An iPad™-based picture and video activity schedule increases community shopping skills of a young adult with autism spectrum disorder and intellectual disability

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Abstract

Objective: To evaluate the iPad 2™ with Book Creator™ software to provide visual cues and video prompting to teach shopping skills in the community to a young adult with an autism spectrum disorder and intellectual disability. Methods: A multiple probe across settings design was used to assess effects of the intervention on the participant’s independence with following a shopping list in a grocery store across three community locations. Results: Visual cues and video prompting substantially increased the participant’s shopping skills within two of the three community locations, skill increases maintained after the intervention was withdrawn, and shopping skills generalized to two untaught shopping items. Social validity surveys suggested that the participant’s parent and staff favorably viewed the goals, procedures, and outcomes of intervention. Conclusions: The iPad 2™ with Book Creator™ software may be an effective way to teach independent shopping skills in the community; additional replications are needed.

Keywords

Applied behavior analysis, autism spectrum disorder, community-based instruction, intellectual disability, iPad™, shopping skills, technology

As adolescents and young adults with intellectual disabilities progress towards adulthood, community-based instruction is increasingly important to their self-determination and independence [1–3]. There is an extensive literature base to support techniques to establish community-based skills within non-community contexts [4–7]. However, researchers have recognized the importance of teaching community skills, such as shopping for groceries, directly in the community [8–10]. Given the dearth of community-based research, more studies are needed to evaluate strategies for teaching community skills directly in the community.

Previous research has shown that visual schedules are effective in teaching individuals with disabilities to acquire and maintain complex response chains [11], and picture lists and visual cues have been used effectively to teach shopping skills within the community [8]. More recently, investigators have employed various types of technology to teach community shopping skills, such as reading aisle signs and locating grocery store items [4, 12], identifying common grocery store products [6], and checking out and paying for groceries [13]. Additional research has shown that video prompting and video modeling are effective in producing complex response chains while minimizing prompting from instructors or caregivers [14, 15].

Given the dearth of research on teaching community-based skills in the community and demonstrated efficacy of technology-based instruction to establish complex response chains for people with intellectual disability, the purpose of the current study was to evaluate the use of visual cues and video prompting delivered by an iPad 2™ to teach shopping skills in the community to a young adult with an autism spectrum disorder (ASD) and intellectual disability. Maintenance and generalization were also assessed.

Method

Participant

The participant was an 18-year-old Caucasian female student diagnosed with Pervasive Developmental Disorder-Not Otherwise Specified according to DSM-IV-TR criteria [16]. On a recent administration of the Wechsler Abbreviated Scale of Intelligence – II, she received a composite score of 54 at the 0.01 percentile, within the range of intellectual disability. She attended an approved private school in the northeastern USA and resided in a residential community home on the same campus. She demonstrated limited independence with shopping in community stores and was reported to be heavily reliant on instructor prompts to perform skills such as shopping. She was familiar with the iPad 2™ for use with communication applications, but had not been exposed to the iPad 2™ to teach shopping skills or related skills. Consent was obtained from the participant’s parents who were her
legal guardians per the University’s Institutional Review Board and school’s internal research.

Materials and settings

Book Creator™ software downloaded on an iPad 2™ was used to provide visual cues and video prompting. A protective case, the Otter Box™, was used to prevent damage to the device. The study took place at three locations of the Acme™ chain grocery store located in the northeastern USA. Acme’s™ corporate office provided an approval letter for the study to take place at the three locations.

Experimental design

A multiple-probe design across settings was used in three grocery store locations. During baseline, the participant was assessed on her skills in following a printed picture list to shop for two items identified in the preference assessment. During intervention, the participant was taught to shop for the same two items using the iPad 2™ with Book Creator™ software to provide visual cues and video prompting. Then, a maintenance probe was conducted to evaluate the participant’s independence in shopping for the same two items without the iPad 2™. Finally, a generalization probe was conducted to assess the participant’s independence in shopping for two novel items, also identified in the preference assessment, in the second and third locations, with the iPad 2™ with Book Creator™ software to provide visual cues and video prompting.

