Promoting Independence through Assistive Technology: 
Evaluating Audio Recorders to Support Grocery Shopping

Emily C. Bouck and Rajiv Satsangi  
Purdue University

Whitney Bartlett  
Lafayette School Corporation

Pei-Lin Weng  
Purdue University

Abstract: In light of a positive research base regarding technology-based self-operating prompting systems (e.g., iPods), yet a concern about the sustainability of such technologies after a research project is completed, this study sought to explore the effectiveness and efficiency of an audio recorder, a low-cost, more commonly accessible technology to support grocery shopping skills in students with moderate intellectual disability. Using a single subject ABAB design with three high school male students with moderate intellectual disability, the researcher explored student use of an audio recorder to identify and locate grocery list items in a grocery store. The results of the project suggest the students were able to use the audio recorders to correctly identify and locate 10-items from a grocery list. In other words, teachers could implement a relatively inexpensive and easy-to-use technology (i.e., audio recorders) and support students in grocery shopping in a more independent fashion than picture symbol lists.

Despite recent contentions, a functional curriculum is a common curriculum for educating students with intellectual disability (Ayres, Lowery, Douglas, & Sievers, 2011). A functional life skills curriculum is conceptualized as a curriculum focused on teaching the skills deemed necessary to live, work, and have fun in an inclusive community (Bouck, 2004; Brown et al., 1979). Typically, a functional life skills curriculum includes a focus on functional academics, vocational education, community access, daily life skills, financial skills, independent living, transportation, social/relationships, and self-determination (Patton, Cronin, & Jairrels, 1997). The purpose of a functional curriculum is to ensure the maximum amount of independence (i.e., living, working, engaging in daily activities), with a focus on individuals being productive members of society (Bouck & Joshi, 2012).

The field is rich with research on functional life skills curriculum for students with intellectual disability, including the focus on daily living skills (i.e., Alwell & Cobb, 2009). However, attention to the daily living skill of grocery shopping has decreased over the last decade or so, although the value of grocery shopping skills for individuals with intellectual disability has not (Mechling & Gast, 2003; Morse, Schuster, & Sandknop, 1996). Morse and colleagues, in their review of the literature on grocery shopping skills for individuals with moderate to profound intellectual disability in the past few decades, suggested the importance of grocery shopping skills in terms of daily living skills, independence, and its relation to nutrition.

Grocery shopping—a weekly routine for many—is actually composed of multiple activities, all of which can pose challenges to individuals with intellectual disability (Mechling & Gast, 2003). Mechling and Gast (2003) outlined these activities as (a) identifying items to purchase, (b) moving around a store, (c) selecting the appropriate item, (d) addressing prices, and (e) purchasing the item(s). Most of the research on grocery shopping skills for individuals with intellectual disability focused...
on a single activity or a combination of two activities within the whole process, with the majority involving the identification of grocery items (Mechling & Gast, 2003; Morse et al., 1996). Specifically, in the review of the literature by Morse et al. (1996) the majority of studies on grocery shopping skills focused on participants using a picture-based shopping list—a representation of a self-operated prompting system.

**Self-Operated Prompting Systems**

Self-operated prompting systems have a rich history of research in the field of intellectual disability (Mechling, Gast, & Seid, 2010). For decades, researchers have evaluated the use of self-operated prompting systems to support individuals with intellectual disability in a range of functional life skills tasks (e.g., Graves, Collins, Schuster, & Kleinert, 2005; Mechling, Gast, & Fields, 2008; Singh, Oswald, Ellis, & Singh, 1995; Taber, Seltzer, Hefflin, & Alberto, 1999; Taber-Doughty, 2005; Taber-Doughty et al., 2011; Taber-Doughty, Patton, & Brennan, 2008; Van Laarhoven, Van Laarhoven-Myers, & Zurita, 2007). Self-promoting systems have undergone transformations throughout their time of research, moving from static picture-based tools (e.g., Singh et al.) to audio tools (e.g., Taber et al.; Taber-Doughty) to video tools (e.g., Graves et al.; Taber-Doughty et al., 2011, 2008; Van Laarhoven et al.). The research progression on self-promoting systems (i.e., low tech to high tech) has been to address what Mechling et al. (2010) referred to as “keeping abreast with developing technologies” as well as “portability” (p. 423). Hence, research explored paper-based picture systems (e.g., picture symbols and photographs; Mechling & Stephens, 2009), then moved into audio systems (e.g., audio recorders and MP3 Players; Taber et al.; Taber-Doughty), and finally into video systems (e.g., personal digital assistants, portable DVD players; Mechling et al., 2010, 2008; Mechling & Stephens; Taber-Doughty et al., 2008; Van Laarhoven, et al.).

