Teaching Grocery Store Purchasing Skills to Students with Intellectual Disabilities Using a Computer-Based Instruction Program

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Abstract: This research evaluated effects of a multi-media computer-based instruction (CBI) program designed to teach grocery store purchasing skills to three high-school students with intellectual disabilities. A multiple baseline design across participants used measures of computer performance mastery and grocery store probes to evaluate the CBI. All participants initially performed at low percentages of correct responses in purchasing items at grocery store checkout stands. Following introduction of CBI, all participants increased correct purchasing skills. Additionally, all participants performed at high levels in generalization probes at three different grocery stores and in a 30-day follow-up probe. Participants and parents rated purchasing skills higher following treatment. Results are discussed in terms of increased purchasing skills using CBI, generalization, maintenance, and implications for practice.

Teaching community purchasing skills to individuals with disabilities is a high priority because it allows children and youth to access new environments and participate as valued citizens (Ayres & Langone, 2002; Donnell & Laughlin, 1989). However, most school-based programs face resource constraints which limit the number of opportunities for instruction to occur in community-based settings (Wissick, Lloyd, & Kinzie, 1992). Considerable research has examined ways to teach shopping skills to students with intellectual disabilities (see Morse, Schuster, & Sandknop, 1996 for a review). One method of simulating community instruction of purchasing involves computer-based instruction (CBI) (Ayers & Langone). For example, Wissick et al. used CBI to train three youth with intellectual disabilities how to locate and purchase snack items in convenience store settings. An interactive videodisc presented text, graphics, photographs and motion video to participants in effort to teach skills. Following treatment, youth located items more efficiently, required fewer teacher prompts, and increased independent performance in the community setting.

Ayres and Langone (2002) evaluated the effects of a CBI program called Dollar Plus. This program is similar to others requiring a purchaser to submit one dollar more than the number needed to purchase (e.g., Colver & Collins, 1996), however, all training steps are embedded within the CBI. A software package employed video, photos, and animations in a computer simulation to teach purchasing of grocery items. Participants were three children from ages 6 - 10 with mild to moderate intellectual disabilities. The researchers measured accurate initiation and completion of the purchase using Dollar Plus and then assessed generalization in community-based...
probes. While Ayres and Langone reported increased scores on computer trials, they did not find generalized accuracy in purchasing at the grocery store.

Langone, Clees, Rieber, and Matzko (2003) developed a CBI program called Project Shop as a part of a federally funded grant for teaching shopping skills to learners with intellectual disabilities. The program consisted of two main elements. First, a DVD video with three 10-min presentations provided models of correct and incorrect grocery shopping skills. Video actors consisted of two pairs of young adults playing roles of roommates, including individuals with disabilities. Demonstrated skills included making a shopping list using a picture book, going to the grocery store, finding items in the store, and checking out. A narrator described correct and incorrect shopping procedures demonstrated by actors on video. Second, an interactive CD-ROM provided learners with a virtual shopping experience including instructional activities and skill practice. During instructional activities, the narrator described actors’ actions in video demonstrations. During skill practice, the narrator provided affirmative or corrective feedback regarding learner performance. In the design of the CD-ROM, activities were embedded in a short story of a grocery store shopping trip. Interactive activities targeted: (a) making a grocery store list, (b) finding items on a grocery store shelf, (c) maneuvering a shopping cart properly, (d) counting items in a shopping cart, (e) identifying the shortest check-out line, (f) paying for groceries using the Dollar Plus method, and (g) taking coin change, receipt, and groceries.

Hutcherson, Langone, Ayres, and Clees (2004) investigated the effects of the same CBI program on locating shelf items in four middle school students with significant intellectual disabilities. All students quickly increased accurate location skill using the CBI program. However, although all participants eventually located more items in the community shopping component, performance of some participants indicated marginal and gradual gains.

