USING VIDEO MODELING DELIVERED THROUGH AN IPOD TOUCH TO TEACH PURCHASING SKILLS TO STUDENTS WITH SEVERE COGNITIVE DISABILITIES

by

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ABSTRACT

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by

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Utah State University, 2013

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The purpose of this study was to evaluate the effectiveness of video modeling other individual as a model (VMO) in the acquisition of purchasing skills. A multiple baseline across participants design was used with three high-school-aged students with significant cognitive disabilities who displayed a need for purchasing skills. The study used a video model with a peer as the model delivered through an *Apple iPod Touch* to teach a seven-step purchasing skill in a local grocery store. Each participant referred to the VMO and was expected to exhibit skills such as: (a) select shortest checkout lane, (b) put divider down and place items from the cart on the belt, (c) greet cashier, (d) pay cashier appropriate bill or combination of bills, (e) wait and take change and receipt from cashier, (f) thank cashier, and (g) take bag and carry belongings to the exit. Generalization probes were conducted in different grocery stores not involved in initial teaching. Results indicated VMO increased responding in all three participants from baseline for purchasing groceries in the VMO and generalization probes. All participants generalized the purchasing skills in other grocery stores; however, each participant required additional instruction via VMO or other prompting throughout the VMO and generalization probes. The results illustrate for educators and researchers that VMO represents a practical method for increasing skills in community settings.

(53 pages)

PUBLIC ABSTRACT

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Video modeling is a recent buzzword in the vocabulary of special educators and other professionals who work with individuals with disabilities. This type of modeling has proven effective in many studies specifically for individuals with autism. Recent studies show the effectiveness of acquiring skills through observing a video recording of a model (themselves or another person) performing the skill correctly. The technique used in this study is video modeling with another individual as the model (VMO). The researchers looked at the acquisition of purchasing skills based on viewing the video model in the grocery store. The VMO was presented using an *Apple iPod Touch* where the student could easily access the video and use headphones to hear the VMO while shopping in the grocery store.

This research involved three high school-aged participants with significant cognitive disabilities who displayed a need for purchasing skills within the grocery store. They were taught seven steps through the VMO in the grocery store. The skills were: (a) select shortest checkout lane, (b) put divider down and place items from the cart on the belt, (c) greet cashier, (d) pay cashier appropriate bill or combination of bills, (e) wait and take change and receipt from cashier, (f) thank cashier, and (g) take bag and carry

belongings to the exit. In order to check for generalization of the skill, the participant was taken to different local grocery stores not involved in initial teaching once they acquired mastery at the original grocery store.

Results indicated VMO increased responding for all three participants from the beginning of the study for purchasing groceries. All participants generalized the purchasing skills in other grocery stores; however, each participant required additional instruction via VMO or other prompting throughout the study.

The results illustrate for educators and researchers that VMO represents a practical method for increasing skills in community settings. This also illustrates the need for VMO to be paired with additional instruction and should not be used as the only mode to teach a skill.

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Sarah M. Stone

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INTRODUCTION

Video modeling (VM) is a training technique used to demonstrate skills that a student must imitate within the natural environment. VM may be effective for students with significant disabilities (i.e., severe intellectual disability, autism spectrum disorder) because it visually portrays all aspects of how to perform a skill (Morgan & Salzberg, 1992) within the natural environment. Particularly for students with significant disabilities, watching a video of a skill sequence foregoes the requirement of reading about how to do something or becoming dependent on a teacher's prompts. Research has shown that VM is effective (Gelbar, Anderson, McCarthy, & Buggey, 2012). These researchers examined different video modeling techniques (i.e., self, other individual, or point-of-view model) and found all to be effective in increasing skills. Although there were no differences across different techniques, their findings were clear that VM is an evidence-based practice worthy of additional research. Similar conclusions were drawn by researchers who conducted a meta-analysis of 41 VM studies (Mason, Ganz, Parker, Burke, & Camargo, 2012).

