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Can video prompting be used to teach employment skills to older adults with moderate to moderate-severe intellectual developmental disabilities?

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ABSTRACT

Background: Being employed gives people with intellectual developmental disabilities (IDDs) a daily routine and helps them develop a range of physical, cognitive, and social skills, along with a sense of independence, but many have difficulty integrating into the work force. Assistive technologies may support employment but research on their efficacy is scarce. The study examined the impact of using video prompting on the ability of older adults with IDD to learn two new employment-related tasks.
Method: In this single-subject study design, we examined six adult participants (over age 50) with IDD, asking whether viewing video prompts on a tablet could help them learn novel work-related duties. We compared the completion of steps in these work tasks before the intervention, during the intervention (with prompts), and after the intervention (with no prompts).
Results: All participants showed the ability to learn. Accuracy in follow-up was better than in the baseline sessions, albeit with some variability: three performed the tasks correctly in follow-up when they were not given prompts, but the accuracy of the remaining three participants dropped, suggesting the utility of longer interventions.
Conclusions: Video prompts may promote active aging and independence in older adults with IDD by teaching new work skills.

1. What this paper adds

Older adults with intellectual and developmental disabilities (IDDs) have unique needs, assistive technology may be able to address some of these needs. However, little research has explored this possibility. In our study, we found video prompting helped older adults with IDD to acquire new employment-related skills. The findings suggest the potential of video prompting to improve task performance. Notably, some participants showed sustained improvements after the intervention. We conclude that assistive technologies like video prompting could be used to promote independence and skill-building in this population.

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2. Introduction

Individuals with intellectual developmental disabilities (IDDs) can derive tremendous benefits from employment (Morash-Macneil et al., 2018; Nota et al., 2010; Schalock et al., 2002). Among other things, employment can foster the development of daily routines and independence, improve motor and cognitive abilities, and develop social skills (Stephens et al., 2005). Despite the value of employment, individuals with IDD are seldom employed; in the United States, only about 17 % are in paid employment (Morash-Macneil et al., 2018; Newman et al., 2011). Even if they are employed, most have part-time jobs and non-competitive salaries (Siperstein et al., 2013). They have difficulty finding work because of their lack of behavioral and emotional skills, cognitive difficulties (Noel et al., 2017; Siperstein et al., 2013), and the need for ongoing assistance from job coaches and instructors (Gilson et al., 2017; Spooner et al., 2012).

Video modeling has been used to teach individuals with IDD household work and daily living tasks (Alberto et al., 2005; Banda et al., 2011; Mechling & O'Brien, 2010; Park et al., 2019; Taber-Doughty et al., 2008). In these videos, a person is shown performing a certain behavior or displaying a particular skill. The individual with IDD watches the video, and then attempts to replicate the task (Alberto et al., 2005; Mechling & O'Brien, 2010). For example, Almalki and Binomran (2025) found that video modeling was effective in teaching four individuals with IDD how to prepare meals in a fast-food restaurant, specifically addressing employment skills in food service settings where this population often finds work opportunities.

One type of video modeling, video prompting, shows one step of a task at a time. The individual viewing the video is asked to perform this step before seeing the next (Cannella-Malone et al., 2006; Mechling, 2005; Norman et al., 2001; Sigafoos et al., 2005). A number of devices can be used to show video prompts, including television using VCR tapes (e.g., Norman et al., 2001), as well as computer technologies, such as tablets (e.g., Van Laarhoven et al., 2009). Breaking down a task into small segments reduces the cognitive load, making it easier for those with cognitive challenges to master a task (Park et al., 2019; Weng et al., 2014).

Young adults with IDD have been shown to be able to acquire and maintain skills when video prompting was used (for reviews, see Banda et al., 2011; Morash-Macneil et al., 2018; Park et al., 2019). In one example, Lo et al. (2014) used it to teach basketball youth with moderate IDD. All participants performed more steps correctly, and they continued to do so in the follow-up sessions when they did not have access to video prompts. In a study of three adults aged 34–36 years with moderate IDD, Sigafoos et al. (2005) used video prompting to teach them to operate a microwave. Video prompting has also been tested in children. Cannella-Malone et al. (2011) found it was more useful than video modeling to teach children aged 11–13 years with severe IDD to do basic household chores, such as washing dishes; importantly, their accuracy improved, as did their independence. Mechling et al. (2014) discovered video prompting improved the ability of high-school students with moderate IDD to complete a number of ordinary household tasks. Furthermore, Stierle et al. (2023) used video prompting delivered by smartphone application to teach three young adults with intellectual disabilities how to cook safely and independently three multistep recipes.

Studies have shown promising results for children's and young adults' ability to learn employment-related tasks with video prompting. Van Laarhoven et al. (2007) found strategies shown on a pocket handheld PC helped teach two youths with IDD how to perform tasks at a restaurant, including clocking in/out and cleaning. In another study, Van Laarhoven et al. (2009) found viewing video prompts on an iPod helped one person with IDD perform cleaning tasks in an animal shelter. Schroeder et al. (2023) found that video promoting was effective teaching eight young adults with developmental disabilities how to perform work related task such as doing laundry and vacuuming with minimal staff–learner interaction (Schroeder, Ragotzy, & Poling, 2023). Finally, Randall et al. (2019) reported video prompting on an iPhone helped teach four young adults with moderate IDD office tasks, such as copying, scanning, and shredding papers. Simply viewing the prompts is not always enough, however; some may require further support, including having their errors corrected and receiving physical prompts from coaches (e.g., Cannella-Malone et al., 2013; Goodson et al., 2007).