Ayres, Langone, Boon, and Norman (2006) examined effects of the Project Shop CBI program in promoting generalization of Dollar Plus purchasing skills in grocery store probes of four middle school students with intellectual disabilities. Results indicated that with CBI, three of four participants increased Dollar Plus purchasing skills in grocery store probes; the lowest-performing participant may have been adversely affected by medication changes.

This study extends the Ayres et al. (2006) investigation of Project Shop by (a) assessing effects of CBI according to a five-step purchasing sequence (from choosing shortest check-out line to taking coin change, receipt, and groceries), (b) involving participants of high school age with intellectual disabilities, (c) probing generalization in one initial grocery store and subsequently in three different ones, and (d) probing maintenance of skills 30 days following conclusion of the study. Additionally, this study included a measure of the social significance of the CBI treatment. Specifically, research questions examined in this study included the following:

1. Given CBI, to what extent do participants with significant intellectual disability increase percentage of correct purchasing responses in grocery store generalization probes?
2. To what extent do participants’ purchasing skills (a) generalize to different grocery stores, and (b) maintain after 30 days?
3. Do participants and their parents/guardians rate purchasing skills higher in posttest than in pretest?

Method

Participants

Three participants were chosen from a high school classroom of 12 students who experienced intellectual disabilities. Criteria for selection as participants included (a) IEP goals related to grocery shopping, (b) parent/guardian consent, (c) high percentages of school attendance, (d) visual and auditory acuity within normal range, (e) motor ability to make selections on the computer screen using a standard or adapted mouse, and (e) ability to maintain attention to task at a computer terminal for 30 min. Of 10 students who
met these criteria, a role-play pretest of purchasing grocery items was conducted to identify those with limitations in purchasing skills. Three participants receiving lowest percentages of correct responses (0 – 40% correct) were selected. The remaining seven students’ scores ranged from 60 – 100% correct.

Mr. Red, age 17, was a high school senior. His special education file indicated an IQ score of 55 and an adaptive behavior standard score of 65. Money, shopping, and banking skills had been targeted on his Individual Education Program (IEP). In the role-play pretest, Mr. Red correctly responded to two (choosing the shortest line and placing the groceries on the conveyor with a divider) of five purchasing steps.

Mr. Blue, age 17, was a high school senior with an IQ score of 45 and an adaptive behavior score of 46. He had worked on Dollar Plus skills for two school years with minimal skill acquisition. In the role-play pretest, Mr. Blue did not correctly respond to any steps.

Mr. Green, age 16, was a high school junior with an IQ score of 45 and an adaptive behavior score of 51. Money, shopping, and banking skills were targeted on his IEP. In the role-play pretest, Mr. Green correctly responded to one of five purchasing steps (i.e., response to the “paper or plastic” question by indicating one alternative).

**Response Definitions**

Responses were recorded in both computer performance mastery assessment (i.e., participants’ responses at the computer) and in grocery store generalization probes (i.e., participants’ responses in stores independent of training). Computer assessments and store probes consisted of responses to a five-step purchasing sequence: (a) selecting the check-out stand with the shortest line or the one marked 15 items or less; (b) placing three items on the checkout stand conveyor; (c) providing the correct Dollar Plus amount; (d) responding to the cashier’s question about bagging preference (i.e., “Paper or Plastic”), and (e) taking coin change, receipt, and groceries.

**Selection of shortest line or the one marked 15 items or less.** Different responses were targeted in selecting shortest lines in grocery probes compared with computer assessment. In the computer assessment, a participant chose the shortest checkout line from three photos presented in a trial by clicking the mouse on the correct line. In grocery probes, after scanning the number of customers in checkout lines, the first author (the participants’ classroom teacher and primary observer) walked with the participant to a starting point within 3 m of the longest line or to a point farthest from the shortest line. Each participant was taught to identify the shortest checkout line based on three decision rules: (a) choose the checkout stand marked 15 items or less if there were three or fewer customers; (b) if not “a”, choose a checkout stand with no customers; or (c) if neither “a” or “b” yielded a clear checkout line, select the line with the fewest customers. If the participant failed to scan lines but chose the closest and longest line, the response was scored as incorrect. If the participant scanned the lines but selected a line other than the shortest (based on the decision rules), the response was scored as incorrect. If the participant scanned the lines and selected the shortest line, the response was scored as correct. The participant had 15 s to choose a check stand line after he and the first author had reached the starting point.