VM offers several advantages, including a realistic representation of the setting and an opportunity for the student to repeat the training by reviewing the video as many times as needed (Hammond, Whatley, Ayres, & Gast, 2010). As such, VM may represent a realistic and efficient way to depict functional skills in school and community environments. Rather than present a model of the target behavior independent of the environmental context, VM shows the model interacting with the environment and the function served by behaving in a certain way.

One necessary functional skill for individuals with significant disabilities is making purchases at the grocery store. For over 20 years researchers have studied the importance of teaching and improving shopping skills (Morse, Schuster, & Sandknop, 1996). There are multiple skills that are necessary to successfully complete a shopping trip: (a) creating a shopping list, (b) navigating the store to find the correct aisle, (c) locating the item within the aisle, (d) finding an open check stand, (e) placing items on belt, and (f) paying for items. This list does not begin to address the social aspect of shopping: greeting people in the store, asking for help when an item cannot be found, talking to the cashier, and thanking them for the help. Morse et al. (1996) claimed that teaching these skills is crucial for individuals with significant disabilities to have independence within their community. They suggest additional research to study further identification of the most effective and efficient procedures for teaching shopping skills.

Literature Review

The majority of research on VM has been conducted on one disability population: individuals with autism spectrum disorder. In my original search on *EBSCO-HOST-Education Full-Text* using the following Boolean string searches *video modeling* or *disabilities* or *vocational,* 155 articles were found only 55 of them dealt with populations other than autism spectrum disorder. Half of those 55 articles were not considered because they were not using populations of individuals with disabilities. I am interested in the effects of video modeling on multiple disability populations, thus two out of three articles reviewed below are focused on disabilities other than autism spectrum disorder.

Upon review of research investigating VM, I examined reference sections to identify additional research. I found 11 articles related to VM that were relevant to my topic from these reference sections. The three articles chosen for the following review included researching shopping skills in grocery stores or discussing the mode of video modeling I plan to design my research after, video modeling with other individuals as model. I did not review six of the eleven articles because the emphasis of those articles was different from the focus of my proposed research. The final article found was not chosen for review because of the age of the research; the articles chosen for this review are more updated than the 1996 article.

Mason et al. (2012) compiled a meta-analysis of single case studies concerning video modeling with other as a model (VMO). This video modeling technique is a practical and cost effective model to teach skills compared to other forms of modeling that require more time for editing. This study evaluated the evidence supporting VMO with individuals with disabilities. The research suggests participant characteristics and target outcomes affect the usefulness of this technique. VMO uses an adult or peer to act out a script representing the new skill. This is a less time consuming technique compared to the other two options; self model, which records the model engaging in the appropriate behavior, and point-of-view model, which is recorded from the perspective of the learner.

The research questions of Mason et al. (2012) were as follows:

- Do participant characteristics (age, gender, and diagnostic category) moderate the effectiveness of VMO?
- Do the implementation components moderate effects when participant diagnosis is considered?
- Does the targeted outcome moderate the magnitude of change that occurs with the implementation of VMO? (Mason et al., 2012, p. 1077)

> Authors selected 41 studies based on these eight criteria:
>
> (a) Implemented video based intervention using other-as-model as the independent variable; (b) published in English; (c) appeared in a peer-reviewed journal; (d) focused on communication, social, academic, behavior, or self-help skills as the dependent variable; (e) used a minimum of one participant with a disability; (f) used a single-case research design; (g) demonstrated experimental control through three or more phase changes; and (h) reported scores with time sequence data available. (Mason et al., 2012, p. 1078)

Across all studies, the selected participants either had autism spectrum disorder (84%) or another developmental disability (16%). Participants were from all four levels of schooling: preschool, elementary, secondary, and postsecondary. The implementation variable was based on three levels of VM: (a) VMO alone, (b) VMO with reinforcement, and (c) VMO as part of a package. The outcome variable was based on five levels, independent living skills (43%), socio-communication (33%), play (19%), adaptive behavior, and academic skills (2%). In the meta-analysis, the researchers analyzed the effects of VMO and provide additional information on the population that is impacted the most by VMO between autism spectrum disorder and developmental disability. Inter-rater agreement was evaluated by the first author and a doctoral student concerning which articles to select for analysis. If there were disagreements, a third rater was used. The reference sections of all the articles were examined to determine that all research that met the criteria was included.