The efficacy of video prompting has not been examined in older adults with IDD, even though the proportion of older adults with IDD is increasing (Santos et al., 2022). This is especially surprising as the technique may promote their employment, and employment is known to improve their quality of life. Problematically, older adults with IDD are characterized as having worse quality of life than younger adults with IDD or older adults without IDD (Bishop et al., 2013; Carmeli et al., 2016; Santos et al., 2022). The importance of studying the efficacy of interventions in older adults with IDD is supported by the Compensation Age Theory, which highlights that cognitive intervention programs may carry benefits even at an advanced age, when some abilities may be considered non-modifiable (Lifshitz, 2020). Moreover, the theory states that adults with IDD continue to develop cognitively throughout their lives, gaining knowledge and skills through their experiences, and can exceed cognitive limitations predicted in childhood. Similarly, the Structural Cognitive Modifiability proposed that the intelligence should be viewed as a dynamic process rather than a fixed one, which can be developed, through interventions, the right stimulations, and mediated learning experiences (Feuerstein, 2003; Feuerstein, 2008).

Indeed, recent studies have called for more research on intervention strategies for older adults with IDD to promote healthy aging and active engagement in life (Heller & van Heumen, 2021; Santos et al., 2022). Given the gap in the research, we examined the impact of video prompting on the ability of six older adults (over age 50) with IDD to learn two new work-related tasks. We focus our study on moderate-to-moderate severe IDD as this population has been understudied.

3. Method

3.1. Ethical statement

The study was approved by the Social Security Ministry, the management at the facility, and the University of Haifa Faculty of Education Ethics Committee (approval number 262/21).

4. Participants

Criteria for participation included the following: participants were 50 years old and older and diagnosed with moderate or moderate-severe IDD, as determined by the diagnostic committee of the Social Security Ministry, in accordance with the definitions in DSM-5 (2013). Participants' diagnoses were taken from the social and medical records of the facility where they lived. In addition, participants had no auditory or visual or auditory deficit and did not exhibit intense disruptive behaviors, as determined by a psychologist. They could understand simple verbal instructions (i.e., one or two steps), as determined by the researcher who asked potential participants to follow several verbal commands in a sequence; for example, "Take the keys in your hand, and put the keys on the ground." Participants had no motor difficulties in their hands, with proper bilateral skill, as determined by a physiotherapist and occupational therapist. They had full range of motion in upper and lower limbs, as well as normal gross and fine motor abilities. They could draw a line or circle to give written agreement (i.e., by drawing a circle on a consent form) and perform press gestures on the iPad device. Finally, participants had no previous exposure to video prompts.

Based on these criteria, we identified seven potential participants. We contacted their guardians, explained the study's objective, procedure, and duration, and asked for their consent. We explained the study to possible participants, and they gave verbal and by simple markings in the consent form. One dropped out in the intervention stage, leaving six older adults in the final sample. Table 1 gives demographic details (age, gender) and diagnosis for each participant. Note that all names are pseudonyms.

Given participants' communication difficulties, throughout the study, we closely observed their behaviors, as we wished to ensure ongoing consent (e.g., expressions or gestures). If we saw a sign indicating a lack of interest, fatigue, or uneasiness, a session was not initiated; if in progress, it was terminated. One participant, Rose, did not complete one session when we saw she was having difficulty and was dropped from the study.

5. Participant characteristics

All participants lived in a residential facility. Four worked at an employment center attached to the residence six days a week and were paid for their work. They enjoyed their work. Two participants did not work at the employment center, giving us an opportunity to test the feasibility of video prompts to promote the ability to perform tasks resembling those at the center and to encourage these participants' subsequent integration at the employment center. All participants experienced challenges with working memory (as determined by a psychologist), possibly limiting the acquisition of tasks containing series of steps.

Yuri (67/male): Yuri had a heart condition and was diagnosed with moderate IDD. He expressed himself using gestures and a limited number of words such as "happy" or "eat". He worked at the employment center on weekdays performing repetitive tasks comprising one or two steps. He enjoyed the work and with the exception of showering and keeping personal hygiene, he independently performed all basic daily activities.

Ralph (68/male)**:** Ralph was diagnosed with moderate IDD. He communicated using short sentences. Like Yuri, during weekdays he worked at the center performing repetitive tasks consisting of two steps. With the exception of bathing, Ralph could independently perform all basic daily activities.

Shaun (55/male)**:** Shaun was diagnosed with fragile X syndrome and moderate IDD. He used limited speech to communicate (three or fewer words). Shaun worked at the employment center during weekdays transferring goods or repeatedly performing one step of a multiple step task, such as placing a wick in a candle, and was happy when working. Shaun needed assistance to maintain his personal hygiene but could otherwise independently perform all basic living activities.

Eliza (63/female): Eliza was diagnosed with moderate-severe IDD. She could follow simple one-step instructions. To communicate, she used limited words (e.g., no, yes, thank you), gestures, and facial expressions. At the employment center, Eliza repetitively performed a single step of a task. Although Eliza was independent in consuming food and beverages, she needed some assistance to get dressed and complete support in bathing and maintaining her personal hygiene.

Rose (59/female): Rose was diagnosed with Down syndrome and moderate-severe IDD. Her communication skills were limited, and she used facial expressions and minimal gestures to communicate. Rose comprehended simple straightforward two-stage directions. She was not employed at the center, and she had not worked before. Rose could eat and drink independently, but she needed supervision to walk and moderate to total help to perform other basic daily activities.

Owen (52/male)**:** Owen exhibited disruptive behaviors and was diagnosed with IDD. He could follow simple one-step instructions but his communication skills were limited, and he expressed his basic needs via facial expressions and specific gestures. Like Rose, Owen had no work experience. He could eat independently, but he needed supervision to walk and more comprehensive help to

Table 1
Participant Details.