Dependent measure

Data were collected by the first author on the percentage of steps in the shopping task analysis independently completed without instructor prompting. The steps were (1) walk into the store, (2) obtain a shopping basket, (3) tap the picture of the first item, (4) navigate to the location of first item, (5) select the first item and put it in the basket, (6) tap the picture of the second item, (7) navigate to the location of the second item, (8) select the second item and put it in the basket, and (9) walk to a checkout lane and get in line. Data on paying for the item at checkout were not collected. Staff members and graduate students served as secondary data collectors for interobserver agreement (IOA). They were trained on response definitions and data collection procedures prior to baseline, and were required to score 90% or better IOA from videotaped sessions before data collection commenced. IOA data were collected for 30% of sessions across all phases and averaged 98% (range, 79–100%).

Procedural fidelity and social validity

A procedural fidelity checklist was used to assess if the teaching procedures were implemented as intended. Data were collected by educational and residential staff on the percentage of intervention steps correctly completed by the instructor from a detailed list of 47 steps across 30% of sessions. Procedural fidelity averaged 92% (range, 68–100%). Following the generalization probe, a nine-item social validity survey was completed by the participant’s parent, one educational staff person, and one residential staff person, each of whom had regular contact with the participant. Respondents rated their agreement on nine items using a five point Likert scale regarding the appropriateness of instructional procedures for future use, and any observed changes in the participant’s independence with shopping skills in the community.

Procedures

Preference assessment

A preference assessment was conducted with the participant to determine preferred items to be purchased during intervention and generalization. First, staff members who were most familiar with the participant generated a list of edible items in the order of preference [17]. The identified items were presented in a multiple stimulus without replacement preference assessment and a rank order of preferred items was generated [18]. Based on the preference assessment results, the four most preferred items were chosen, two for intervention, and two for generalization. In the order of preference, items one and three were assigned to intervention, and items two and four were assigned to generalization.

Baseline

During baseline, the first author, the instructor, collected data on the participant’s independence with completing the nine-step task analysis of shopping for two preferred items. At the beginning of each session, the instructor and participant stood at the entrance to the store; the instructor gave the cue, ‘It’s time to shop’, presented a piece of paper with pictures of the two shopping items printed on it, and then allowed the participant to shop for the items. If the participant was unable to complete a step that required her to select and place an item in the basket, completed the wrong step, or otherwise responded incorrectly, the first author asked the participant to turn away and unobtrusively completed the step out of the participant’s view. The first author then obtained the participant’s attention and said, ‘Okay, continue shopping’. If the participant did not respond independently to steps that required navigation through the store, the first author stated, ‘Let me help you’, and provided supportive physical guidance to the next location. The instructor then stated, ‘Okay, continue shopping’.

iPad 2™ training

During the intervention, Book Creator™ software, downloaded on an iPad 2™ was used to provide picture cues for steps 3 and 6 of the task analysis (i.e. tapping a picture of the requisite shopping item) and to provide video prompting on steps 1, 2, 4, 5, 7, and 8 of the task analysis (see Figure 1, e.g. screen shots). The application allows the user to create a ‘book’ with individualized photos, videos, and lists. The first author photographed or filmed each step of the task analysis in each of the three locations. These photos and video clips were embedded in the ‘book’ created the within the Book Creator™ application for each location.

At the beginning of each session, the first author held the iPad 2™ in front of the participant, provided the verbal cue
“watch this”, and activated the first frame. The instructor held the iPad 2™ in front of the participant during each step of the task and, when the participant completed a step, pressed the touch screen to forward the software to the next frame, except for steps 3 and 6, for which the participant was required to tap a picture of the grocery item on the screen (see above). If the participant did not respond to each frame within 5 s of presentation or made an error in response, the frame was represented with the vocal cue, ‘Try again, watch this’. If the participant did not respond within 5 s after the second presentation of the frame or made another error in response, the same prompting procedures were followed as in baseline with the first author completing the step out of the participant’s view or providing supportive physical guidance to the next location.

Maintenance and generalization

To assess maintenance, a probe was conducted to measure the participant’s independence in shopping for the two items taught during intervention at the second and third locations without the iPad 2™ with Book Creator™ software. Procedures during maintenance were identical to baseline. Then, a generalization probe was conducted to measure the participant’s independence with shopping for two novel items identified in the preference assessment with visual cues and video prompting provided by the iPad 2™ with Book Creator™ software at two of the three store locations. The procedures during generalization were identical to the intervention except for the use of two novel shopping items.