The results were presented according to research questions within the article. First, regarding participant's characteristics, moderate to large effects across all levels of participant characteristics were found. Age and diagnosis moderate the potency of VMO, meaning that as participants get older and experience less disabling factors VMO becomes more effective. However, VMO was effective for all age groups. Second, results indicated that diagnosis influenced the effectiveness of VMO. The VMO procedure was only moderately effective with individuals with developmental disabilities. Third, results indicated VMO was generally more effective when combined with reinforcement. This would indicate that reinforcement was necessary to strengthen the effects of VMO. Overall, this technique was highly effective for individuals with autism spectrum disorder and moderately effective for individuals with developmental disabilities. Taking this into account, the small sample size of individuals with developmental disabilities needs to be considered as a factor when making conclusive statements.

Mason et al. (2012) provided a comprehensive review of video modeling applied in a variety of situations. What was not clear from their meta-analysis is the extent to which participants used video models presented via computer-based instruction (CBI), hand-held devices such as a camcorder, iPad or iPod, or other portable video devices. Without knowing the technology used, it becomes difficult to gauge: (a) a participant's interaction with the technology, (b) the stimulus characteristics of the motion video, and (c) other teaching or prompting necessary to ensure the target behavior occurs.

Multiple researchers studied the effects of CBI for teaching grocery shopping skills (Hansen & Morgan, 2008; Mechling, 2004; Mechling, Gast, & Langone, 2002). Hansen and Morgan (2008) studied the effects of multi-media CBI program on the grocery store purchasing skills of three high school students with intellectual disabilities.

The study took place in two settings: a high school computer lab and grocery stores near the participants' school. The CBI program used verbal explanations, pictures of the skill, and videos representing the grocery store setting to teach each of the target skills. The participant would watch the specific lesson in the computer lab while interacting via the use of the mouse. There was one observer present in the computer lab with a participant during the CBI sessions. In the grocery store probes the observers had timers and data sheets to mark performance during each trial. Responses were recorded in the CBI and grocery store probes based on a five-step purchasing system:

> (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. (Hansen & Morgan, 2008, p. 433)

As the participants responded within the allotted time limit data were collected on each of the five correct responses. The computer collected and stored the data from each participant's responses. In the grocery store probes, the participants were expected to respond correctly to the actual stimuli while the observer took data on responses. Inter-observer agreement was collected during 30% of sessions for each participant in the probes. Baseline data were collected at the grocery store probes to assess skill level before implementing CBI. An attention measure was taken during 30% of the CBI sessions to make sure changes in performance were due to the CBI and not other factors. Probes in different grocery stores assessed generalization but the same procedures were followed in the new stores. Researchers also scheduled a 30-day follow-up assessment.

All of the participants showed the need for the CBI in their respective baseline phases as none of the participants consistently completed more than one of the five steps without prompts. CBI performance and grocery store probes showed each participant's performance increased to 80%-100% performance at all the stores. Participants scored at 100% on the computer performance mastery assessment and grocery store probes after 30 days. All participants showed high levels of performance in the grocery stores even with added stimuli from shoppers and a variety of employees; each participant produced generalized responding. This study shows that CBI is an effective tool to teach grocery shopping skills. One suggestion for further research was the use of video to assess generalization.

To further validate the use of CBI programs to increase grocery shopping skills, Mechling (2004) studied the effectiveness of an interactive computer program, video captions, and still photographs to increase the shopping fluency of three students 13-19 years old, with mild to moderate intellectual disabilities. The focus of this study was to increase the fluency in which the students read aisle signs and located items without the use of an adaptive grocery list by using the CBI.

The sessions took place individually in each student's home 4-5 days per week one or two times a day. The student used a laptop computer to view the instruction. The instructor sat next to the student during all instruction and reliability data were collected through a camera about five feet behind the student.