Pseudonym	Age	Gender	Diagnosis
Eliza	67	Female	Moderate-severe IDD
Rose	59	Female	Down syndrome; Moderate-severe IDD.
Owen	52	Male	Moderate-severe IDD,
Shaun	55	Male	Fragile X syndrom; Moderate IDD.
Yuri	67	Male	Heart condition; Moderate IDD.
Ralph	68	Male	Moderate IDD.

conduct all remaining basic daily activities.

6. Study design

We used a single-subject multiple-baseline design across subjects, allowing us to apply the intervention sequentially among participants at different times (Hacker, 1980). There were two tasks: task 1 was preparing a holiday bag, and task 2 was preparing a pencil case. The study had three stages for each task: baseline, intervention, and follow-up. After participants reached a consistent accuracy level, which was determined after two baseline sessions, they proceeded to the intervention.

7. Setting

For Rose and Owen, who did not work at the employment center, the study happened in a room near their residential facility. The remaining four participants took part in the study during work hours at the employment center.

8. Tasks

To select appropriate tasks for the intervention, we observed the types of work tasks participants performed routinely at the center and interviewed four staff members. We had two main considerations: unfamiliarity and complexity level. Work tasks should be new to all participants and appropriately complex – neither too difficult nor too easy for this population to perform. Bearing these considerations in mind, we designed two tasks: task 1 was preparing a holiday gift bag and task 2 was preparing a pencil case (Fig. 1). Tasks were broken down into steps (Table 2). Despite our efforts to match levels of difficulty, it turned out that task 2 was slightly more difficult than task 1, as it required fine motor skills.

The video clips included a combination of demonstration and instruction. The individual shown in the clip performed the task and also explained it. Each video clip lasted 5–21 s and included three repetitions of one step of the task. The participants' work coaches video-recorded participants performing the steps for each task.

8.1. Materials

The video prompts were recorded using a smartphone; the clips were edited and copied to the tablet (an iPad). When participants were viewing the video prompts, the tablet was placed on a stand on a table in front of them for consistent viewing (Fig. 1). The sessions were video recorded and also observed by work coaches. For the recordings, we used two types of smartphones. Observation forms completed by work coaches for each participant included each step and a no or yes indication of whether the step was completed correctly.

8.2. Dependent variable

The dependent variable was the percentage of steps correctly completed in the task.

8.3. Session observations

The study had three observers. First, two staff members from the employment center (i.e., work coaches) sat in on and observed the sessions and completed the performance observation forms. Second, a speech therapist, who was naïve to the study's purpose, completed the observation forms while watching the session recordings. The three observers received detailed training by observing two individuals who were not part of the study. The two work coaches were allowed to give some assistance during sessions, but their

Fig. 1. Illustration of materials, setup, iPad, and tasks. Left: holiday bag task and target product (top left). Right: pencil case task and target product (top right).

Table 2
Task analysis for each task.

	Step	Clip duration	Action
Holiday bag Task	1	10 s	Take the transparent bag and open it.
	2	5 s	Take a paper decoration.
	3	6 s	Place the paper decoration in the transparent bag.
	4	6 s.	Pick up first snack.
	5	11 s.	Put the first snack in the transparent bag right to the end.
	6	5 s.	Pick up second snack.
	7	11 s.	Put the second snack above the first snack.
	8	5 s.	Pick up the candy.
	9	17 s.	Put the candy at the top.
Pencil case task	1	6 s.	Pick up the pencil case.
	2	21 s	Fully open the zipper of the pencil case.
	3	5 s	Pick up a marker.
	4	15 s.	Place the marker in the case in the right space.
	5	14 s.	Pick up a pencil and put it next to the marker.
	6	5 s.	Pick up an eraser.
	7	15 s.	Put the eraser in the case, on the other side of the marker.
	8	20 s.	Pick up the adhesive and place it in the case.
	9	5 s.	Close the pencil case.
	10.	12 s.	Zip the pencil case up.

assistance was limited to giving physical prompts to participants or encouraging them, for example, by saying “Keep going”.

8.4. Inter-observer agreement

Observer agreement is defined as the frequency with which observers record the same observations from the demonstrated behavior (Cooper et al., 1987). We calculated inter-observer agreement, that is, number of agreements / total number of agreements plus disagreements (across steps) multiplied by 100. Using data collected during two sessions of each condition (baseline, intervention, follow-up) for each participant, we reached an inter-observer agreement of 100 %.

8.5. Procedure

8.5.1. Familiarity with tablet and training

Before the baseline stage, participants learned how to use the tablet. The pre-baseline stage lasted about a month, and participants had three 15-min training meetings each week - participants learned how to operate the basic icons and how to operate video presentations on the tablet. Two participants learned how to use the tablet independently, but four had difficulty and needed assistance. In addition, participants were asked to perform an action shown in the videos, such as clapping one’s hands. All participants showed the ability to copy these actions.

8.5.2. Study stages

The study comprised baseline, intervention, and follow-up sessions. The baseline and intervention sessions lasted less than 10 min and took place two days a week, with two sessions each day. The work coach/observer arranged the materials that were needed for the task on a table within arm’s reach of the participants. If the participant did not complete the step shown in the video clip, the work coach/observer finished it and recorded it as incorrect on the observation form. The participant did not see what the work coach did. In all conditions (baseline, intervention, follow-up), participants had a minute to start the step. If they did not start performing the step within this time, despite verbal encouragement, it was recorded by the work coach/observer as incorrect. Work coaches used physical prompts if participants understood the task but could not complete it because it required fine motor skills. For example, Eliza and Owen repeatedly tried to open the zipper in task 2 but failed. If a physical prompt was required, the work coach/observer recorded the step as incorrect.

