Abstract: The purpose of the study was to evaluate use of multi-media instruction to teach students with intellectual disabilities to locate grocery items by reading words on aisle signs that are associated with the target item word. A multiple probe design across three sets of word pairs, replicated across 3 students with mild to moderate intellectual disabilities was used to evaluate the effectiveness of the program. Instruction was conducted using a simulated multi-media program with text, photographs, and video recordings depicting the target grocery items and the associated word on an aisle sign. All generalization probes, including generalizing to a novel grocery store not depicted in the computer-based program, were assessed in community grocery stores. Results indicate that the multi-media program was effective in teaching generalized reading of the associated word pairs and location of the grocery items in the store. Recommendations for enhancing the program are discussed.

The field of special education has both recognized and reported the importance and functionality of grocery shopping skills for persons with intellectual disabilities (Morse, Schuster, & Sandknop, 1996). Purchasing in grocery stores requires a complex set of chained steps and multiple tasks including: a) knowing which item to purchase; b) navigation of the store; c) locating the item in the aisles; d) reading prices; and e) paying for items. Additionally, the complexity of the task is further compounded by the variability of stimulus conditions across stores (McDonnell & Laughlin, 1989). Item location, aisle design, department layouts, and item brand names may vary across different stores and even within the same chain of stores. The increasing number of stores available to shoppers and the expanding size of “super stores” also perpetuate the complex task of shopping for persons with disabilities.

Although the complexity of the task has been acknowledged, issues addressing these instructional concerns have not fully been evaluated. Available research and practice have primarily focused on the identification of items to be purchased, relying on the use of adaptive shopping lists comprised of photographs, pictures, or labels from target items (Aeschleman & Schladenhauffen, 1984; Bates, Cuvo, Miner, & Korabek, 2001; Horner, Albin, & Ralph, 1986; Morse & Schuster, 2000; Morse et al., 1996; Sandknop, Schuster, Wolery, & Cross, 1992). In addition to knowing which item to purchase, shoppers with disabilities face the difficult task of identifying in which aisle items are located. The majority of the studies to date have relied on three basic strategies for locating items in the actual store. The most commonly used strategy limits the number of items purchased (1-5) in order for students to memorize item location through repeated practice in the store (Alcantara, 1994; Haring, Breen, Weiner, Kennedy, & Bednersh, 1995; McDonnell & Laughlin, 1989; Morse & Schuster, 2000; Wissick, Lloyd, & Kinzie, 1992). Although shown to be effective, this method limits the number and variety of foods that can be purchased. Two additional strategies include: teaching a student to walk down each aisle in sequence until the item is located (Wheeler, Ford, Nietupski,
Loomis, & Brown, 1980); taking the student to the middle of the store and instructing them to "find ___" (a word on an aisle sign) (Kyhl, Alper, & Sinclair, 1999) or taking the student to the correct aisle and instructing them to find the next item on the list (Lalli & Browder, 1993). With these shopping approaches the amount of time to locate an item, preparation of lists, and need for adult support can negatively effect the efficiency of and the independence allowed by the strategy.

Another strategy, reading words on aisle signs (Kyhl et al., 1999) or reading words on both lists and aisle signs (Mechling, Gast, & Langone, 2002; Wheeler et al., 1980) has been shown to be effective although receiving limited investigation. A number of studies have been conducted, however, which support the ability of students with moderate intellectual disabilities to read functional sight words (Browder & Lalli, 1991; Browder & Xin, 1998; Conners, 1992; Singleton, Schuster, Morse, & Collins, 1999) and applying their use within community contexts (Cuvo & Klatt, 1992; Lalli & Browder, 1993; Schloss, Alper, Young, Arnold-Reid, Aylward, & Dudenhoefler, 1995). Traditionally such sight word instruction has been conducted through the use of flash cards, although in recent years a limited number of studies have begun to examine the use of multi-media techniques for teaching sight words for use in community settings (Kyhl et al.; Mechling, et al.).