Although the research base is positive regarding high tech self-operating prompting systems (e.g., iPods)—and is aligned with the current technology use outside of school by students’ peers and perhaps students themselves (Lenhart, Ling, Campbell, & Purcell, 2010; Rideout, Foehr, & Roberts, 2010)—one has to question the intense focus on the “developing technologies” (Mechling et al., 2010) for students with intellectual disability (Lancioni, O’Reilly, Seedhouse, Furniss, & Cunha, 2000). Specifically, one has to question the sustained use of some more advanced self-operating prompting systems after the research is completed—both in school as well as the more important issue of life outside of school (i.e., daily living). Yet, technologies can offer assistance to students with disabilities in terms of independence, particularly considering postschool experiences (Davies, Stock, & Wehmeyer, 2002). Hence this study sought to explore the effectiveness and efficiency of a low-cost, more commonly accessible technology to support grocery shopping skills in students with moderate intellectual disability, with a particular focus on identifying and locating grocery items. The research questions for this study included (a) will students increase their level of independence in completing grocery shopping (i.e., identifying and securing items) following intervention consisting of an audio recorder?; (b) will students perform tasks more independently when using the audio recorder as compared to their typical means of maintaining a grocery list?; and (c) what are the students’ perspectives of audio recorders to support them in grocery shopping?

**Method**

**Participants**

Three male high school students with moderate intellectual disability participated in this research project. All three were educated by the teacher in the same program, which focused on functional life skills and community-based instruction. All three young men were over 18 years of age, although Curt’s parents had guardianship.

**Curt.** Curt was a 20-year-old male student identified in twelfth grade. He was identified with a moderate intellectual disability (IQ of 40) with a secondary disability of speech and language impairment. Curt was supposed to
use an augmentative and alternative communication device, but did not at any time during the study or during observations in the classroom. He could be understood in a one-on-one situation when one leaned in closely to hear. Curt’s IEP goals involved making a grocery list from a recipe and cost comparison in a grocery store. Curt was a friendly and social young man who responded positively to praise and encouragement.

Jesse. Jesse was an 18-year-old young man enrolled in the twelfth grade. He was also identified with a moderate intellectual disability (IQ of 56) and had a secondary disability of language impairment. Jesse had IEP goals relative to creating a grocery list from a recipe and rounding to the nearest dollar when shopping to determine cost. Jesse was a hard worker and enjoyed having responsibilities. He was eager to please, polite, and wanted to do a good job.

Jon. Jon was a 20-year-old twelfth grade student. He was identified as having multiple disabilities, including moderate intellectual disability (IQ of 49) and health impairments (heart problems). Jon had IEP goals related to rounding to the nearest dollar and determining change. He engaged in vocational education in the community through his work at a local restaurant. Jon was very friendly, social, and always willing to ask for help.

Settings

The research project occurred in two settings—the students’ typical classroom setting and a local chain grocery store where the students regularly shopped with their class and was in close proximity to the school. The classroom was used for training, interviews, and recording on the audio recorders. All of the shopping occurred in the same grocery store.

Classroom. The classroom, which housed one of two self-contained life skills programs in the high school, consisted of two adjacent rooms. One room contained rows of desks and served as the instructional area for students. The second room contained a kitchen sink, oven, microwave, couch, and large circular tables. When working with the three students, researchers worked in the room with the large tables separate from the other students in the class.

Grocery store. The grocery store was a two-state chain store located one block from the high school that the students attended, although students—in the study accompanied by their class and another life skills program—took a school bus to the store. The grocery store was located off a busy road in a small strip mall. The three participants of this study would be accompanied on the trip by approximately twenty of their classmates. Consistent with most grocery stores, the store was sectioned into multiple areas, with the produce section located on one far side, dairy on the other far side, meat selection in the far back, and subsequent isles going across the center of the store. The store was well lit with soft music playing over the sound system at all times.