Baseline. Baseline data were collected concurrently for all participants. The work coach placed the items required to perform the task on the table in front of participants, naming each item. Next, the instructor gave verbal instructions, showed an example of the completed bag, and then moved it out of the field of view of the participant. Participants were asked to start performing the task on their own. The instructor did not provide feedback or corrected participants, but did give speech affirmations to continue with the steps in the task.

Intervention. This stage started after the participant reached stable accuracy in the previous stage (generally after two sessions). The tablet was positioned on the table such that participants could easily see it and comfortably perform the task (Fig. 1). Some participants were unable to operate the iPad, and in such cases, the observers helped them. The work coach asked the participant to view the clips and perform the action that was demonstrated. If the participant did not complete the step, the work coach would perform it (considered an error), and the next clip was played. In task 1, mastery criterion for accuracy was set to 100 % correct steps; while in task 2, it was set to 80 % minimum in two successive sessions; this difference was due to the fact that the tasks had a difference in difficulty level. Once a participant reached the mastery criterion for task 1 and the intervention ended, task 2 began. Similarly, task 2

intervention ended when achieving the mastery criterion. A week after this stage ended, the participant began the follow-up stage.

Follow-up. In this stage, we requested participants to complete the tasks without video prompts on their own. These sessions occurred one, two, and three weeks after finishing the previous stage.

8.5.3. Semi-structured interviews with staff members

Four staff members at the employment center (two females and two males, 40–55 years old) were interviewed before the baseline to select relevant tasks and better understand their difficulties and how they perceive their work with residents. Face-to-face semi-structured interviews included questions about staff members' work and their interactions with residents, as well as the difficulties faced by residents. Questions included: 'How do you match the work task with residents?'; 'Describe a difficulty encountered by residents in their work'.

8.5.4. Social validity questionnaires

After study completion, we examined the social validity of the study by asking participants to respond to a questionnaire (see Supplementary Information) on their experience with video prompting with five simple yes/no questions (see Gat et al., 2015). After reading a question aloud, the researcher asked participants to draw a circle around faces corresponding to their response (either positive or negative). Three participants answered the questions by drawing circles. Staff members (work coaches/observers) were also asked to respond to questions about their experience with video prompting (see Supplementary Materials).

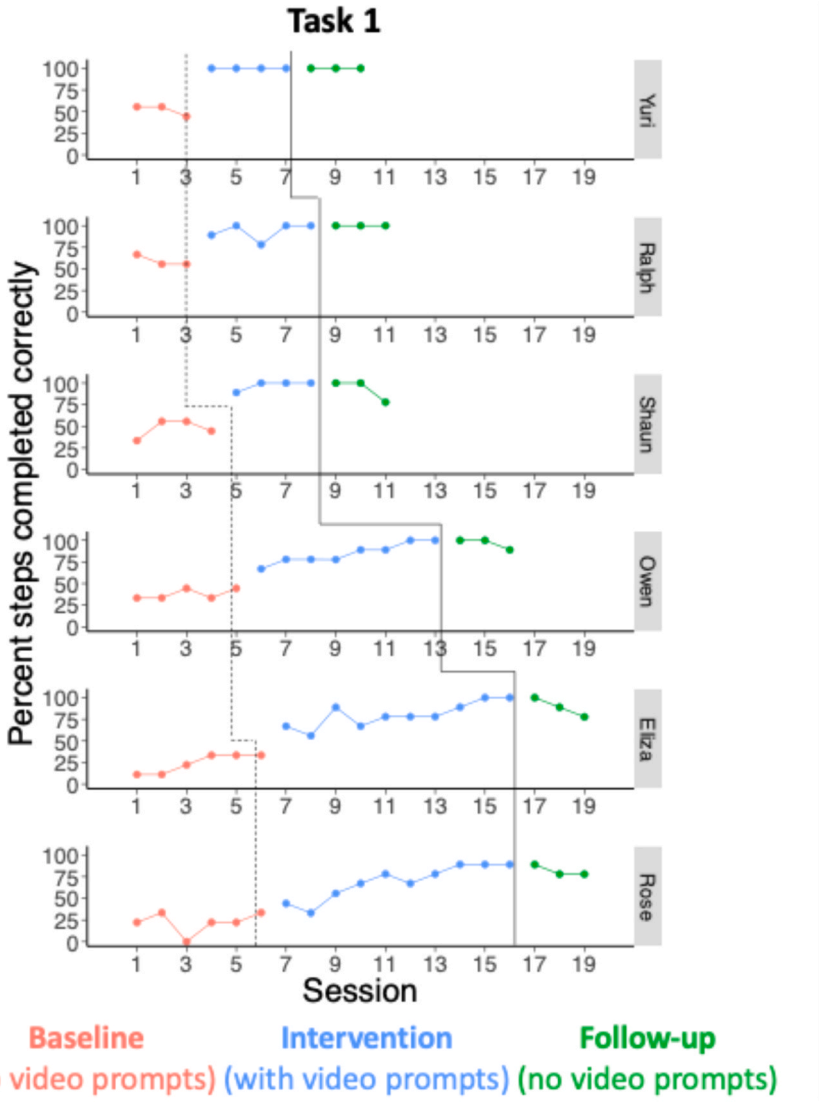

Fig. 2. Accuracy in task 1, by participant (rows) and stage (baseline=red; intervention=blue; follow-up=green).