Use of multi media, computer-based, and video-based instruction is becoming more widely recognized as a means for authentically simulating environments where skills must be applied (Langone, Shade, Clees, & Day, 1999; Morse et al., 1996; Wissick, Gardner, & Langone, 1999; Wissick et al., 1992) and when community-based instruction is limited due to a lack of resources. Resource issues such as funding, scheduling, and time constraints limit many students’ visits to the community to one or two hours of instruction per week. In addition, the issue of increasing placements of students in inclusive settings (where peers without disabilities do not receive instruction in the community) is receiving increased attention.

The purpose of this study was to assess the use of multi-media instruction as a means for providing instruction in a simulated environment to teach students to locate grocery items by reading words on aisle signs that are associated with items on their grocery list. Although results of the Mechling et al. (2002) study demonstrated that students could read and use aisle signs in actual grocery stores and learn to do so solely in a simulated environment, the words included on the grocery lists were limited to words found only on aisle signs. The current investigation expands this research by including words on a nine item list, which were not presented on the actual grocery aisle signs. Rather, students were taught through an interactive, simulated environment to associate a word on their list with a target word on the aisle sign where the item was located.

Research has shown that students with moderate disabilities can learn conditional discriminations within stimulus classes comprised of nonidentical stimuli (Kennedy, Itkonen, & Lindquist, 1994; McIlvane, Dube, Kledaras, Iennaco, & Stoddard, 1990). These stimulus classes included stimuli without physical similarities but with common relationships such as those between the spoken word and printed words (Green, Mackay, McIlvane, Saunders, & Soraci, 1990) and the classification of foods into food groups. Classification is supported in the research through the use of shopping lists in which items are categorized by grocery store departments/zones, aisles, or food groups. Such lists have used color coding of departments (dairy, frozen foods) and the associated items (milk, frozen pizza) on the list (Sarber, Halasz, Messmer, Bickett, & Lutzker, 1983; Wilson, Cuvo, & Davis, 1986), words written under labels for aisle headings (Wheeler et al., 1980), or relied on pre-arrangement of the list by the instructor. With such a list, the instructor categorized all items, by department, on the grocery list and students “marked” the items to be purchased (Sarber & Cuvo, 1983). The current investigation is the only study to date which required students to locate grocery items based on the conditional discrimination of unlike words (i.e., matching the word “chocolate chips” on the grocery list to the word “cake mix” on the aisle sign), which were not pre-arranged on a list by categories.
The primary research question addressed was: Would multi-media instruction result in students generalizing the association of grocery aisle sign words with words on their list in order to locate items in vivo?

Method

Participants

Three students (2 males and 1 female), ages 12-18 years, with mild to moderate intellectual disabilities, were participants in the study. Selection of students was based on: age; Individualized Educational Program (IEP) objectives for purchasing skills; intellectual disability; and entry level skills. Screening occurred through parent and teacher interviews, review of IEPs and psychological evaluations for the following pre-requisite skills: (a) visual ability to recognize grocery items; (b) ability to make selections on the computer screen using a computer mouse or touch screen; (c) verbal (or motor) imitation for reading (or signing) words on lists and aisle signs; and (d) attention to task for 15 minutes (estimated time to complete the multi-media program). Students were also screened for their: knowledge of verbal labels for the nine grocery items; ability to read the nine words on the grocery list; and ability to read nine associated words on the aisle marker signs. All three students were unable to read some of the target words and, therefore were taught these words prior to the start of the study.

Each student had experience with constant time delay and computer-based instruction. Students were able to read some sight words and two of the students (Carol and Martin) were also participants in the previously conducted grocery shopping study by Mechling et al. (2002). Daryl had some experience shopping in a grocery store, but had not received any systematic instruction in reading grocery related words or locating items in the store. Student characteristics are shown in Table 1.

The nine target words were presented to parents of the participants prior to the study to determine the relevance of the words. Families indicated that all nine items were products frequently purchased and/or consumed by the students and their families. Computers, television, videos, CDs, and DVDs were identified through student interviews as reinforcing activities for each participant.

Experimental Design

A multiple probe design across three sets of associated word pairs and replicated across three students (Tawney & Gast, 1984) was used to evaluate the effectiveness of the multi-media program to teach grocery word associations and location of target items in generalized grocery stores. Nine grocery word pairs (three sets of three words) were taught to each of three students, in an individual format, using the constant time delay (CTD) procedure and the multi-media based program.