Materials

Grocery lists. Each weekly grocery list consisted of 10 items selected by the teacher. Prior to the study, each student typically had two items that they acquired with the help of an adult on their weekly grocery shopping trips. In this study, the teacher selected items needed for her classroom for the curriculum (e.g., toothpaste for their hygiene program, apples for their recipes for cooking) as well as items students were likely to purchase for themselves on their own (e.g., pop, milk, granola bars). Across the weeks, items might repeat (e.g., dishwashing soap), but a whole list in its entirety was never repeated. New items were always included on each list.

During baseline and withdrawal, the ten items were presented on a single piece of paper using picture symbols from Boardmaker software. Each item was then represented by a picture communication symbol (i.e., a picture of a bottle of hand soap) as well as typed words above (i.e., hand soap). Each student had his own copy of the picture symbol grocery list during baseline and withdrawal. During the two intervention phases, students were provided the grocery list using picture symbols and words in advance and recorded the ten items into their audio recorders. The audio recorders were the only form of a grocery list they had in the store.
Audio recorders. All three students used the same audio recorder in the study—an Olympus DP-10 digital voice recorder. The audio recorder ran between $25 and $35, depending on when ordered and from what venue (e.g., directly from Olympus or Amazon.com). The audio recorder was selected because of its simple design and ease of use. The digital recorder had a large LCD screen and large buttons for play, stop, and record—which were also set apart by large, different shapes (sideways triangle, square, and circle, respectively) and color (blue, white, and red, respectively). The recorder had 63 hours of battery life and could record up to 131 hours. The device also had high quality recording with its noise cancellation feature and ability to set the microphone’s sensory setting. The volume for playing the recordings could also easily be adjusted. The recorder weighed approximately eight ounces and looked like a small cell phone. Students were also provided with a storage case designed specifically for the audio recorder for transporting and storing the devices.

Dependent and Independent Variables

The independent variable for the study was the audio recorders. During the intervention phases, students used the audio recorders to present the grocery lists. The audio recorders were in contrast to the picture symbol lists students used during baseline and withdrawal phases, consistent with their typical grocery list method in their class. Multiple dependent variables were gathered, including the correct number of items identified from the 10-item grocery list, the correct number of items obtained from the 10-item grocery list, the number of prompts (verbal and/or listening to each item on the recorder more than once), the number of times items on the 10-item grocery list were listened to, and the time to complete the 10-item grocery list. Event recording was used for the dependent variables, except for the time, which used duration.

Procedure

The study involved an ABAB design, otherwise known as a withdrawal design. In other words, baseline data were collected on the three students (i.e., grocery shopping with picture symbol grocery list), an intervention (i.e., grocery shopping with grocery list recorded on audio recorders) was introduced, the baseline phase was reexamined (i.e., audio recorders withdrawn and a picture symbol list was used) and finally the audio recorders were reintroduced (Kennedy, 2005). ABAB is an appropriate design as it allowed for the replication of both baseline and intervention phases as well as ended with students receiving the intervention, which is perceived to be beneficial in terms of increasing their independence (Kennedy, 2005).

All data collection occurred one-on-one with a member of the research team. In both baseline and intervention conditions, each student shopped independently with one member of the research team. Students typically arrived at the grocery store around 12:45 pm and had until 1:15 pm to complete their grocery shopping, at which time the school buses with the two classes were to return to school.

Training. Prior to data collection, the three students were introduced to the audio recorders. The students were shown how to turn on and off the recorders, how to record, how to play the recording as well as how to play and stop the recording, how to repeat the recording, how to adjust the volume, and how to erase the recording. Students were all required to independently complete each step.

Baseline (A). During baseline, each student was provided with a hard copy ten-item picture symbol grocery list. A member of the research team accompanied each student as they identified the grocery items, located them in the store, and selected the appropriate item from the shelf. Researchers used a data collection sheet to identify start and ending times for each grocery list visit as well as to identify if students correctly identified each grocery list item from the picture symbol provided, if they correctly located and retrieved the item as well as did so independently or with prompts, the number of prompts, and the type of prompts. All students completed the baseline phase at the same time, which occurred for three sessions.