8.6. Data analysis

Statistical analysis included two-tailed paired-sample t-tests on accuracy. The data were visually inspected to compare means within and between the three study conditions (baseline, intervention, follow-up). The graphs indicated variability in task accuracy for each participant, as well as directional trends of accuracy (Lane & Gast, 2014). We also audio-recorded, transcribed, and thematically analyzed our interviews with the staff members, both before the experiment and in the social validity interview thereafter (Braun & Clarke, 2006).

9. Results

9.1. Staff experiences before the experiment

The interviewed four staff members said their heavy workload made it difficult for them to teach new work tasks to the center's employees. They lacked the time they needed to break a job task down into stages; nor could they dedicate time to teaching every step within a task. One staff member said:

"The biggest problem we face is actually the lack of staff members; more work coaches are needed. We have to teach the residents each step in a new task. Because of the variety of work tasks we receive, sometimes it's not feasible to teach each step."

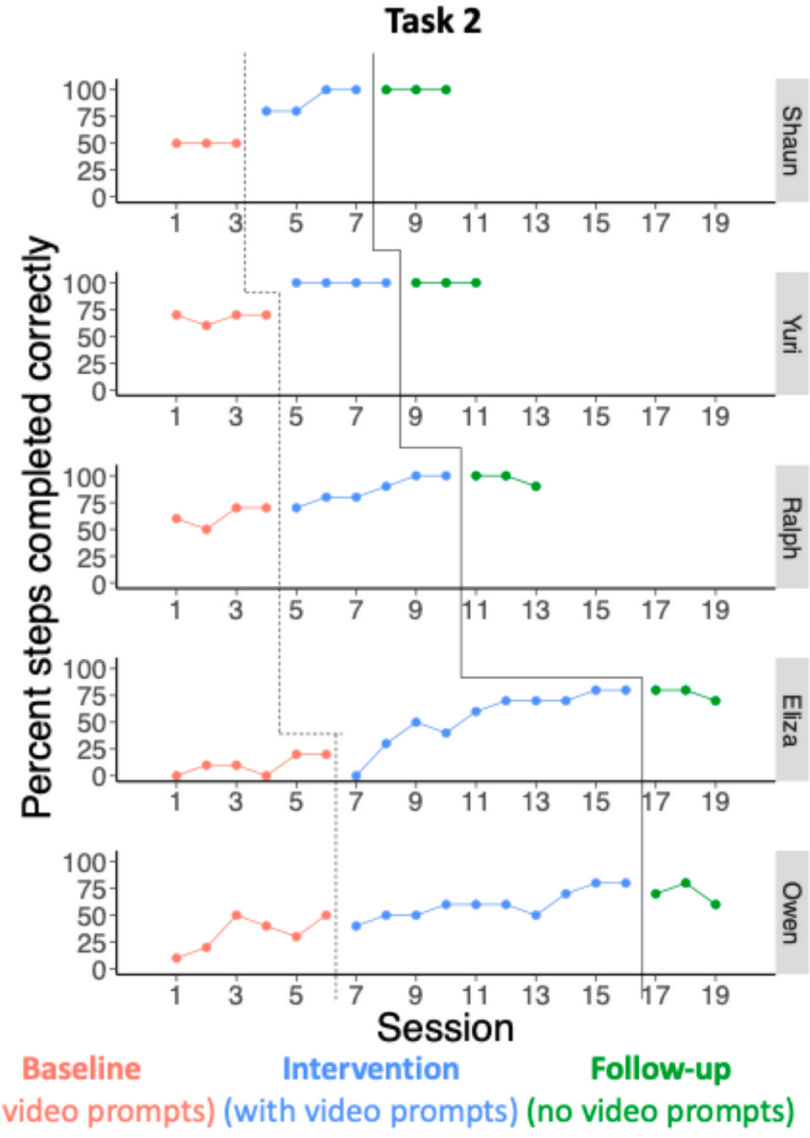

Fig. 3. Accuracy in task 2, by participant (rows) and stage (baseline=red; intervention=blue; follow-up=green).

Staff members also said work aids and assistive technologies were not available to residents.

9.2. Participant results

We visually analyzed participants' task accuracy in each stage (Figs. 2–3).

Yuri: Yuri participated in four intervention sessions for each task, fewer than the other five participants. He needed help moving from one video clip to the next but did not need other verbal or physical prompts. He even played some clips on his own. His accuracy rapidly and dramatically improved when the intervention stage started. Yuri needed four sessions to achieve perfect accuracy in both tasks, and his accuracy stabilized here. In the follow-up stage, he first asked if he could watch the clips, but when he was asked to perform tasks on his own, he maintained perfect accuracy. For Task 1, in the baseline stage, Yuri was unable to complete the tasks above 55.55 % for task 1, but after the intervention, he immediately performed independently and without errors. For Task 2, Yuri's performance was relatively high in the first baseline session around 70 % suggesting a more challenging task could better fit his abilities. Yet, his accuracy level plateaued and did not improve further across the 4 sessions of the baseline. In contrast, once the video prompts were introduced, Yuri's performance immediately improved to 100 %.

Ralph: During the baseline stage, Ralph's accuracy was between 50 % and 70 % in both tasks across three (task 1) to four (task 2) sessions. For task 1, performance at baseline was between 55 % and 66 %, and was stable at 55 % in the final two sessions of the baseline. During intervention stage, he needed five sessions to learn task 1 and six to acquire task 2. Ralph could use the iPad, but occasionally had difficulty moving from one clip to the next. In those instances, the work coach gave him verbal reminders and prompts. In task 1, Ralph's accuracy immediately improved when the intervention began (from 55 % to 88 %). In task 2, at baseline he showed 70 % accuracy, suggesting that task 2 may have not challenging enough. Nevertheless, throughout the intervention, his accuracy continued to improve until it reached maximum along with a decline in his need for video prompting, and he performed some steps without viewing clips. Importantly, Ralph maintained perfect accuracy in task 1 in the follow-up, but there was a slight decrease in accuracy (to 90 %) in task 2's third follow-up session, when he made one mistake.