Prior to instruction, probe measures were implemented for each set of words for a student for three sessions at the Kroger grocery store. Following probe measures, instruction on the first set of three words with the multi-media program was implemented. When criterion (100% independent correct) was reached for a student, generalization probe measures at the grocery store were collected on all three sets of words followed by instruction for the second set of words. This format of generalization probes followed by training, continued until all three sets of words reached criterion using the multi-media program.

Settings and Instructional Arrangements

All instruction occurred through the multi-media program two to three days per week at the private office of the primary investigator. The referent grocery store (Kroger) was located 5 miles from the office and was video recorded and photographed to use for simulated instruction and to measure generalization of skills from multi-media instruction to the actual store. A novel grocery store (Publix) was used only for generalization measures. Both stores were selected based on parent interviews concerning frequency of use and the approval of corporate management for store participation.

During individualized instruction, the laptop computer was placed on a table with the student sitting directly in front of the screen. The instructor sat beside the student and the
<table>
<thead>
<tr>
<th>Student</th>
<th>Age</th>
<th>Diagnosis</th>
<th>IQ</th>
<th>Demonstrated Strengths</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carol</td>
<td>16 years 9 months</td>
<td>Mild Intellectual Disability, Cerebral Palsy</td>
<td>WISC–III 1999 60</td>
<td>Independent Self Care skills including: tying double knots in shoes; manipulating fasteners, reading sight words, reading and writing simple phonetic patterns, adding with re-grouping, subtracting with re-grouping, telling time on 1 min intervals, counting coin combinations and paper currency combinations, writing simple 2–5 letter words, speaking in complete sentences, cooking simple snacks, social skills</td>
<td>Emotional difficulties including: easily frightened, insecurity, low self confidence, excessive helping, excessive verbalizations concerning past events</td>
</tr>
<tr>
<td>Daryl</td>
<td>18 years 7 months</td>
<td>Moderate Intellectual Disability</td>
<td>Stanford-Binet Intelligence Scale Fourth Edition 1998 47</td>
<td>Independent Self Care skills including tying shoes and manipulating fasteners (assistance with shaving), reading 75 sight words, telling time on 5 min intervals, completing simple addition sums, counting coin and paper currency, writing high frequency words, completing simple vocational tasks</td>
<td>Refusal to speak or to speak with an audible volume, refusal to comply to adult directions, excessive helping of others, insecurities (withdrawal) in new situations</td>
</tr>
<tr>
<td>Martin</td>
<td>11 years 8 months</td>
<td>Mild Intellectual Disability, Autism</td>
<td>Stanford-Binet Intelligence Scale Fourth Edition 2000 62</td>
<td>Independent Self Care skills including tying double knots in shoes and bathing, reading sight words, phonetic decoding of words, spelling high frequency words, composition of stories (1–3 paragraphs), adding and subtracting with re-grouping, multiplication facts, telling time on 1 min intervals, counting coin and paper currency combinations, riding a bicycle, computer skills, telling simple jokes</td>
<td>Difficulty with auditory processing and receptive language, easily distracted by current and past events and verbal repetition of ideas, obsession with collecting items, obsession with placing items in horizontal rows, agitated by change in routines, stereotypic behaviors such as hand flapping and crossing eyes</td>
</tr>
</tbody>
</table>
camcorder was positioned behind, to the side or in front of the computer. Generalization sessions in the referent grocery store were also conducted individually with each student. The primary investigator followed approximately 2 ft behind the student, and the reliability data collector (with the camcorder) followed approximately 8 ft behind the primary investigator. Procedures used during the study were similar to those used by Mechling et al. (2002).

Dependent Measures

For generalization conditions in the stores, a list of all nine grocery words was used. Words were typed in the sequence in which they appeared in the aisles of the store. Order of the items on the generalization store and novel store lists varied due to differences in the store layout. Lists were held on a clip board placed in the shopping cart. Students’ performance of locating the nine items on their list of target words was reported as percent correct.

Generalization probe procedures. Evaluation of the novel grocery store (Publix) was conducted through pre and post testing, to assess generalization of skills to the natural setting. Illustration of this store was not included in any of the multi-media programs. Each student was assessed one time with the list of nine words during pretest and posttest measures. Each session began with the student entering the store, placing the clip board with the grocery list in the cart and receiving the attentional cue; “Find the things on your list.” The instructor waited 5s for the student to respond by looking at the first item on the list.