**Placement of three items.** In both computer assessment and store probes, the participant was required to place three grocery items...
from his basket onto the conveyor. In each assessment, three items were delivered to the participant for purchasing because the computer assessment was configured in this manner. In the computer assessment, the participant had 10 s to click the mouse to drag pictures of first, a divider, and second, grocery items, to a picture of a check-stand conveyor. In the grocery probe, the participant first placed a divider between the preceding customer’s items and his items within 10 s of space becoming available.

Payment of correct amount. In both computer assessment and grocery probes, the participant had to pay the correct Dollar Plus amount (i.e., dollar amount plus one more) after the total cost was announced. The participant had 5 s to initiate a response by starting to count his money and 20 s from initial response to complete the step. Therefore, a correct response required correct dollar amount, no more than 5 s for initiation, and no more than an additional 20 s for completion. In computer assessment, when a video clip showed a cashier announcing the total of the purchase, the participant responded by clicking on the number of dollar bills needed. The software contained 36 videos displaying four different cashiers asking for various purchase amounts ranging from $1.03 to $9.93. The software randomly selected the video for a purchase. In grocery probes, purchase amounts ranged from $1.00 to $9.00. For consistency across probes and participants, three and only three items were provided for purchase.

Response to “paper-or-plastic” question. In computer assessment, the participant chose paper or plastic by clicking on a picture of either a plastic or a paper bag within 3 s of the narrator’s question. A correct response required a clicking response within 3 s of the question to either picture. In grocery probes, the participant was required to make a verbal response to the cashier’s paper-or-plastic question within 3 s. Either response was scored as correct as long as it was audible. No response, an inaudible one, or a gesture was scored as incorrect.

Collection of change, receipt, and groceries. In computer assessment, when a dispenser showed coin change, the participant clicked the mouse and dragged the change and receipt to a wallet. The participant then clicked on the groceries. The participant had 5 s to take the receipt and change from the dispenser, and another 5 s to take the bagged groceries. In grocery probes, the participant was required to take change, receipt and bagged groceries when offered by the cashier according to the same time parameters.

Data Collection

Primary data collection included computer performance mastery assessments and grocery store probes. These data collection activities are described below.

Computer performance mastery assessment. In CBI, a computer performance mastery assessment scored individual participants on correct/incorrect responses on each of the five responses in sequence. This assessment applied the same time limits as the grocery store probe but required mouse clicking responses. The computer collected and stored data. The score was expressed as percent of five responses performed correctly. The first author developed software to collect computer performance mastery assessment data. This assessment, not included in the original CBI program, determined whether participants performed responses in the purchasing sequence using the computer. Assessments were conducted after 4-5 CBI sessions (i.e., at the end of each week). Participants received the computer assessment prior to weekly grocery probes. The first author incorporated numerous photographs of checkout stands with varying numbers of customers into the computer software. For individual participants, the software randomly selected a set of three photographs from which the participant selected the shortest line or the one marked 15 items or less. For the payment using Dollar Plus step, the first author programmed 32 different amounts from which the computer randomly selected one for each trial. No participant received feedback on the computer assessment for correct/incorrect responses because resources were unavailable for such programming when this research was conducted.

Grocery Store Probes

Data were collected during grocery store probe sessions by the first author (primary
observer). An assistant acting as a second observer collected data during 30% of total sessions for each participant. Observers scored probe responses in one of two ways:

1. Correct: an accurate response within the time limit.
2. Incorrect: a response of an incorrect topography performed within the specified time limit, a response of a correct topography but beyond the specified time limit, or no response.

