INTRODUCTION

Individuals with autism who experience significant limitations in communication functioning often benefit from augmentative and alternative communication (AAC), such as communication boards, speech generating devices, and or mobile technologies with AAC apps. Research indicates that AAC interventions are effective to improve communication outcomes for individuals with autism who experience complex communication needs [1, 2]. For these individuals, it is critical that AAC supports communication and participation in real-world community and vocational tasks [3]. However, much of the AAC research to date has examined AAC use and participation in segregated settings [3, 4].

The limited research available investigating participation in real-world settings may reflect limitations in the design of existing technologies. Visual scene displays (VSDs) are one type of AAC display that depict meaningful events from an individual’s life in a photograph, with vocabulary embedded as hotspots (i.e., a part of the display that can be activated to result in voice output). VSDs lessen cognitive and linguistic demands of use by preserving the context within meaningful events [5]. However, VSDs are static, while real-world activities contain dynamic routines that require communication. Light, McNaughton, and Jakobs [6] proposed the use of videos with integrated VSDs, suggesting that videos would preserve the spatial and temporal contexts of activities and preserve the dynamic relationships found in real-world interactions.

Previous research indicates that individuals with autism benefit from video modeling to improve participation in community and vocational tasks [7, 8]. However, current video modeling apps do not include communication supports, and many community and vocational activities require communication by employees [9]. Therefore, the use of videos with integrated VSDs (i.e., video VSDs) should capitalize on the positive effects of both video modeling and VSDs.

The purpose of this pilot case study was to evaluate the effectiveness of videos with integrated VSDs on a tablet-based app (EasyVSD by InvoTek Inc.) on the percent of steps completed (including communication steps) during vocational and community activities by a teenager with autism and complex communication needs.

METHODS

Design

A case study was used to evaluate the effects of video VSDs on participation. The independent variable was the video VSD app and a least-to-most prompting hierarchy to encourage use of the app. The dependent variable was the percent of steps (including communication steps) completed independently in each activity. Due to time constraints, the introduction of the independent variable was not systematically staggered across contexts. Accordingly, the study did not establish experimental control, and the results should be interpreted with caution. This study served as a pilot to examine the efficacy and feasibility of utilizing video VSDs to promote communication and participation in real-world activities. Given the current lack of research in this area, pilot work is critical.

Participant

One participant with autism (Lena, pseudonym used here) participated. She experienced limitations in expressive communication and was highly prompt dependent during community and vocational activities.

Settings and tasks

Three intervention tasks were chosen, based on a pre-established set of criteria. The three tasks were: working at the print shop, riding the public bus, and doing a shredding job. Task analyses were used to identify the required steps for each activity, including steps related to task completion and steps related to communication. Each task had between 11-22 steps and at least 2 communication steps.

Materials
Tablet and app

A 12-inch tablet containing the EasyVSD app was used. Figure 1 provides a screenshot of the EasyVSD app from the bus riding task. The app contains a primary display containing video VSDs, as well as programming icons positioned to the left vertically that were used to capture videos and make hotspots. The menu also contained thumbnails that were used to navigate between video segments. The following steps were required to use the app: (1) press play, (2) watch the video segment depicting one step from the task analysis, (3) perform the step depicted, (4) select the thumbnail of the next video, (5) repeat steps 1-4 for each segment until the task is completed.

Videos with integrated VSDs

Videos were captured using a video recorder with Lena serving as a self-model. Videos were collected and edited to eliminate or mute any prompts and divided into segments of about 10 seconds in length corresponding to the steps in the task analysis. Videos were then loaded onto the EasyVSD app and hotspots were added to fulfill the communicative opportunities identified within the task analysis. Wherever a hotspot was programmed, the video automatically paused and the hotspot appeared momentarily to highlight the message. Figure 1 provides an example of a VSD with an embedded hotspot.

Text captions that provided a short description of the step were added for the final two sessions of bus riding and the final session at the print shop. They were added to evaluate if this additional support would promote task completion and communication.

Procedures

The study included baseline and intervention phases. During baseline, data were collected during target tasks as they typically occurred within Lena’s school program, without the use of the video VSDs. During intervention, the participant completed the tasks while using the video VSD app. No separate phase was completed for training. Prior to beginning each activity, Lena reviewed the videos with the first author who modeled the operation of the app. Lena demonstrated independent operation of the app by the third session.

During intervention sessions, after a general verbal prompt (e.g., “Time to work”), Lena operated the app to complete the task. If Lena failed to complete a step after 5 seconds of the natural environmental stimulus, the interventionist used a least-to-most prompting hierarchy to encourage use of the app. It included the following set of prompts: (a) expectant delay (i.e., wait 5 seconds), (b) gestural prompt (i.e., point towards the app), (c) model (i.e., model playing the video or activating the hotspot).

Procedural integrity was calculated for 19% of intervention sessions. It was 93% on average across contexts (range 91-94%).

Measures and data analysis

The percent of steps completed independently was the dependent variable. Steps included both behavioral task steps and communicative opportunities. It was calculated by dividing the number of steps completed by the total number of steps and multiplying by 100.

Data were collected and coded post hoc through review of videos. The data were summarized for each session and graphed separately for each activity in the order in which they were collected. The data were analyzed visually for changes in trend, slope, and variability to explore the effects of the video VSDs on independent communication and task completion [10].
Interobserver agreement between the first author and a graduate research assistant was computed for 23% of sessions by calculating taking the number of agreements divided by the number of disagreements plus agreements and multiplying by 100. Interobserver agreement resulted in an average score of 95% (range 89-100%).

RESULTS
The data suggested that videos with integrated VSDs improved Lena’s independent task completion and communication within community and vocational tasks. Data for the dependent variable (i.e., the number of steps completed independently within each task) are represented in Figure 2. Changes in the participant’s performance were noted immediately after the app was introduced. Additionally, she required only a few intervention sessions to perform tasks independently even with low performance levels at baseline. In two of the three activities (public transportation and shredding), she reached 100% independence by the final intervention session.

DISCUSSION
This study provides preliminary evidence of the effectiveness of video VSDs to promote independent communication and participation of individuals with autism in authentic community and vocational activities. The participant reached 100% independence by the final session in two out three activities.

Several factors may have contributed to the outcomes in this intervention. The intervention included a number of evidence-based practices for individuals with autism including: VSDs depicting vocabulary in meaningful contexts, video self-modeling, task analysis, videos with automatic pauses to prompt task completion, and a least-to-most cuing hierarchy.

Video VSDs have the potential to improve independence and decrease dependence on prompting from staff, such as job coaches. This has important implications for reducing costs and developing self-determination.

There are several limitations of the study that warrant consideration. It did not use an experimental design; therefore, it cannot be said with certainty that the introduction of the independent variable (video VSD app) produced a change in the dependent variable (percent of steps completed independently). However, given the rapid positive gains, it seems likely that gains are due to the introduction of the video VSD app. Additionally, the generalization of results is limited due to the study only including one participant. Finally, maintenance and generalization were not collected. Future research should include greater numbers of participants, with various diagnoses, and evaluate outcomes in the context of maintenance and generalization.

Figure 2. Percent of steps independently completed during baseline and intervention across three activities.
CONCLUSION
It is critical that, moving forward, research in AAC target communication and participation of individuals with complex communication needs within real world tasks. This study suggests that video VSDs may support meaningful, independent participation of learners with autism in real-world activities. This could allow individuals who use AAC to have greater access to employment and meaningful participation in society.

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REFERENCES