For each of the nine items on the list, students were evaluated on the following chain of steps: (a) locate the first item on the grocery list; (b) locate the associated word on the corresponding aisle sign; (c) walk down the aisle; (d) locate the item on the shelf; (e) place the item in the shopping cart; (f) cross off the item on the list; (g) return to the beginning of the aisle; and (h) locate the next item on the list and repeat the steps. Critical steps were: (a) entering correct aisles; and (b) removing correct items from the shelves within the aisles. Size, number, and brand names were not considered to be critical to the study.

Students could perform each step correctly, incorrectly, or not respond. Incorrect responses on the two critical steps were identified as: failing to enter a correct aisle; entering a correct aisle, but failing to locate the correct item on the shelf within 25s. No responses were defined as: failure to initiate the next step within 5s of the previous step completion. The instructor physically guided the student to the next aisle and said, “Keep looking” (if the student entered an incorrect aisle); physically guided the student to the next aisle if the student exited an aisle to the right); physically guided the student back to the aisle, crossed the item off of the list and said, “What’s next?” if the student passed a target aisle or if an error occurred in a target aisle. This strategy was in keeping with the multiple opportunity testing procedure to insure an accurate evaluation of a student’s performance level.

Students received verbal praise for general participation and attempts to locate items. At the completion of the task, Daryl purchased a soda at the store and Martin purchased a “collectible” item. Carol chose a CD to play while traveling in the car back to the office. Students were not corrected if they put an incorrect item into the cart if the item was selected within an aisle. Students were not permitted to put incorrect or correct items into the cart from displays presented at peripheral aisles. At the completion of the task, the instructor, or reliability data collector, re-shelved items from the cart while the student’s view was blocked.

Following pre-test sessions, probe sessions (identical to those conducted in the Publix store) were delivered in the referent Kroger grocery store prior to training with the multi-media program. The Kroger store was depicted in the multi-media program, whereas the Publix grocery store was not. Thus there were two levels of generalization assessed during the course of the investigation.

Instructional Materials and Procedures

Equipment. A Macintosh G3 Powerbook computer was used during training. Video record-
ings were made with a SONY, 12x SteadyShot, video Hi8, Handycam recorder, tripod and 8mm videotapes. Photographs were made with a SAMSUNG, Panorama, Slim Zoom 1150 auto focus camera and 35 mm film and scanned with a Hewlett Packard, ScanJet 5p scanner. Video recordings were compressed using an Apple Video Player on the laptop computer. Photographic images and video clips were saved as separate files on a 1GB Iomega Jazz Drive. The Hyperstudio 3.1 (Roger Wagner, 1997) program was used to develop the individual lessons using the photographs, text, and video. Progression during each lesson was based on the student’s selections of correct words on the screen using the computer mouse.

Text. The primary materials used for instruction were text, photographs and video recordings. Nine pairs of overhead, grocery aisle sign words and grocery list words of items to be purchased were evaluated. Words were on the list, which did not appear on aisle signs, and pairs were chosen for words whose corresponding grocery items had differing physical features. For example, words such as pretzels on the list and potato chips on the aisle sign were not included due to the physical similarities of the items. The associated word pairs were taught in groups of three to each student. Pairs of words used in the study are presented in Table 2. Using the Hyperstudio 3.1 program, a frame would appear on the computer screen with four aisle sign words in a horizontal row. The grocery list word was centered beneath the row. Selection of the associated aisle word (using the computer mouse) would advance the program to the next frame (Figure 1).

TABLE 2
Word Association Pairs

<table>
<thead>
<tr>
<th>Set 1</th>
<th>Set 2</th>
<th>Set 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aisle Sign</td>
<td>Grocery List</td>
<td>Aisle Sign</td>
</tr>
<tr>
<td>stuffing</td>
<td>parmesan cheese</td>
<td>mayonnaise</td>
</tr>
<tr>
<td>foil/wraps</td>
<td>sandwich bags</td>
<td>frozen desserts</td>
</tr>
<tr>
<td>canned meats</td>
<td>lunchables</td>
<td>coffee</td>
</tr>
</tbody>
</table>

Photographs. In the training condition, still photographs of aisle signs were photographed from the store, scanned, and saved onto computer files. Following correct selection of the word in text format, a frame appeared with the aisle sign. Students made a direct selection of associated aisle word from the photograph of the sign (Figure 2).