Intervention (B). Similar to baseline, each student had a grocery list with ten items to locate in the grocery store. However, rather
than using a piece of paper, students recorded their grocery lists in advance and retrieved the items from their audio recorders. Students individually and independently recorded their grocery list in the classroom prior to leaving for the grocery store (i.e., students recorded their own lists with their own voices). Before students recorded, a member of the research team went over the picture symbol list with each student to ensure they knew what the item was and what they were to record. The researchers took the list after the recording was complete. At the grocery store, students maneuvered around the store with a member of the research team, a shopping cart, and their audio recorders. Students could listen to the audio recorders as much as they wanted, but during training they were trained how to record in such a manner that they could play and stop the device after each item. They also practiced listening to the audio recorders in this manner in the classroom. Like during the baseline phase, researchers used a data collection sheet to identify start and ending times for each grocery list visit as well as to identify if students correctly identified each grocery list item from the audio recorders, if they correctly located and retrieved the item as well as did so independently or with prompts, the number of prompts, and the type of prompts. All students completed the intervention phase at the same time and the intervention phase occurred for three sessions.

Withdrawal (A'). During the withdrawal phase, students returned to using ten-item picture symbol grocery lists. The same procedures were implemented during the withdrawal phase as in baseline, including what data were collected and how they were collected. All students completed the withdrawal phase simultaneously, which occurred over three sessions.

Intervention (B'). The second intervention phase followed similar procedures as the first intervention phase. Each student again used audio recorders to support their retrieval of ten items. They recorded their ten-item grocery list in advance in their classroom and were free to listen to their recordings as many times as they desired, whether that entailed listening to the recording in its entirety, or stopping the recording after each item mentioned. One change in the second intervention condition from the first was that instead of Curt recording his list, the second author (a male) recorded the list. The researchers and the teacher were concerned that Curt did not understand his own voice on the audio recorder, and elected to test if having someone else record his list would change Curt’s behavior. Curt was present during the recording, and the researcher went over the list with him and had Curt tell the researcher what to record; the list was then removed. The data collected were similar to the previous phases. Again, all students completed the final intervention phase simultaneously, which occurred over three sessions.

Interobserver agreement and treatment integrity. The first three authors collected data on one student during each shopping trip; authors rotated collecting data on each student. Interobserver agreement data were collected by an independently trained observer (the fourth author) for each student across the phases. The second observer recorded the same data as the original observer at the same time (e.g., correctly identifying items, correctly selecting items, number of prompts needed, and time). The percent agreement for all types of data collected was calculated by dividing the number of agreements by the total number of agreements plus disagreements and multiplying the quotient by 100. Interobserver agreement was 91%.

A checklist was used to assess treatment integrity during the intervention phases. The checklist involved each student receiving his grocery list, going over the grocery list for clarity, recording the grocery list into the audio recorders, and using the audio recorders to grocery shop. Treatment integrity data were collected for 33.3% of the sessions for all three students. Treatment integrity was 100%.

Social validity. Each student was interviewed prior to and following data collection. Using a semi-structured interview protocol, students were asked about their perceptions on the value of grocery shopping, how students currently shopped for groceries, and the audio recorders that were shown to them. The students’ teacher was also interviewed regarding students’ current means of grocery shopping and her opinion of the audio recorders.
in prompting independence, including benefits as well as any challenges.

Results

Figures 1, 2, and 3 demonstrate the number of correctly obtained grocery items from the list of 10 each student (Curt, Jesse, and Jon, respectively) was able to obtain during each phase (baseline, intervention I, withdrawal, intervention II). Visual analysis revealed the success of the audio recorder for helping the students obtain the 10 grocery items from each list varied by student. For Curt (see Figure 1), the audio recorders were a challenging technology, particularly during the first intervention phase when he recorded the list himself. Jesse (see Figure 2) appeared overall to do similarly well with both the picture list (baseline/withdrawal) and the audio recorders (interventions). Jon (see Figure 3), similar to Jesse, had a lot of overlapping data points between the no intervention and intervention phases.

Curt

Overall, Curt struggled to successfully use the audio recorders to grocery shop (refer to Table 1 to see the data for each student). Curt’s challenge with using the audio recorders was particularly noted during the first intervention phase where he recorded the grocery lists himself. He often struggled to understand what he had said, as noted by the lowest average number of correctly identified items (3.7), lowest number of correctly identified items (2.7), and greatest average number of prompts (36.0). In comparison, on average, Curt correctly identified and correctly obtained the most number of items during the second intervention phase (9.0 and 6.3 respectively). Curt’s improvement during the second intervention phase—in which the second author recorded the grocery list—is notable during visual analysis (refer to Figure 1). During the second intervention phase, Curt’s success in obtaining grocery items improved in each session. Curt’s increasing success with the audio recorders when the grocery list was recorded by another individual is also noted in the fewer average number of prompts needed during the second intervention phase as compared to the first (27.7 vs. 36.0, respectively) as well as the decrease in the number of times he listened to the recorded list (16.7 vs. 33.3, respectively). Curt’s data, including time...
and number of obtained items, was impacted by his running out of time to complete the list as well as his determination that he was finished even though he did not have 10 items and refusal to continue; these sessions are noted separately in Figure 1.