When a participant initiated an incorrect response but corrected his response with the time limit, this response was scored as correct. Each step counted as 20% with a maximum score of 100% available for correct completion of all five tasks.

All grocery probes took place during school hours at varying times during mornings or early afternoons. Researchers scheduled one grocery probe per participant per week. Probes were conducted during both baseline and treatment. During baseline, grocery probes were conducted to assess individual participants’ purchasing skills prior to CBI. Individual participants were accompanied to Albertson’s by the first author. Prior to the first grocery store trip, shopping skills such as cart safety, asking for help, and locating items were taught. In all grocery probe sessions, the first author provided each participant with three items and 10 one-dollar bills, stating: “Here are three items I want you to purchase. Choose the best checkout stand, and correctly purchase these three items with the money I gave you. You may begin.” The first author delivered these instructions after positioning himself and the participant nearest the checkout line with the most customers. Participants had to move 4-6 m to find the shortest line. The first author moved to the bagging side of the checkout stand about 1 m from the participant and refrained from delivering any form of prompt. Using the clipboard and timing device, he scored each of five purchasing responses. Prior to the study and given approval from the store manager, the first author prompted cashiers not to assist the participant. The manager and cashiers agreed to cooperate by refraining from prompting participants. Prior to each purchase, the first author reminded the cashier to avoid prompting by showing a printed sign on the back of a clipboard with the words no help please. Also, the sign reminded the cashier to ask paper-or-plastic question and do not tell the shopper to take change. If a cashier prompted a participant, the observer noted it on the data sheet and the response was scored correct.

Measures of Attention to Task during CBI
On 30% of the CBI sessions, an observer collected data to assess percent of observations during which the individual participant was attentive to the CBI task. These data were collected to confirm that a participant was attentive to CBI so changes in performance could be attributable to the computer program and not other variables. During the last 15 min of the selected session, an observer collected momentary time sampling data at fixed 1-min intervals on whether the participant was attentive to CBI. Attention to task was defined as eye contact with the computer screen, hand placed on computer mouse, earphones placed on ears and absence of conversation with peers. Observations of on-task performance were divided by 15 total observations times 100 to produce a percentage of observations with attention to task.

Generalization Probes: Different Grocery Stores
Following the completion of four to eight grocery store probes, individual participants were taken to three different stores scheduled about three school days apart. Identical probe procedures were followed in the new stores. However, differences existed in physical environments and checkout routines in these stores compared to Albertson’s. For example, Ream’s used a linear conveyor belt rather than the circular one at Albertson’s. Additionally, Ream’s did not have coin dispensers; instead, the cashier handed change and a receipt to a customer. Although coin change and receipts were hand delivered, participants were still scored on whether they extended a hand to take change and receipt. Smith’s checkout stands used linear conveyors and included a coin dispenser. Harmon’s configured a checkout stand with no conveyor, divider, or coin dispenser. The customer pulled
the cart up to the cashier who removed groceries from the cart one at a time. Coin change was handed to the customer. With no conveyor at this store, one step was removed from the task analysis producing four steps to complete the task, each worth 25%.

**30-day Follow-up Assessment**

Maintenance of purchasing skills was assessed 30 days following completion of the Different Grocery Stores generalization probe. For each participant, follow-up data were collected in one CBI performance mastery assessment and one grocery probe at Albertsons.

**Skill Ratings by Parents and Participants**

Prior to the study, parents were asked to rate their child’s purchasing skills using a five-point Likert scale. Following the study, parents again rated performance on the same scale. Additionally, participants were asked to rate their performance prior to and following the study.

