner, so teachers and caregivers can individualize these supports as needed.

Future research should focus on the use of mobile technology and video prompting to teach personal skills (e.g., hygiene, grooming and dressing), as this is an area that has not yet been studied. Future research should also focus on teaching skills to individuals diagnosed with severe and profound intellectual disabilities, as the vast majority of research has been conducted with individuals with mild and moderate intellectual disabilities. Future research should also expand upon domestic and community skills (e.g., navigation, money management and cleaning) for which there is limited research but still present challenges for the population. Future video prompting studies should include teaching individuals with intellectual disabilities strategies to mitigate challenges with transportation and be able to obtain goods and services (e.g., mobile technology apps to order groceries for delivery and rideshare service).

8 | CONCLUSION

In conclusion, video prompting is an effective instructional strategy which allows the user to self-prompt and manage their ability to successfully complete daily living skills. The use of video prompting can decrease the reliance on others (e.g., teachers and caregivers), improve self-confidence of the user, and improve the user’s level of autonomy (Morash-MacNeil et al., 2018). With the increase in mobile technology, individuals with intellectual disabilities can now access their video prompts in a discrete way, and bring their prompts with them wherever they may be needed (e.g., into the community).

Research has shown that video prompting on mobile devices has been effectively used to teach navigation, cooking, cleaning, wrapping gifts, using an ATM, gardening, grocery shopping, using technology and completing laundry. Video prompts are fully customizable to the needs of the individual, making it an effective intervention for a variety of needs and ability levels.

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