Figure 2. Number of correctly obtained grocery items per session (Jesse).

Figure 3. Number of correctly obtained grocery items per session (Jon).
TABLE 1
Student Grocery Store Outcomes Across Phases

<table>
<thead>
<tr>
<th>Participants</th>
<th>Average Number Correctly Identified Items</th>
<th>Average Number Correctly Obtained Items</th>
<th>Average Number of Prompts</th>
<th>Average Number of Times Listened to Items</th>
<th>Average Time to Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>7.0</td>
<td>6.0</td>
<td>9.7</td>
<td>28.3</td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>3.7</td>
<td>2.7</td>
<td>36.0</td>
<td>33.3</td>
<td>21.3</td>
</tr>
<tr>
<td>Withdrawal</td>
<td>8</td>
<td>3.3</td>
<td>20</td>
<td></td>
<td>25.3</td>
</tr>
<tr>
<td>Intervention II</td>
<td>9</td>
<td>6.3</td>
<td>27.7</td>
<td>16.7</td>
<td>29.3</td>
</tr>
<tr>
<td>Jesse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>8.0</td>
<td>9.7</td>
<td>3.0</td>
<td>20.7</td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>9.3</td>
<td>9.0</td>
<td>4.3</td>
<td>9.3</td>
<td>18.3</td>
</tr>
<tr>
<td>Withdrawal</td>
<td>8.7</td>
<td>9.7</td>
<td>2.0</td>
<td></td>
<td>16.3</td>
</tr>
<tr>
<td>Intervention II</td>
<td>9.3</td>
<td>9.0</td>
<td>7.7</td>
<td>11.3</td>
<td>16.0</td>
</tr>
<tr>
<td>Jon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>8.0</td>
<td>9.7</td>
<td>2.7</td>
<td>20.7</td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>10.0</td>
<td>7.0</td>
<td>7.3</td>
<td>10.0</td>
<td>18.0</td>
</tr>
<tr>
<td>Withdrawal</td>
<td>8.3</td>
<td>9.0</td>
<td>6.0</td>
<td></td>
<td>15.7</td>
</tr>
<tr>
<td>Intervention II</td>
<td>10.0</td>
<td>9.3</td>
<td>5.3</td>
<td>11.0</td>
<td>14.7</td>
</tr>
</tbody>
</table>

Note: During the second intervention phase, the second author (a male) recorded the grocery list into the recorder rather than Curt based on an assessment from the teacher and researchers that Curt was having trouble understanding his own recordings. Curt also ran out of time to finish grocery shopping during baseline, withdrawal, and the second intervention (i.e., the program had a certain amount of time—variable depending on the day but typically about 25 minutes—to grocery shop before they had to ride their buses back to school). During the first intervention, in every session Curt said he was done shopping even though he did not run out of time or obtain all items (correctly or incorrectly).

Jesse successfully used the audio recorders to grocery shop (refer to Table 1). A visual analysis of Figure 2 indicated that, for the most part, Jesse was successful in correctly obtaining the ten items from his list with both the picture symbols and the audio recorders. The data in Table 1 supported the visual analysis; during both non-intervention phases Jesse averaged 9.7 correctly obtained and 9.0 correctly obtained during both intervention phases. Yet, Jesse did need more prompts to correctly obtain the items during the audio recorder phases than the picture symbol phases. Jesse did however correctly identify more items when using the audio recorders (averaging 9.3 for both intervention phases as compared to 8.0 for baseline and 8.7 for withdrawal). Jesse’s average time to complete the list decreased for each subsequent phase, resulting in the lowest average time to shop as 16.0 minutes during the second intervention phase.