The CBI program taught students to read the aisle signs starting with the back half of the store and then move to the front half of the store. Video was recorded onto CD-ROM disks and then played on the laptop for the instruction. Each program was individualized for a student. The models were recorded in POV modeling showing the grocery store and this sequence of steps:

> (a) Video caption navigating to Aisle 1 in the store (traveling left to right from the back of the store), (b) still photograph of Aisle 1 sign, (c) photograph of the shelf containing the first item, (d) photograph of the item placed correctly in the cart, (e) repeat view of the photograph of Aisle 1, and (f) video caption navigating to Aisle 2. (Mechling, 2004, p. 26)

When a student would select the appropriate aisle sign word that corresponded with words on their grocery list, the program would advance to the next card. Automatic timers were in place if an answer was not given in within 5s, the timers would prompt the slide to the next card after no response. When the correct item is selected from the shelf the program advances to the next screen showing the items in the shopping cart. Each work session lasted about 23 min. Students needed to get 100% unprompted correct responses for three consecutive sessions to reach criterion. A constant time delay procedure was used with a delay of 5s after each prompt.

The student selected 12 items for a shopping list; the most frequently bought items were put at the top of the list. Six of the items on the list were items directly from the store signs and six of the items were associated with names on the aisle signs. A multiple probe design was used across the three students to evaluate the effectiveness of CBI to teach the students to locate items on the grocery list.

Generalization probes were conducted at the local supermarket before CBI to assess a student's locating of 12 items. These probes were initiated with the teacher giving the cue, "Find the things on your list." Students were scored on the amount of time it took to complete the steps. Generalization trials were conducted after CBI instruction at the local supermarket as well. The instructor would follow about 2 feet behind the student and the reliability observer would follow 2-4 feet behind the instructor with a camcorder to record the student's actions in each aisle. An independent observer reviewed these videos. Inter-observer agreement data were collected 33% of all the probes and instruction sessions. Inter-observer agreement was 98.9% on CBI sessions across all participants and conditions and increased during generalization sessions to 99.7%.

The results of this study showed increases in each of the student's skills to find the items on their shopping list by reading the words on aisle signs. In the original generalization probes, the students found 50-90% of the items. After CBI in the final generalization trials the students located 100% of the items across all three sessions. The researchers concluded that CBI is an effective visual prompting strategy for increasing student's grocery shopping and reducing the amount of time taken.

This study only used one store in the generalization measures so we do not know what the student's responses would have been in other stores. This study continues to support the effectiveness of CBI video technology to teach skills that generalize into the community settings. Future research was suggested to have CBI simultaneously taught with instruction in the actual environment, i.e. taught in the grocery store. This could easily be done using iPod delivered video modeling technology.

Hansen and Morgan (2008) and Mechling (2004) used video modeling in the context of a CBI program, with the computer located in a classroom or home environment. Advances in technology could conceivably allow video models to be shown on smaller and more portable electronic devices such as iPods. The same set of purchasing skills could be taught today by showing the video model to learners in the actual learning environment, i.e., a supermarket.

VM has been shown effective in teaching a variety of functional skills in many environments (Ayres & Langone, 2005; Cihak, Fahrenkrog, Ayres, & Smith, 2010; Hammond et al., 2010; Mechling et al., 2002; Morgan & Salzberg, 1992). However, CBI as a mode of teaching skills requires the use of a computer typically located in school classrooms. Yet, given today's technology involving portable computer devices such as an iPod, classroom computers are no longer the only way to deliver the video instruction. Video files can be placed on iPods. Video models on portable iPods represent an efficient and potentially powerful tool for learning (Cihak et al., 2010). However, I found limited research conducted using the iPod to deliver VM in community environments. There is a need to conduct research on VM using iPod technology to teach functional skills, in this case grocery store purchasing skills, to students with disabilities. The purpose of the proposed study is to use an iPod Touch with a recorded video model, using other as a model, to teach grocery shopping skills. The research questions are as follows given three high school aged individuals are as follows:

- To what extent will iPod-delivered VMO have an effect on the acquisition of purchasing skills, as measured by percent correct on a task analysis checklist?
- To what extent will skills learned using the iPod-delivered VMO generalize across three different local grocery stores?