Shaun: Shaun participated in 4 baseline sessions for task 1 (accuracy range, 33 %-56 %, average 43 %) and three for task 2 (accuracy stable at 50 %). Shaun needed four intervention sessions to acquire each task, but the need for video prompts decreased, and he finally performed the steps without watching all clips. His task 1 accuracy level increased immediately after the intervention began, with a jump from ~45 % to ~90 %; task 2 accuracy showed a similar trend, going from 50 % to 80 %. Throughout the remainder of the intervention, his accuracy ranged from 90 % to 100 % in task 1 and from 80 % to 100 % in task 2. There was a decline in accuracy in the follow-up stage for task 1; the mean percentage of the follow-up accuracy (93 %) decreased compared to the mean accuracy of the intervention accuracy (97 %). However, Shaun had 100 % accuracy in all three follow-up sessions for task 2.

Eliza: Eliza had six baseline sessions for each task. At baseline, her accuracy rose from 11 % to 33 % for task 1 and performance remained stable in the last 3 sessions of the intervention at performance of 33 %. For task 2, from 0 % to 20 % for task 2 and was stable at 20 % in the last two sessions of the baseline. At the start of the intervention stage for task 1, her accuracy immediately jumped, going from 33 % to 67 %. However, she showed variability in her accuracy, as her accuracy did not remain constant throughout the intervention, especially for task 2. Eliza needed more verbal reinforcement than the other five participants to keep looking at the videos, as she kept laughing. In task 2, she also needed physical prompts and assistance to zip up and down the case, as the zipper

Table 3
Mean percent and standard deviations across stages and tasks.

	Participant		Baseline	Intervention	Follow-up
Holiday bag task	Yuri	Mean	51.85 %	100 %	100 %
		SD	6.414	0	0
	Ralph	Mean	59.25 %	93 %	100 %
		SD	6.414	9.942	0
	Shaun	Mean	47.22 %	97 %	93 %
		SD	10.637	5.56	12.834
	Eliza	Mean	24.07 %	80 %	89 %
		SD	10.923	14.63	11.115
	Rose	Mean	22.22 %	69 %	81 %
		SD	12.1704	19.455	6.4143
	Owen	Mean	37.77 %	85 %	96 %
		SD	6.085	11.78764	6.4201
Pencil case task	Yuri	Mean	67.50 %	100 %	100 %
		SD	5	0	0
	Ralph	Mean	62.50 %	87 %	97 %
		SD	9.5742	12.1106	5.7735
	Shaun	Mean	50 %	90 %	100 %
		SD	0	11.54701	0
	Eliza	Mean	10 %	55 %	77 %
		SD	8.9442	25.4951	5.7735
	Owen	Mean	33.33 %	60 %	70 %
		SD	16.3299	13.3333	10

seemed too difficult for her to operate. Ultimately, she only completed 80 % of the steps in task 2. Eliza had 10 intervention sessions for each task, more than the other participants. Counter-intuitively, in the first session of the intervention stage of task 2, her accuracy dropped dramatically, falling from 20 % in the baseline stage to 0 % in the intervention. The trend and levels increased thereafter, however, reaching 80 % in the final two intervention sessions. Her accuracy decreased in the second and third follow-up sessions for both task 1 and task 2; even so, her follow-up accuracy was better than her baseline accuracy (Table 3).

Rose: Rose only took part in task 1. During the baseline, she took part in six sessions and maintained a sustained baseline throughout the sessions (range 11 %-33 %; average 22.22 %). She took part in ten intervention sessions (range 44 %-89 %; average 69 %). Accuracy levels and trends increased when the intervention began (33 %-44 %). She completed 89 % of the steps correctly in the last three intervention sessions. She made the mistake of putting one item the wrong way around; the video clips did not help her to differentiate between directions. Comparing sessions 1–6 in baseline versus intervention - the best performance among the baseline sessions was achieved as soon as the 2nd session of baseline (i.e., 33 %) and was not exceeded in following 3rd-6th sessions. In contrast, during the intervention the best performance was achieved on the 5th intervention session (78 %; among the first 6 intervention sessions). Thus, whereas performance varied throughout baseline sessions, in the intervention accuracy steadily increased, demonstrating the effect of the intervention. After the intervention ended, her accuracy slightly decreased by one error. The intervention sessions for task 1 were limited to 10 because of signs of fatigue and changes in alertness, and Rose did not want to continue to task 2.

Owen: Owen participated in five baseline sessions for task 1; his accuracy ranged from 33 % to 44 % (average 37.7 %, 1 error of variance). In task 1, it increased from 44 % to 67 %, and as the intervention continued, it rose to 89 %. Specifically, when comparing sessions 1–5, baseline accuracy varied between 33 % and 44 %. In contrast, during the intervention the performance immediately improved to 67 % and steadily increased across sessions 1–5 (and continued thereafter reaching 100 %). In the first and second follow-up sessions, Owen completed 100 % of the steps correctly, but his accuracy then decreased in the third follow-up session when he made one mistake (89 % accuracy).