Results and discussion

Results of the study are depicted in Figure 2. As suggested by the data in Figure 2, while variability is evident across phases, the iPad 2™ with Book Creator™ software to provide visual cues and video prompting increased the participant’s independent shopping in the community with evidence of maintenance and generalization in Locations 2 and 3. During baseline, the participant independently completed an average of only 22% of the nine steps of the shopping task analysis in the first location, 17% (range, 11–44%) in the second location,
and 21% (range, 11–33%) in the third location. Upon implementation of the intervention in the first location, the participant’s percentage of independent shopping increased, but was variable with an average of 49% (range 10–100%). Due to variable performance, medication changes as denoted on the graph in Figure 2, and closure of the Acme® at the first location on session 43. When the intervention was implemented in the second location, she performed 66% of steps independently (range, 0–100%). While her performance was initially variable, in later sessions her performance increased and became more stable, and thus intervention was introduced in the third location. When intervention was implemented in the third location, she performed 62% of steps independently (range, 44–88%).

During the maintenance probe without the iPad 2® with Book Creator® software, the participant was able to independently complete 88% of the shopping steps in the second location, and 88% of steps independently in the third location. In the generalization probe, in which she shopped for
two novel items with the iPad 2™ with Book Creator™ software, she was able to independently complete 88% of steps of the shopping steps in the second location, and 88% of independent shopping steps in the third location with the iPad 2™.

Finally, the participant’s parent, an educational staff person, and a residential staff person completed a nine-item social validity survey to assess their opinions on the goals, procedures, and outcomes of intervention. All respondents strongly agreed that the goals of the study to teach following a shopping list and navigating a grocery store were important. All respondents felt that the iPad 2™ with Book Creator™ software was as effective as other instructional methods for the community; her parent and residential staff person rated the iPad 2™ with Book Creator™ software as easy to use, while her educational staff person rated its ease of use as comparable with other methods. All respondents indicated that the iPad 2™ with Book Creator™ software was as acceptable as other methods for community instruction, and all indicated that they would be somewhat likely to use it to teach other community skills. Her educational and residential staff indicated that they were likely to use iPad 2™ with Book Creator™ software to teach shopping skills to other students in the community. Finally, all respondents reported some improvement in the participant’s community shopping skills, although all reported no change in her challenging behavior while in the community.

The purpose of the study was to evaluate the use of visual cues and video prompting delivered by an iPad 2™ with Book Creator™ software to teach shopping skills in the community to a young adult with ASD and intellectual disability. Results of the current study replicate previous research showing the benefits of picture schedules, video prompting, and video modeling [8, 11, 14, 15], as well as the use of educational technology to teach community living skills [4, 6, 12, 13]. In particular, results of the study suggest that the iPad 2™, a readily available technology device that many people without disabilities use, can be effectively adapted to teach functional daily living skills directly in the community. Furthermore, data suggest that shopping skills taught with the iPad 2™ maintained when the iPad 2™ was withdrawn, and that shopping skills generalized to novel shopping items. Social validity surveys reflected that the participant’s parent and staff generally rated the intervention favorably, particularly the goals of intervention to teach shopping in the community, applicability with other skills and students, and improvement in overall shopping skills.

Previous researchers have sought to establish shopping skills in non-community contexts, and then to evaluate for generalization in the community [4–6, 12]. The current study is one of few to employ exclusively community-based instruction to establish community shopping skills. Some skills, such as navigating to a specific location of the grocery store, could only be taught within the community. Conversely, teaching in the community presents certain challenges. For instance, the first location of the grocery store chain closed during the study precluding further evaluation of the intervention at that location, and the frequency of community shopping trips was affected by the availability of staff, transportation, and other logistical variables.

Three limitations should be considered in relation to the results. First, as is evident from the phase change lines on the graph in Figure 2, there were several medication changes that could have affected the participant’s performance during the study. Second, while the participant acquired independent shopping skills as operationally defined in the study, the instructor continued to hold the iPad 2™ and to forward the video frames during intervention; future studies should attempt to completely fade instructor assistance with the iPad 2™. Lastly, preference assessments to identify shopping items were conducted once at the beginning of the study; however, the participant’s preferences could have shifted over the course of the study, potentially decreasing her motivation to shop for the chosen items. Future researchers could employ more frequent preference assessments to identify different preferred items to be used in daily shopping trips.

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Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

References