Jon was able to use the audio recorder to locate items in a grocery store (refer to Table 1). The visual analysis of Figure 3 showed that Jon was less successful with correctly locating the grocery list items during the first intervention as compared to either baseline or withdrawal, but improved during the second intervention phase. The improvement in the second intervention phase is supported by the data in Table 1. The improvement in the second intervention phase of correctly locating the grocery items coincides with a reduction in the number of prompts. Beyond correctly locating the grocery list items, Jon was more successful in correctly identifying the grocery list items with the audio recorders as compared to the picture lists (averages of 8.0 and 8.3 for picture list phases vs. 10.0 for both audio recorder phases). Jon’s average time to complete the 10-item grocery list decreased for each phase, resulting in completing the sec-
ond intervention phase in an average of 14.7 minutes.

Social Validity

All three students were positive about using audio recorders when the tool was initially shown to them and the idea discussed. They all indicated they liked it and thought it was “pretty cool” that they could record their own voice and hear it back. Jesse indicated that it would help him not to get “confused or upset” and indicated that he “need something because I want to read good but can’t. Hate to ask teacher.” All three students thought they could use the audio recorder instead of their current picture lists. The only negative comment mentioned was by Jon who thought the volume was too loud, but he was then shown how to adjust this setting. The teacher was also very positive about the inclusion of audio recorders to support her students in grocery shopping. She said she typically gave her students pictures symbols or words (Jesse). She felt it would support students in being more independent and began to question the use of pictures symbols with regards to creating independence or dependence. She expressed a little apprehension with having the students each find 10 items, as previously they only shopped for one or two. Yet, the teacher indicated ten items was probably “more realistic.”

At the end of the study, all three students indicated they liked using the audio recorders. They liked to be able to hear the list and thought it was fun to use the recorder. Jesse indicated that “the recorder can tell you if you forget; with the recorder you can push again [play] and can’t forget.” Both Jesse and Jon indicated they liked going over the list with a researcher to make sure they knew what the items were before recording; this provided them a strategy to understand all the items. There was a split decision about what approach was faster for them to grocery shop—the picture list or the audio recorder. Jon found the picture list faster, but Jesse felt the audio recorder resulted in faster shopping. Curt indicated he just liked working one-on-one with a researcher.

The teacher felt the audio recorders helped her students—at least for Jesse and Jon. She felt the tool would help the young men become more independent in the future since the participating students often struggled with spelling and reading and using the audio recorders they could record their grocery list independently and access it without the assistance of someone else. The teacher also commented on the lack of needing to rely on pictures of items as a benefit to the audio recorders. In the end, the teacher stated that her students enjoyed using the recorders and she appreciated that her students were exposed to the low-cost, age-appropriate technology. The teacher also told researchers that she was changing her practice as a result of participating in the research project. She had never shopped one-on-one with a student at a grocery store or for so many items—during their typical instruction, students worked in small groups finding one or two items. The teacher expressed that she realized her students did not know how to think about where items were in the store based on aisles. Similarly, she often made lists for her students haphazardly, without lumping similar items together—a strategy that many might apply to the grocery store.

Discussion

In light of a positive research base regarding technology-based, self-operating prompting systems (e.g., iPods, Lancioni et al., 2000; Mechling et al., 2010), yet a concern about the sustainability of such technologies after a research project is completed, this study sought to explore the effectiveness and efficiency of a low-cost, more commonly accessible technology to support grocery shopping skills in students with moderate intellectual disability. The results of the project suggest the students were able to use the audio recorders to correctly identify and locate 10-items from a grocery list. Although the students were typically not more successful with the audio recorders than with their traditional means of picture symbol lists, with the exception of Curt’s first intervention phase, they were not largely less successful. Overall, the results support the potential of audio recorders to assist students with moderate intellectual disability in independently grocery shopping.

Although students were generally successful in using the picture symbol lists to grocery
shop—as the researcher hypothesized they would be, a concern exists about the lack of independence picture symbol lists create for the students. In other words, to use a picture symbol list to grocery shop, someone (i.e., a teacher) had to locate the picture symbols and then put them on a list—a practice that may not continue once the three young men involved in the study left high school. Hence, the researchers sought to explore if students could be just as successful grocery shopping with the use of a simple technology—audio recorders. The researchers felt the audio recorders would promote a level of independence the students were not currently obtaining, which was supported by the social validity interview of the teacher. The researchers—in conjunction with the teacher—felt if students could successfully and independently use the audio recorders, use of the audio recorders might be a strategy for independence in their adult life with respect to grocery shopping as well as other daily living or life skills (i.e., riding the city bus).