In task 2, he performed six sessions at baseline 2; and his accuracy ranged from 10 % to 50 % (average 33.33 %) - a variable performance and an increase (the best performance across baseline sessions was achieved in the 3rd session from the six baseline sessions), suggesting more baseline sessions may have been needed to establish a baseline. Owen did not learn how to open and close the pencil case by watching the video clips and his work coach had to give physical prompts on how to operate the zipper. In the intervention stage of task 2, improvements in accuracy levels and trends did not occur immediately; in fact, his accuracy declined from 50 % to 40 %. Owen was distracted at the beginning of the task 2 intervention and wanted a snack. However, in the final two sessions, Owen successfully completed 80 % of the steps. In the follow-up sessions for task 2, his accuracy was once again variable; it decreased to 70 % in the first session, increased to 80 % in the second, and dropped again 60 % in the third. These mixed results for Owen, suggest that in contrast to task 1, task 2, was not well designed to fit his abilities (see Limitations).

9.3. Statistical results

The statistical analysis across tasks averaged across participants showed that during the baseline stage, participants' accuracy was lower and less inconsistent than in the intervention and follow-up stages (Table 3; Figs. 2–3). Our paired sample t-tests revealed significant improvements in participants' accuracy in the intervention stage for both tasks (task 1: mean baseline accuracy increased from 39.86 % to 93.166 %; $t(5) = 14.587$, $p < 0.001$; task 2: mean baseline accuracy increased from 44.66 % to 88.8 %; $t(4) = 6.805$, $p < 0.005$). However, accuracy dropped when video prompting was removed in the follow-up sessions, with a marginal decrease in task 1 ($t(5) = 2.087$, $p < 0.1$) and a significant decrease in task 2 ($t(4) = 3.011$, $p < 0.05$). While three participants maintained a high accuracy level during follow-up, three exhibited a decline in accuracy. Importantly, however, accuracy during follow-up was still better than at baseline for both tasks (task 1: $t(5) = 13.773$, $p < 0.001$; task 2: $t(4) = 6.819$, $p < 0.01$).

9.4. Social validity

Three participants managed to respond or outline their answers on the questionnaire. They seemed to enjoy watching the video prompts and thought they could follow the steps. They felt capable of performing the tasks independently and indicated that the video presentations facilitated their learning. Staff also said their experience of video prompting was positive (see Supplementary Materials).

10. Discussion

Our study breaks new ground by demonstrating the successful use of video prompting to teach new employment tasks to six adults aged 50 and above with moderate to moderate-severe IDD. Participants learned to perform specific job-related steps with the help of video prompts and were able to complete multiple steps in two different tasks. Although results were not consistent across the two tasks for all participants on an individual level, given the mixed findings for task 2, along with the results of task 1, our study suggests that video prompting can be effective in older adults with IDD. This suggests the use of this technology could help older workers with IDD learn and complete more complex jobs. In the follow-up sessions, when participants did not have access to video prompts, some showed diminished performance. Moreover, part of the study took place at employment center (four participants), and we demonstrated the feasibility of using video prompting there. Based on our findings, we suggest the iPad and video prompting could be provided on as-needed basis, based on tasks and skills at the center. Given the age of the participants, and their lack of experience with touch devices and technology, our results highlight that interventions tested in young adults with IDD could potentially impact older adults as well.

Our first finding is that impact of video prompting was impressive; participants learned a new task without the need for further strategies, other than verbal and sometimes physical prompting. In the baseline stage, accuracy was low, with participants completing ~5 steps correctly. Accuracy in task 1 improved immediately after the introduction of video prompting. Although Eliza and Owen (neither of whom worked at the employment center) showed lower accuracy in the first intervention session of task 2 (they had trouble paying attention), their accuracy increased thereafter. Accuracy in the follow-up sessions was more variable across participants, but overall, it was still significantly better in the follow-up than in the baseline sessions for both task 1 and task 2. One participant performed both tasks correctly in all three follow-up sessions, and two performed one task correctly and made only one mistake in the second. Yet, we note that for task 2, it was evident that the task was challenging for some participants, but too easy for other, limiting the efficacy of the intervention in this task for these participants.

Our second finding highlights the critical importance of matching task difficulty to individual participant abilities. Our goal was to create tasks with comparable motor and cognitive challenges while ensuring they remained ecological (i.e., suitable for use in the employment center). However, we discovered task 2 was a little more difficult than task 1, both motorically and cognitively. Task 2 required inserting items in order (some on the left, others on the right) and opening/closing a zipper. Participants showed no fine motor difficulties before the study, so we did not evaluate their ability to perform this action. Shaun, Yuri, and Ralph completed both tasks without issues. Owen and Eliza, diagnosed with moderate-severe IDD, struggled with specific steps, particularly the zipper, in all study stages, even with physical prompts. The work coaches had to perform the zipper actions for them. Notably, when video prompting did not work for these participants, supplementing the videos with physical prompts did not seem to help. It is possible that the use of physical prompts interacted with the ability to learn that task and with the intervention. Future studies could investigate the impact and interaction of physical prompts with different types of interventions. These challenges suggest the limits of video prompting for tasks that are complicated, especially among lower-functioning adults. Conversely, the mixed results for Task 2 also revealed that it may have been too easy for some participants, limiting the efficacy of the intervention in task 2 for them (i.e., Ralph, Owen; And for Yuri performance was high at ~70 % at baseline, although it still jumped to 100 % once the intervention started). Importantly, for these participants the effect of the intervention was clear in task 1. These contrasting findings—task 2 being too difficult for some participants while too easy for others—highlight the limits of video prompting when tasks are not appropriately matched to individual abilities. Thus, we stress that future studies should carefully balance the design of tasks across individual abilities of participants, while maintaining a similar overall structure of the intervention across participants.