**Procedure**

CBI consisted of instructional activities on DVD and CD-ROM. Participants were individually and sequentially introduced to CBI. The first author remained with each participant to answer questions or assist with computer issues, but did not deliver instruction. However, in some sessions, the first author provided technical aid in use of software and watched for technical errors, such as clicking the mouse in the wrong place to view videos or teaching the participant to navigate the software.

**DVD videos.** Three DVD videos were shown to individual participants in one 30-min. session per week in a computer lab. Individual participants viewed the DVD videos showing correct and incorrect ways to shop and purchase groceries. The DVD narrator described correct and incorrect performance of the actors in each video.

**CD-ROM instruction.** CD-ROM instruction took place in the computer lab four to five days a week in 30-min sessions. The software consisted of several pages, or screens. The participant navigated from one page to the next using a button near the bottom of each screen. As the participant entered a page, the narrator verbally explained the skill to be learned. The narrator provided affirmative or corrective feedback regarding the participant’s performance. The narrator, whose script was open captioned, cued the participant to click on training videos, and then asked the participant to click on a practice button to play an interactive learning game. The CD-ROM first presented five video clips on how to identify a short checkout line using the decision rules described above. An activity provided the participant with three pictures of checkout stands, and required the participant to manipulate the mouse to move a picture of a shopping cart to the shortest checkout line. Second, the CD-ROM presented four video clips demonstrating the proper time to place the groceries on the conveyor and how to place a divider between the participant’s groceries and those of preceding customers. Third, the CD-ROM demonstrated the response to the paper-or-plastic question by verbalizing one alternative. The participant did not practice this step. Fourth, the CD-ROM provided instruction on how to pay for groceries using Dollar Plus and how take change and a receipt. A practice activity provided participants opportunities to pay for the groceries by clicking on a set of dollar bills. A computer voice counted each dollar as it was clicked. When the participant ascertained the correct amount, he clicked on an icon indicating his decision to purchase. If correct, the narrator voice stated “good job.” If incorrect, the narrator provided corrective feedback by verbally counting the correct amount (along with a visual cue showing each dollar bill being counted). The software contained 36 videos displaying four different cashiers asking for varied amounts of money ranging from $1.03 to $9.93. The software randomly chose a video for each session. Fifth, the computer demonstrated a coin dispenser providing change. The participant did not practice this step.

**Experimental Design**

A multiple baseline design across three participants (Kennedy, 2005) was used to evaluate the effects of CBI. To safeguard the assumption of independence of subject data associ-
ated with multiple baseline designs (Tawney & Gast, 1984), all sessions (CBI, computer performance mastery assessments, grocery probes, and maintenance probes) were conducted with individual participants. Measures of percent correct in the five-step task analysis were collected in grocery store probes across baseline and treatment, different grocery store probes and 30-day follow-up. Measures in computer performance mastery assessment and participant attentiveness were collected during treatment. Parent and participant ratings of purchasing skills were collected before and after treatment.

Inter-Observer Agreement

In grocery probes, the first author served as primary observer standing 1 m in front of the participant at the end of the checkout stand. In 30% of probes, a second observer stood 1 m behind the participant in the checkout line. Prior to the study, primary and secondary observers scored performance of consumers at the same Albertson’s grocery store. Agreement was calculated using the point-by-point method (Kennedy, 2005), in which the number of agreements is divided by agreements plus disagreements times 100%. An agreement was defined as the two observers recording the same response for a step in the task analysis. The observers used the software and response definitions as a reference while scoring consumers. Inter-observer training continued until observers achieved 100% agreement for each step in the task analysis for two consecutive sessions (across a total of eight customers).

Inter-Observer Agreement Results

Of the 15 grocery store probes, inter-observer data were collected five times (i.e., Sessions 2, 3, 6, 9, and 13). For five data collection sessions, there were 75 possible agreements or disagreements (i.e., three participants times five sessions times five steps in the task analysis). Four disagreements and 71 agreements were recorded, or 94.6% inter-observer agreement.