Video recordings. During the computer-based training program, video recordings presented the two items together that corresponded to the pair of words. A video segment was shown in this manner when a correct aisle word was selected from the photograph of the aisle sign. In addition, positive auditory feedback was provided such as, “Yes, cooking spray is with the oil and shortening in the grocery store” along with a video caption of the two items together followed by footage showing functional use of the grocery list item (cooking spray being applied to a pan).

The text, still photographs, and video recordings were presented as follows during multimedia instruction: a text screen of four aisle sign words and the associated grocery word appeared; student selected correct aisle sign word using the computer mouse; program advanced to next card of a photograph of a grocery aisle sign on the screen; selection of the correct word on the aisle sign prompted the computer to show a video segment of the two items (e.g., coffee and pudding) being placed next to each other with auditory feedback (e.g., “Yes, in the grocery store, pudding is in the aisle with the coffee”); and a video caption provided reinforcing footage of the item being used (e.g., someone mixing pudding).
Multi-Media Instruction

Following generalization pretest measures at Publix and the first probe condition at Kroger, instruction was initiated using the multi-media program. The grocery item words were typed on a list and secured to a clip board. During training of Set 1 the list contained three items and during training of Sets 2 and 3 the list contained six and nine items, increasing the difficulty level of the number of words per list and facilitating maintenance of previously learned words. After turning on the computer program the instructor gave the attentional cue, “Find the things on your list.” The task was presented in a total task sequence using a 3s CTD procedure. Objectives were: (a) locate the first item on the grocery list; (b) select the associated aisle sign word on the text screen computer display (Figure 1); (c) select the associated aisle sign word on the photograph.

![Figure 1. Hyperstudio frame with text.](image1)

![Figure 2. Hyperstudio frame with aisle sign.](image2)
screen computer display (Figure 2); (d) cross off the item on the list; (d) repeat the steps with the next item.

At the text display of each aisle sign word, the instructor gave the task direction, “What does____ (target item on the list) go with?” During the first three sessions of a 0s delay, the instructor immediately pointed to the correct word. During subsequent sessions, the instructor provided a 3s delay with pointing as the controlling prompt. Student responses included: (a) unprompted correct, selecting the correct word before the instructor pointed; (b) prompted correct, selecting the correct word within 3s after the instructor pointed; (c) unprompted error, selecting the incorrect word before the instructor pointed; (d) prompted error, selecting the incorrect word within 3s after the instructor pointed; and (e) no response, student did not respond after the instructor pointed to the correct word.

Correct selection of the word was followed by advancement of the program to the next screen. The next screen contained a photograph of the aisle sign and students were instructed in the identical format described for selection of words on the text screen. Correct selection of the word advanced the program to a 10s viewing of a video caption showing the grocery list item and the aisle sign item together followed by 12-15s footage of functional use of the grocery item.

Trials were intermixed for teaching three items in each set with five trials presented for each item. After criterion (100% unprompted corrects on three consecutive sessions) was reached on a word set, generalization probe measures were delivered at the Kroger grocery store. Instruction began on the next set of words following the generalization measures. Previously learned words were interspersed through review trials of words from mastered sets within training trials of new sets. Each student’s progression to a new set of words was independent of the other two students’ performances.

Reliability

Interobserver and procedural reliability data were collected during 33% of all probe and multi-media sessions (at least one time per condition). Video recordings were made during each of these sessions for evaluation by the reliability observers. Each observer had previous experience with viewing video recordings and collecting data for similar target responses. Student performance on critical steps was recorded on the data forms used by the instructor. Interobserver reliability estimates were reported using the point-by-point method by dividing the number of instructor and observer agreements by the number of agreements plus disagreements and multiplying by 100 (Alberto & Troutman, 1999). Procedural reliability measured the following instructor behaviors: presenting attentional cues; obtaining attentional responses; presenting task directions; delivering prompts for each trial (multi-media training only); waiting 3s for delivery of prompts using the multi-media program; waiting 25s for students to locate items in aisles; responding to student errors; and providing reinforcement. Procedural reliability agreement was determined by dividing the number of observed instructor behaviors by the number of opportunities to emit the behavior, multiplied by 100 (Billingsley, White, & Munson, 1980).