Our third finding is that video prompting was perceived positively by both participants and staff. The three participants who completed the social validity stage and questionnaire reported enjoying the video prompts and carrying out the tasks. Staff members surveyed highlighted that the technology helped reduce their workload and enabled participants to learn new tasks efficiently (see Supplementary Materials).

10.1. Breaking barriers to employment for older adults with IDD

Previous studies on the utility of video prompting to teach work tasks to adults with IDD have focused on young adults (e.g., Sigafoos et al., 2005), possibly because it is generally easier to teach new skills to younger persons. Older adults with IDD tend to be less active and more dependent; they also face greater health challenges, including mental and cognitive ones (Carmeli et al., 2016). These age-related challenges may affect their learning ability and reduce the effectiveness of video prompting. Nevertheless, our findings suggest the potential of this technology to support the development of work-related skills in older adults with IDD, highlighting its promise as an assistive tool in promoting task acquisition, employment, and independence.

People with IDD often have deficits in attention and working memory (e.g., Costanzo et al., 2013; Danielsson et al., 2010), and video prompting may be helpful for such individuals. Video prompting divides a task into steps; users watch a single step at a time and immediately perform it, thereby reducing cognitive and memory demands (Park et al., 2019; Taber-Doughty et al., 2008; Weng et al., 2014). When video prompting was removed in follow-up, some of our participants maintained a high level of accuracy. The level dropped for others, but this may reflect problems in working memory and/or inattention, and they no longer had access to an assistive technology. Our findings suggest that if video prompting is used at the employment center or for similar adults elsewhere, some workers may need video prompting not just to learn a task but also to continue to perform it without errors. Overall, however, participants achieved a high accuracy level, with most completing nearly all steps correctly during the follow-up tasks, and only minimal errors occurring, with at most two steps being done incorrectly in each task. Formal standardized cognitive and adaptive functioning assessments could help tailor task demands to participants' individual abilities. Future studies should include such standardized measures to better characterize participant functioning and enable analyses examining the relationship between cognitive abilities and intervention effectiveness.

Our findings should motivate further research, especially among individuals with moderate-severe functioning IDD who previously may have been excluded from work environments and centers due to their diagnosis and behavior; video prompting could potentially create new pathways and employment opportunities for them. Indeed, two of our participants, Owen and Rose, had not been exposed to employment tasks at all due to their diagnosis as moderate-severe IDD and their challenging behaviors. Nevertheless, both clearly benefited from video prompting. Owen learned to perform both tasks, albeit showing better accuracy in task 1. Rose did not take part in task 2, but she performed well in task 1, making only one error and repeating it (putting something in the wrong direction).

In sum, our findings suggest that video prompting could potentially expand employment possibilities for older adults who are low-functioning and previously deemed unsuitable for participating in employment centers. Their integration may be possible with video prompting. This, in turn, would give them more motivation and a sense of capability and social belonging.

An interesting direction for future research would be to use AI to create video prompting segments, thus reducing staff workload.

Large language models can be used to analyze tasks and to generate simple video clips. These could be tailored to the unique needs of individual users, offering a personalized assistive technology solution. A next step could be using computer vision from the tablet's front-facing camera feed to provide personalized prompting, while keeping privacy concerns in mind.

10.2. Limitations

Admittedly, our study had some limitations. First, our sample was small (six participants), and we only examined two specific tasks. Future work should include additional scenarios and larger samples. With a larger sample, the study could have been divided into two replication units, thus increasing the number of comparisons and the overall study reliability. In addition, the need to design tasks that are challenging enough for participants is crucial. The results of the intervention in task 2 are mixed: the baseline sessions indicated that for some participants the task was not challenging enough, and the thus effect of the intervention was not as significant as task 1. For example, for Owen the impact of the intervention was clear in task 1, but in task 2 results at baseline improved suggesting that the intervention may have started a bit too early, and a more challenging task would have been a better fit. Future studies should consider testing specific steps ahead of task design, tailoring tasks to individual abilities, or testing more than two tasks to reveal robust findings across tasks and participants.

Second, we expected participants to operate the tablet and videos by themselves, but only two could play a clip and move to the next, and even those participants needed verbal instructions. Future studies could allocate more time to teaching device operation.

Third, we did not test participants' ability to perform specific motor tasks (using a zipper) before the study and relied instead on the facility's evaluations. The participants' difficulty in completing these actions could stem more from insufficient prior exposure and training rather than inherent limitations, and teaching these steps beforehand might have enhanced their accuracy outcomes. Two participants needed motor prompts for task 2; this was unexpected, as we thought the tasks were matched for overall difficulty. Future research should aim to find tasks that are appropriate and fit individual participants' abilities. We also recommend the development of proprietary applications tailored to the fine motor skills of each participant.

Four, our participants' characterization was based on clinical observations and interviews that were managed by the welfare authorities. The lack of standardized cognitive assessments represents a limitation of this study and could have enabled additional analyses based on these standardized scores. Future research would benefit from incorporating formal cognitive and adaptive behavior assessments to strengthen participant characterization.

10.3. Ethics declarations

The study was approved by the Social Security Ministry, the management at the facility, and the University of Haifa Education Faculty Faculty Ethics Committee (approval number 262/21).

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CRediT authorship contribution statement

Tanweer Milhem-Midlej: Writing – original draft, Visualization, Project administration, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Sarit F.A. Szpiro:** Writing – review & editing, Visualization, Supervision, Project administration, Methodology, Funding acquisition, Formal analysis, Conceptualization.

Declaration of Competing Interest

The authors declare no conflict of interest concerning the research, authorship, and publication of this article.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.ridd.2025.105112.

Data availability

Data will be made available on request.

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