METHOD

Participants

Two males and one female with severe cognitive disabilities between the ages of 17-20 participated. All participants displayed expressive and receptive English language skills. Participant 1 was 18 years old with autism spectrum disorder. Parents had legal guardianship of Participant 1 because of the severity of her disability. Her IQ score was 36 and her Adaptive Behavior Assessment score was 75 with low average score (6) on functional academics and a low average score (5) on community use. She used an app on an *Apple iPad* to communicate her basic needs and conversations. Participant 1 displayed well-developed social skills but had limited access to the community because of extenuating family circumstances. Parents requested that she work on shopping skills in her IEP meeting with a commitment that they would send a shopping list each week. She could find items on her grocery list by asking for help with her device, but needed maximum prompting on the steps required to purchase the groceries.

Participant 2 was 17 years old with autism spectrum disorder. He had an IQ score of 33. He followed instructions with explicit directions. He used expressive English language but was more reserved socially; this was in part due to limited access to the community through his family. His father indicated the need for him to increase appropriate behavior when grocery shopping specifically; he needed to greet the cashier and not throw all his money at them before the total was stated. He would participate in community activities with his classmates and peer tutors during school hours.

Participant 3 was 20 years old with multiple disabilities including Down syndrome. He had an IQ score of 48 with an Adaptive Behavior Assessment score of 78 rating low average (6) on functional academics and a low average (6) on community use. Classroom data showed deficits in purchasing skills. Participant 3 had more access to the community through his family than the other two participants. His parents would take him to the grocery store each week with a list that he needed to find on his own and purchase with the cash he had in his wallet. Parents indicated that he struggled with all areas of purchasing the items and required maximum prompts to complete the steps.

One additional participant was excluded from further research based on data and observations showing the need of more prerequisite skills during baseline before VMO would be effective for him (i.e. obsessive-compulsive behaviors, following directions, and communication). Thus, research and results will be reported from three participants instead of four.

Setting

The grocery store trials were conducted in a local grocery store, Lee's Marketplace, which was near the participant's school. Generalization probes were conducted at Smith's, Theurer's Market, Fresh Market, or Macey's Food and Drug. The particular stores will be chosen by proximity to the student's home.

Pre-experimental Observations/Assessments

The researcher conducted a pretest on all students in two life skills classrooms to determine eligibility for this study. The researcher observed each student in a simulated "grocery store" setting within the school. Instructors directed students to "Go purchase these groceries" then observed them checking out the three items at a simulated check stand. Instructors marked a checklist with target behaviors (see task analysis below) to identify four students having the largest deficit in grocery purchasing skills. A score of no higher than one out of seven correct steps was considered to qualify for participation. Students were also assessed on their skills navigating and operating an iPod Touch. A student's navigating and operating skills were assessed with an iPod Touch. A peer model gave instructions on the iPod Touch to imitate; saying "Do this." then the model put her hand in her pocket, picked up a pencil, said hello, raised her hand above her head, and sat down. Data were collected on the amount of correct imitations the student made. The student needed to imitate at least three out of five cues to be considered for the study.

Only one student had deficits in purchasing skills and also deficits in operating the iPod Touch. Instruction was given prior to starting the research with this participant. They were told to follow the directions on the VMO and do it as fast as the model performed the step.

Task Analysis

Shopping skills was one of the dependent variables and included: (a) selecting shortest checkout lane, (b) putting divider down and place items from the cart on the belt, (c) greeting cashier, (d) paying cashier appropriate bill or combination of bills, (e) waiting and taking change and receipt from cashier, (f) thanking cashier, and (g) taking bag and carrying belongings to the exit. These tasks are listed in sequence below.

Select Shortest Checkout Lane

Participants identified the number of customers in the checkout lanes and made a decision regarding which line is shortest, based on the instruction from the VMO. The participant's classroom teacher (Observer 1) walked with the participant starting from the aisle of the store that the last item was found. The rules that were taught in the VMO for selecting the shortest line were choosing, within 20 s, (a) the line that had either no people, or (b) the least amount of people among the open lanes. The participant's behavior was not scored incorrect if he/she chose a lane with one individual having large numbers of items over another lane with several individuals who have fewer items. If the participant failed to choose the correct lane, based on the VMO, the response was scored incorrect.