Results

Reliability

Data for evaluating interobserver agreement on student performance of critical steps and procedural reliability were collected simultaneously (through video recordings) during 33% of all sessions. For the multi-media program the mean reliability data for the dependent measure (selecting the correct word on the screen using the computer mouse) was 100%. During the generalization probe sessions, mean interobserver agreement on the two critical steps (enter the correct aisle and placing the correct item in the shopping cart) was 100%.

During generalization probe sessions in the Publix and Kroger stores, mean procedural reliability was 96.9% (range = 92.6-100%) and during computer-based training it was 99.7% (range = 96.6-100%). Disagreements at the grocery store were attributed to waiting 25s before responding to the student. During the
general computer-based training program all procedural errors occurred with Carol (first participant) due to computer program errors, which were corrected prior to implementing the study with the other two students.

Generalization to Referent Grocery Store

Graphic displays for the percent of items each of the three students correctly located in the referent grocery store (Kroger) appear in Figures 3-5. Store generalization measures, immediately following multi-media instruction with Carol, show the following mean percentage of correct responses for each word: Set 1 - 88.9%; Set 2 - 44.4%; and Set 3 - 66.7%. Daryl demonstrated similar difficulty with generalization of Set 2 immediately following multi-media instruction. He was able to generalize 100% of the words in Set 1 and 88.9% of the words in Set 3 immediately following instruction, however, his measurement for the mean percentage of correct responses per word in Set 2 was only 11%. Following instruction of Set 2 with the multi-media program, Daryl entered the correct aisles for each word in Set 2, but proceeded to select items from the associated aisle sign rather than the target word on the list. For example, he entered the correct aisle and put coffee (associated aisle sign word) into his shopping cart rather than the pudding, which was the word on the list. Carol also entered the correct aisle, but committed errors by selecting similar yet incorrect products other than relish and onion rings.

Martin demonstrated the greatest overall gains in generalization to the Kroger store immediately after instruction. His mean percentages per word were: Set 1 - 100%; Set 2 - 88.9%; and Set 3 - 66.7%.

During the final probe measure at Kroger, Carol associated words on her list with words on aisle signs and located items in Set 1 with 100% accuracy. For Sets 2 and 3 she demonstrated the ability to associate the words by entering the correct aisles for each of the items, but was unable to select all items in the aisle. She was never able to find relish (Set 2) or cooking spray (Set 3) in the grocery store. Similarly, Martin was able to associate and locate all words in Sets 1 and 2 in the final probe sessions, but was unable to locate the cooking spray in any of the generalization sessions although he entered the correct aisle. Daryl entered the correct aisle and located 100% of the items in Set 1 and 100% of the items in Set 3 on two of three final generalization sessions. Daryl did not generalize location of items in Set 2 until the final generalization session.

Generalization to Novel Grocery Store

Posttest measures showed a substantial increase in each student’s ability to associate the words on their list to those on the aisle signs and locate items. Pretest measures at the second store (Publix), which was not depicted in the multi-media instruction, indicated that Carol was unable to locate any of the nine items prior to instruction with the multi-media program. During post testing she was able to locate 100% of the items in Set 1 and 66.7% of the items in each of Sets 2 and 3. Daryl was also unable to locate any of the nine items in the Publix store during pre testing. Posttest results show that he located 100% of the items in Set 1 and 66.7% of the items in Sets 1 and 2. Martin was able to locate Kleenex (Set 3) during pretesting (using the search method previously described), but was unable to locate any of the items in Sets 1 and 2 prior to instruction. Following instruction he was successful in locating 100% of the items in Set 1 and 66.7% of the items in Sets 2 and 3. Errors were inconsistent across sets and students, however both Carol and Daryl were able to locate the relish in the novel store although they could not do so in the referent store.