Results

Computer Performance Mastery Results

As shown in Figure 1, computer performance mastery assessment commenced in Session 4. Beginning at this point, three participants consistently scored between 60% - 100% in the computer performance mastery assessment. Mr. Red and Mr. Green performed at the 100% level in every session. Mr. Blue’s performance varied between 60% - 100% from Sessions 6 to 8, but maintained at 100% from Sessions 9 - 15.

Grocery Probe Results

Probes during baseline. As shown in Figure 1, Mr. Red performed at the 60% level in three baseline sessions. However, his performance was inconsistent in terms of particular steps he performed correctly. For example, in two of three sessions, he correctly placed the groceries on the conveyor correctly and paid using the Dollar Plus strategy. In one session, he did not correctly take change. He did not locate the shortest checkout line during baseline. In Session 1, he was prompted by the cashier to take coin change.

Mr. Blue scored at the 0% level in three of four sessions. In his first session, he was prompted by a cashier to take his change. This response was scored as correct but is noted in Figure 1. When paying for his groceries, he handed all of his money to the cashier to count. When asked the “paper or plastic” question, he hesitated then pointed to the plastic bag. The cashier asked him, “Do you mean plastic?” These behaviors were scored as incorrect because he did not make a verbal response.

Mr. Green scored at 20% correct in his first three sessions. He correctly responded to the “paper and plastic” question. However, he did not locate the shortest line and sometimes waited longer than 15 s to put his groceries on the conveyor. He placed the divider on the conveyor after, not before, his groceries, contrary to CBI instructions. He consistently paid the cashier one dollar short. Also, in each session, he walked away from his dispensed coin change. In Session 4, Mr. Green placed the groceries on the conveyor correctly. In
Figure 1. Grocery store and CBI performance mastery assessments in baseline, treatment, different grocery stores, and 30-day follow-up.
this session, both observers noted that he appeared to imitate actions of the customer in front of him.

Probes during CBI. Mr. Red was the first participant to receive probes of CBI effects in the grocery store. As shown in Figure 1, performance increased from baseline levels of 60% to 80% in Sessions 4 – 6. During Sessions 4 and 5, Mr. Red did not pay the correct Dollar Plus amount. During Session 6, he failed to place a divider before his groceries, but performed correctly on the Dollar Plus amount. In remaining probes, Mr. Red performed at 100% correct.

Mr. Blue’s performance increased from 60% to 100% in Sessions 6 - 9. In Sessions 6 and 7, Mr. Blue offered too few dollar bills and did not pick up his change. In Session 8, he paid the right amount but did not pick up change. In subsequent probes, he performed each step correctly.

Mr. Green participated in four generalization probes. His performance increased to 100% except for Session 9 when he provided too few dollar bills.

Different grocery stores. At the first store (Ream’s), Mr. Red and Mr. Green performed at 100% correct, but Mr. Blue provided too much money to the cashier for a score of 80%. At Smith’s and Harmon’s, all three participants performed at 100% correct.

30-day Follow-up Results

All participants scored 100% in both the computer performance mastery assessment and grocery store probe. The grocery probe was conducted at the original Albertson’s store.

Results of Attention to Task during CBI

For Mr. Red, attentiveness data were collected in 14 CBI sessions. In the first nine sessions, Mr. Red performed on task in 100% of observations. In the last five sessions, Mr. Red’s attentiveness decreased to a mean of 81% of observations (range = 76% - 90%). For Mr. Blue, attentiveness data were collected in 12 sessions and averaged 94% (range = 73 to 100%). For Mr. Green, attentiveness data were collected in seven sessions. He performed on task in 100% of observation the first five sessions then decreased to a mean of 83% in the last two sessions.

Skill Ratings by Parents and Participants

As shown in Table 1, mean ratings of both parents and participants regarding participant purchasing skills increased from pre-study to post-study. Participants rated their pre-study purchasing skills higher than parents, but post-study ratings were highest for both parents and participants.