Put Divider Down and Place Items from the Cart on the Belt

Participants had three pre-selected items to purchase. The items needed to be placed on the conveyer belt after the items of the customer in front of them. The participants observed the model on the iPod placing the divider between the items of the preceding customer and their own items. Participants were expected to complete the task just as the VMO demonstrated. The participant's actions were scored correct if the divider and groceries were in the correct place within 15 s of conveyor space becoming available.

Greet Cashier

Once the previous customer finished their transaction, a participant greeted the cashier by looking up at them, and saying "hello" or "hi", and answering any questions that the cashier asks, namely "How are you today?" or "Are you having a good day?" If the participant responded within 5 s of the initial question it was marked as a correct response.

Pay Cashier Appropriate Bill or Combination of Bills

As the cashier totaled up the groceries, the participant waited for the total amount owed and gave one dollar more than the total (e.g., "That will be $10.54". Student gives $11.00 in bills). The participant had 5 s to start counting their money and 35 s to complete the step. In order for the response to be counted correct, the proper dollar amount was given within the total 40 s with the 5 s initiation and the 35 s to fully complete the step. The purchase amounts ranged from $5.00- $20.00. The items purchased differed across participants according to the lists sent by participants' parents.

Wait and Take Change and Receipt from Cashier

The participant had 5 s to take their change and receipt from the cashier.

Thank Cashier

After the participant received their receipt and change, they verbally (with device or with own voice) thanked the cashier within 5 s.

Take Bag and Carry Belongings to the Exit

Participants were given another 5 s to take the bagged groceries and exit the check stand.

Response Measurement

Check Stand Measures

Measures of percent correct based on the seven-step task analysis were collected in the grocery store across baseline, VMO, and generalization sessions. The researcher was the primary data collector and conducted grocery-shopping sessions. A second teacher, Observer 2, collected interobserver agreement (IOA) data at least 30% of total sessions for each participant. A step was scored correct (+) if the participant completed the step independently within the time limits. A step was scored incorrect (-) if (a) prompting was necessary to complete the step within the given time limit, (b) the correct response was given but outside of the specified time limit, or (c) no response was exhibited. If a participant started with an incorrect response but self-corrected within the time allotted, this response was counted as correct. Data on correct responses were analyzed by dividing the number of correct responses in each session by the number of total opportunities times 100.

VMO Observations

The researcher recorded the number of times a participant watched the VMO either from start to finish or reviewed particular steps during purchasing. This measure was taken periodically during the VMO phase to assess the extent to which the participant relied on the VMO in the early, middle, and latter stages of the intervention. All participants watched the VMO at least once before they entered the grocery store during VMO probes. Near the end stages of the intervention and generalization stages, the student was given the choice if they wanted to view the video model between sessions. Participant 1 preferred not to view the video in the store during generalization sessions. She watched it in the car prior to checkout trials, but did not watch it after that. Participant 2 watched the VMO every session in the car and then before he bought his items. He never referred back to the VM while purchasing his items. Participant 3 referred to the VMO with the same frequency that Participant 2 did but during generalization sessions he chose not to watch it after the first store.

Interobserver Agreement (IOA)

IOA was calculated using the trial-by-trial method, which was calculated by dividing total number of agreements on (+) and agreements on (-) by the total agreements plus disagreements and multiplying that score by 100 (Cooper, Heron, & Heward, 2007). An agreement was defined as the same recording of a response for a step in the task analysis for both Observer 1 and Observer 2.

Observer 1 stood 1 m behind the participant. During IOA sessions Observer 2 stood at least 1 m in front of the participant at the end of the check stand. IOA training commenced prior to baseline by observing other students from the researcher's classroom and video of regular education students as both observers score performance. Interobserver training continued until both observers achieve 90% agreement for each step on the checklist for three consecutive shopping sessions. Most disagreements resulting in lower IOA were due to a matter of 1-3 s difference where either observer started or stopped the timer at different times. IOA was collected on the dependent variables for 39% of baseline, VMO intervention, and generalization sessions across participants. Mean IOA for each participant was 1.00, .988, and .987 respectively. Mean combined IOA was .992.