Based on the data, audio recorders can be a strategy to promote independence in daily living. For one, students were, on average, better able to identify the items on the grocery list when using the audio recorders as compared to the picture symbol list; with the exception of Curt’s first intervention phase as he struggled to understand his own recordings (refer to Table 1). With the picture symbol lists, all three students struggled at times with somewhat ambiguous picture symbols (e.g., sandwich ziplock bags, baking powder, can of chili, ground beef). The ambiguity of what to look for was minimized with the audio recorders. In addition, during the second use of the audio recorders, all three young men correctly retrieved the grocery items at comparable rates to the picture symbol lists phase (refer to Table 1 and Figures 1, 2, and 3). Finally, Jesse and Jon recorded the lowest average amount of time to grocery shop during the second intervention phase.

Although Mechling (2007) noted research on self-prompting devices advanced over the years from picture symbols to audio supports and to visual supports, perhaps there is a research-to-practice gap. The participating teacher did not have access to video prompting devices prior to the study and used static pictures for prompting. One concern may be the high cost associated with devices used in more current research (i.e., iPod, iPad), and a school’s ability to acquire and/or maintain these outside of a research environment. A similar concern exists for students being able to (a) independently acquire the support after school and (b) with regards to the video prompting, have videos available for prompting after exiting school (i.e., needing someone to create). Hence, with this study—although a less sophisticated technology was used—the researchers hoped the teacher and students could maintain its use in school and after school, with a cost for the device around $30 and the fact the students were able to operate the technology independently with minimal training including recording (Wehmeyer et al., 2006).

Implications for Practice

This study holds implications for practice as it suggests teachers could implement a relatively inexpensive and easy-to-use technology (i.e., audio recorders) and support students in grocery shopping in a more independent fashion. The training for this piece of assistive technology was minimal (less than 10 minutes) and the tool came with easy to understand instructions. Given that lack of or insufficient training can result in not using assistive technology or discontinuing its use, the ease of training for students and teachers weighs positively for the initial as well as sustained use of audio recorders (Bouck, Flanagan, Heutsche, Okolo, & Englert, 2011; Scherer, 1993). Similarly, the low cost of the technology also supports its initial and continued use in practice, as teachers, students, and/or schools might be more apt to acquire the audio recorders. Cost is a noted challenge with teachers and students using assistive technology and mass-produced, commercially marketed audio recorders typically have a lower cost than specialized assistive technology devices (Cihak, Kessler, & Alberto, 2008; Parette & Scherer, 2004). Finally, the fact that audio recorders are not often intended or marketed as assistive technology, but were repurposed to support students in acquiring independence during daily living skills (Bouck
et al., 2012; Mishra & Koehler, 2009), using audio recorders are likely to be attributed with less stigmatization. Audio recorders are generally small, and hence draw less attention to their use. The ones used in this study were also shaped like today’s cell phones, a point noted by the participating students.

Limitations and Future Directions

This study had several limitations. For one, the lists changed each week, although there were some consistent items across weeks, similar to what one might find on an individual’s or family’s weekly grocery list. However, some items proved to be more challenging than others, both in terms of identifying them from the picture symbol list (baseline, withdrawal) or locating them within the store. For example, Curt had trouble with air freshener and when presented with this item he walked repeatedly around the hygiene section and selected multiple items that resembled air freshener (i.e., shaving cream). In another example, baking powder and baking soda were confusing to all three of the individual students. Hence, the actual items on each session’s list may have impacted students’ success or lack thereof with both identifying and locating items. A student’s familiarity with the item, as well as the pictorial representation of the item in the baseline/withdrawal phases, was important.

Another limitation to the study involved the intervention condition and that students went over the picture symbol list with the researchers prior to recording to assist in recording the correct object; students were unaware of the list during the picture symbol list sessions until they arrived at the store. Students, such as Jesse, tried to study the list in the classroom and retrieve the items from memory. Future research can examine the impact of students’ receiving a prerecorded list upon arriving to the store. Similarly, changes to the intervention with Curt may be seen as a limitation, as during the second intervention phase the second author recorded the list (with Curt) rather than Curt’s voice on the recorder given the apparent struggle Curt had in understanding his own voice as noticed by the researchers and the teacher. Another limitation was the lack of either a maintenance or generalization phase; future research should include one of these phases.

References


Graves, T. B., Collins, B. C., Schuster, J. W., & Klein-