Error Analysis

Measures of efficiency were calculated for the number and type of errors committed in the referent grocery store (Kroger). The most frequent error was the inability to locate an item after entering the correct aisle. All three students made incorrect selection of relish from Set 1. Each student selected an item (oil and vinegar) that was shelved next to the relish and in a container similar to the one depicted on the multi-media program (green plastic bottle). The second most frequently committed error was locating cooking spray. Students
entered the correct aisle, but made no selection within 25s. Similar to relish, Daryl and Carol failed to discriminate subtle differences in packaging between tator tots and french fries.

The CTD procedure has been reported as

Figure 3. Carol’s performance for locating grocery items.
both an effective and efficient means to teach chained tasks to individuals with disabilities (Schuster et al., 1998). In the current study, the measure of percentage of errors to criterion supports the use of the CTD procedure as an efficient means to teach students through multi-media instruction. The overall mean percentage of errors using the program was 1.5% with one student (Daryl) emitting 0% errors across all multi-media sessions.

Figure 4. Daryl’s performance for locating grocery items.
Discussion

Results of the study indicate that through simulated instruction with the multi-media program, all three students were able to match associated words on a grocery list with words on a grocery store aisle sign. During the initial probe condition at Kroger, the overall mean percentage of items correctly found across the three students was 8.6% whereas during the final probe condition it was 85.2%. Students

Figure 5. Martin’s performance for locating grocery items.
were further able to generalize the skills to one novel grocery store (Publix). Pretesting across the three students indicated a mean of 7.4% for items found correctly, whereas a mean of 77.8% correct was obtained during post testing.

While research has shown that students with disabilities can read aisle signs to locate items, not all items in the store are listed on the signs. The typical store may contain 8 to 10 words per aisle on the actual sign. As an extension of the Mechling et al. (2002) results, this study provided students with an expanded strategy for using reading and aisle signs for grocery shopping. Students were no longer limited to shopping for items whose names appeared on the aisle signs. After receiving instruction solely with the multi-media program, students were able to shop with an extended list by learning to associate words on a list with those on the aisle signs.

Whereas results show consistent improvement for all three students in the referent generalization setting, analysis of the errors in the store warrants further discussion. Some items learned through multi-media instruction were not generalized to community settings. This lack of generalization could be attributed to a lack of general case programming (Horner, Dunlap, & Koegel, 1988). Only one brand of each item in an associated pair was used during instruction and shown through the video captions. Therefore, when students were faced with a different brand of the same product (Ore Ida french fries and a green bottle of oil and vinegar) they were unable to make the discrimination. In addition to the lack of multiple examples used during instruction, students did not actively make a selection of the item during the multi-media program. Unlike the Mechling et al. (2002) study, students did not select from a multiple array of items represented by a simulated shelf on the computer screen. Instead they passively watched the pairing of items and then were required to make an active response (selection of an item) in the store. It is recommended that future studies include a step for direct selection of items on the computer screen.

Measures of comprehension were included by requiring students to select items in the grocery store in response to words; however, future studies may also be enhanced by including measures for symmetric associations (Kennedy et al., 1994) between word pairs. Students in the current study selected aisle sign words when presented with grocery list words, but were not evaluated on their ability to associate (select) the words in reverse (A to B, B to A).

Future research should further examine students’ abilities to use a range of methods (words from lists displayed on aisle signs and associated with words on signs) and to use a shopping list, which has not been pre-arranged in sequence, by location of items in the store. Further it has been recommended that more of the complete activity, such as grocery shopping, be taught together as part of a “skill cluster” or routine (selection of items, paying for items) rather than as an isolated skill (Morse & Schuster, 2000).

While this study and those by Langone et al. (1999) and Mechling et al. (2002) demonstrate that multi-media instruction alone can result in generalized responding to the natural environment, researchers have recommended that well designed simulations be used in combination with community-based instruction (Bates et al., 2001). Future research should continue to examine realistic simulations in combination with community-based instruction to teach functional skills to students with a range of abilities. Multi-media programs have been an effective avenue for delivering simulated instruction to persons with disabilities, yet “the use of video-based multimedia simulations remains an unexplored application of technology for this group” (Wissick et al., 1992, p. 233).

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