Treatment Integrity

Teacher behaviors that were observed were: (a) delivering task instruction; (b) providing appropriate prompt levels; (c) waiting the appropriate time limit depending on skill before prompting; (d) responding to student errors; and (e) delivering reinforcement. Treatment integrity was calculated by dividing the number of observed teacher behaviors by the total opportunities to respond, multiplied by 100. Observer 2 collected treatment integrity data 25% of all sessions and across phases between Observer 1 and the participants. Observer 2's data indicated that 97.3% of procedures were carried out as prescribed.

Experiment Design

The experimental design used was a multiple baseline across three participants (Cooper et al., 2007) in order to evaluate the effects of VMO using an *Apple iPod Touch* on purchasing skills in a grocery store. The researcher selected this design because each participant's performance needed to be independent of other participants, and internal validity using this design has high probability. Each participant shopped on separate days during the school hours so observing the other participants in the same intervention did not impact the effects of the intervention. Multiple sessions (up to three) were conducted during each shopping trip to maximize the use of time and resources. Another reason for selecting this design was because the effect of VMO is irreversible. If a reversal design had been chosen, the withdrawal of the intervention would probably not have changed level of behavior.

Procedures and Independent Variable

The independent variable in this study was the VMO demonstrating how to correctly carry out each of the seven tasks in sequence. Baseline, VMO, and generalization conditions are described below.

Baseline

Observer 1 accompanied participants to Lee's Marketplace, during baseline to assess purchasing skills before VMO. The participant entered the grocery store, found the three items, and was told to "Purchase these groceries." At the selected check stand, Observer 1 collected data using the same seven-step checklist from the pre-assessment.

The participant with the most stable and low percent correct performance over three sessions within baseline was chosen as Participant 1. Participant 2 continued in baseline until data remained stable and low, and then began the intervention after Participant 1. Participant 3 followed once he had three or more stable and low data sessions.

Video Modeling

This section describes the development of the VMO and the procedures that were carried out in the grocery store.

Development of VMO. The VMO was modeled by a peer with typical skills (no disability) of similar age as the participants. The peer described the tasks as he/she performed them in sequence. A script was written for each step of task analysis. The video was recorded in segments, which allowed for ease during navigation to each step, most importantly if the student needed to refer back to one step specifically they could skip to the specific area of need. The script read:

> I am going to purchase three items. Watch me and then do what I do within the time limit. Select the shortest checkout lane. I am looking to see which line is the shortest. Lane 1 has three people and Lane 2 has one person. I'm choosing Lane 2 because it has less people so I wont have to wait as long.

Second, when there is empty space on the belt I set the divider behind the groceries that are already on the belt. I place my three items after the divider and wait my turn.

When it is my turn I say hello to the cashier that is helping me. Hi! Once the cashier scans my groceries they will say the total that I need to pay. I count my money rounding up to the next dollar and give it to the cashier. Before I leave I wait for my change and receipt. I say thank you to the cashier. Last but not least, I check to make sure I have my groceries and my wallet then I leave the store.

VMO procedures to be carried out in the grocery store. The VMO was shown using an iPod Touch (Apple) and headphones at school and again in the car or parking lot before the shopping trip. Each step needed to be carried out before the time limit and the teacher prompt to be considered correct. Participants could refer back to the VMO at anytime during the session (rewinding and playing the video from the specific skill in question) and responses were recorded as correct if completed within the time limit.

Once the participant entered the grocery store and was given the prompt to purchase the items, Observer 1 followed within 1 m, and kept track of time limits for each step with a stopwatch to prompt participants as necessary. Observer 1 collected data according to the participant's actions within the checkout line. Once the participant reached the end of the checkout having completed all the steps with 100% accuracy, he/she was allowed to consume one of the three items purchased as reinforcement.