Discussion

In summary, all participants significantly increased correct responses in grocery probes when CBI was introduced. Additional generalization measures in three different stores yielded 100% correct responses for all participants except in one session. All participants performed at 100% correct responses in 30-day maintenance probes. Generally, participants remained attentive to the CBI instruction throughout treatment and evidenced high levels of correct responses. Parents and participants rated purchasing skills higher after the study than before the study.

Although previous research (Ayers & Langone, 2002; Hutcherson et al., 2004) presented equivocal results regarding generalized effects of CBI, results of the present study show high levels of correct performance in grocery stores. This finding requires some explanation, given that stores included stimuli not present in CBI, such as shoppers, a variety of employees, and TV ads playing on television screens located at many checkout stands potentially making successful navigation through the task analysis more difficult. Additionally, the study was conducted during the end-of-calendar-year holiday season when shopper traffic was relatively high. Yet, CBI stimuli were apparently similar enough to those encountered in the initial probe store and three different stores to produce generalized responding.

Participant performance in the different stores is noteworthy in that purchasing responses generalized to each of three different grocery stores despite checkout stands of different configurations. This finding is somewhat surprising given the CBI did not present
different checkout configurations. The performance in the different grocery stores demonstrates not only stimulus generalization but the performance of different responses as well. Perhaps the participants learned to discriminate new stimuli in the original grocery store, such as actions of other shoppers or cashiers, as cues for new responses. When presented with new checkout configurations, participants may have relied on previous discriminations to influence their purchasing responses.

Participants in this study demonstrated more rapid skill acquisition on computer and grocery store generalization probes than Ayers et al. (2006) where researchers only examined the Dollar Plus component of purchasing sequence. Multiple factors may explain more rapid acquisition of the purchasing skills in this study as compared to Ayers et al. including age, previous shopping experiences of the participants, teaching methods, and maturity. First, participants of the Ayers et al. study were middle school students with significant intellectual disabilities and a mean age of 14 years. Participants in this study had a mean age of 17 years. Participants in both studies had similar IQ and adaptive behavior standard scores. Participants in this research may have had more experience in both CBI and community shopping environments. Second, participants in this study had past exposure to the Dollar Plus concept with role play and direct instruction in a classroom setting in previous school years. However, baseline data in this study indicate skills had not generalized prior to CBI. Addi-

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Mean Rating Scale Scores of Parents and Participants on Purchasing Skills.</th>
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<tbody>
<tr>
<td><strong>Mr. Red</strong></td>
<td></td>
</tr>
<tr>
<td>1 = no ability</td>
<td>5 = very capable</td>
</tr>
<tr>
<td>Selection of shortest line.</td>
<td>3</td>
</tr>
<tr>
<td>Placement of three items.</td>
<td>3</td>
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<tr>
<td>Payment of correct amount.</td>
<td>2</td>
</tr>
<tr>
<td>“Paper or plastic?”</td>
<td>3</td>
</tr>
<tr>
<td>Collection of change, receipt, and groceries.</td>
<td>3</td>
</tr>
<tr>
<td>Mean</td>
<td>2.8</td>
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<tr>
<td><strong>Mr. Blue</strong></td>
<td></td>
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<tr>
<td>1 = no ability</td>
<td>5 = very capable</td>
</tr>
<tr>
<td>Selection of shortest line.</td>
<td>5</td>
</tr>
<tr>
<td>Placement of three items.</td>
<td>4</td>
</tr>
<tr>
<td>Payment of correct amount.</td>
<td>5</td>
</tr>
<tr>
<td>“Paper or plastic?”</td>
<td>4</td>
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<tr>
<td>Collection of change, receipt, and groceries.</td>
<td>4</td>
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<tr>
<td>Mean</td>
<td>4.4</td>
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<td><strong>Mr. Green</strong></td>
<td></td>
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<tr>
<td>1 = no ability</td>
<td>5 = very capable</td>
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<tr>
<td>Selection of shortest line.</td>
<td>3</td>
</tr>
<tr>
<td>Placement of three items.</td>
<td>4</td>
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<td>Payment of correct amount.</td>
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<tr>
<td>‘Paper or plastic?’</td>
<td>4</td>
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<tr>
<td>Collection of change, receipt, and groceries.</td>
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</tr>
<tr>
<td>Mean</td>
<td>3.8</td>
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</table>
tionally, participants of this study may have had more exposure to various kinds of computer teaching software and easily adapted to this interactive software. These factors may have influenced a quicker and more complete acquisition of Dollar Plus purchasing skills.

Third, teaching methods were different in two ways: the sequence of purchasing steps versus individual responses and grocery store probes versus simulations. This study focused on the entire purchasing sequence, rather than single responses in the Ayers et al. study. While the current purchasing sequence was more complex, it may have helped the participant discriminate the relevance and functionality of the five steps. That is, successful completion of one step may have established the stimuli for the next step in sequence, whereas training on individual steps (Ayers et al.) may have isolated stimuli and limited learning of a successive set of responses. Fourth, unlike Ayers et al., this study used DVD video instruction. The DVD videos presented shopping trips from beginning to end, potentially facilitating acquisition of shopping skills. Fifth, high-school age participants in this study compared to middle school students in the Ayers et al. may have had increased motivation to learn purchasing skills, either because of increased maturity, parents' expectations, or motivations to perform skills similar to non-disabled peers.

All participants and parents rated purchasing performance higher in posttest compared to pretest. Anecdotal reports from parents after the study indicated they were pleased with the newly acquired skills. Mr. Red’s mother stated that she now trusts her son to go to the store, purchase a few items, and bring back the correct amount of change. Mr. Green’s mother commented, “This opens a much wider world for my son.”

Limitations of Research

Four limitations are discussed in regards to this research. First, computer performance mastery assessments were not conducted in the baseline phase of this study, but instead, commenced only in the treatment phase. This discontinuity makes it impossible to evaluate directly the functional relationship between the assessment and the CBI treatment effect.

However, the grocery store probes do provide a consistent measure of checkout skills from baseline throughout treatment and offer evidence of generalization effects only when CBI commenced. Future research should use consistent measures across phases. Second, the first author and, in some cases, a second observer were present each time a participant made a purchase. This study provides no evidence of whether generalization may occur to situations in which no familiar person is present. More research is needed, perhaps using video, to assess generalization. Third, all purchases were less than $10.00. Students were given 10 one-dollar bills and asked to pay using Dollar Plus procedures. However, the Project Shop CBI program teaches using amounts up to 25 one-dollar bills. This study provides no evidence of whether generalization would occur if purchase amounts were greater than $10.00. More research is needed to investigate the generalization effects with varying amounts of money. Finally, on a related note, there were no variations in numbers of items purchased. In all cases, participants placed and paid for three items. This study provides no evidence of whether generalization would occur to more extensive purchases. More research is needed to examine the effects of CBI on purchasing differing quantity of items.

Implications for Practice

This study adds to the extant research literature suggesting CBI is an effective tool in teaching purchasing skills to individuals with disabilities. Moreover, results indicate skills generalized to multiple community settings and maintained over time, thus providing educators with early evidence that, under prescribed circumstances, youth with intellectual disabilities may be able to learn community skills using CBI. While additional research must be conducted, such a finding would have important impact on practices in secondary school settings needing cost efficient teaching materials. If a computer or website could be accessed when community field trips could only be used sparingly, then educators might find the right combination to teach generalized skills. Although the Project Shop CBI program is not commercially available, similar
programs might be constructed for a variety of community skills. However, as recommended by Morse et al. (1996), any such development must be carefully designed to include relevant community stimuli with multiple exemplars to promote generalization.

References


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