The participant took the items previously purchased out to the car. Then, two additional purchase and checkout trials were arranged. That is, the participant and observer re-entered the store for the next trial. The researcher found that it was more beneficial to continue practicing the skills after participant performed at 100%, up to three times, to reinforce the proper skills where the students went one week in between sessions. Researcher continued repeating sessions until participant reached 5-6 100% sessions.

Generalization Conditions

Once a participant reached 100% accuracy over 5-6 consecutive data sessions, generalization sessions were conducted in three different local grocery stores: *Smith's, Theurer's Lewiston Market, Fresh Market*, or *Macey's Food and Drug*. The same procedures were followed in the generalization stores as were followed in the intervention phase.

RESULTS

Figure 1 presents the data on three participants showing baseline, VMO, VMO plus individualized supplemental phases, and generalization to additional supermarkets without training. Results are discussed below according to each participant's performance.

Participant 1

Baseline

Four baseline sessions were conducted with Participant 1, who displayed low levels of correct responding in all areas except "take the bag and carry belongings to the exit," which was 14% correct of the steps within the task analysis. At session five we started VMO.

VMO

Three sessions were conducted with VMO alone. Participant 1's correct responding increased between 43% and 71% correct. Her errors were sporadic except for Step 5, "wait and take change and receipt from cashier"; she performed incorrectly on that task all three times. At this point, an additional prompt was introduced as described below.

VMO + "wait for your change" Prompt

Because Participant 1 did not respond correctly to Step 5 when Participant 1 watched the "wait and take change and receipt from cashier" step, an additional prompt was introduced. Before she purchased her items, Observer 1 paused the VMO when the model takes the change and receipt, and reminded Participant 1 to do what the model does and said, "Look! You take the change and the receipt from the cashier before you walk away. What do you do?" P1 responded correctly for that skill the remainder of the study. This phase change resulted in increased responding (86% on Session 8), however, subsequent performance decreased to 57% on Session 11. In session 11 she missed three steps from worrying about her items in the cart tipping over, pulling up her pants multiple times, saying hello on her device, getting her reinforcement at the end, and leaving the grocery store too soon. In her haste she forgot to put the divider down between her groceries, she handed all her money to the cashier instead of counting it out, and forgot to thank the cashier as she hurried away. Therefore, an additional prompt was introduced as described below.

VMO + Slow Down + Increase Frequency of Watching VMO

Observer 1 reminded Participant 1 to slow down and to pay attention to how calm the model was in the VMO. She was redirected to watch the VMO immediately before and after each session, in addition to the other times she viewed the VMO, to serve as a prompt to slow down and pay attention. The increased frequency of watching the VMO (at least three times per session within the grocery store) was also implemented because Participant 1 would say she did not want to watch the video claiming she already knew what to do but then would forget a step when she went through the line. Beginning on Session 12, her performance returned to 86%, including a correct response on taking change from the cashier. On Session 13, she performed all seven steps correctly. On Session 14, she performed correctly on only six of seven steps, but thereafter performed at 100% for seven consecutive sessions.

Participant 2

Baseline

Participant 2 participated in six sessions in baseline with steady and low responding at 29%, or two out of seven steps correct steps.

VMO

With implementation of VMO, Participant 2 performed between 71-100% for six sessions. In Sessions 10-12, Participant 2 missed "pay cashier appropriate bill or combination for bills", producing the need for another supplemental intervention as described below.

VMO + extra practice on dollar more

Participant 2 could complete tasks using a money strategy where the dollar amount is given for the total and one extra dollar is given for the cent amount with 100% accuracy in the classroom and at the school store, but he was not performing that skill in the grocery store with VMO. We practiced dollar more with the exact words the cashier would use when we worked on it in the grocery store before he purchased his items. This phase change improved his responding for two sessions but Sessions 15-17 he missed the dollar more skill again, producing the need for another supplemental intervention as described below.

VMO + dollar more VMO

Before Participant 2's 18th session, Observer 1 recorded a peer model in a short VMO of counting out the money correctly in Lee's Marketplace, at the check stand. Participant 2 watched the video in the classroom, in the car, and before each session alongside the original VMO. He preferred to pause the original VMO at the point where the model says to pay the correct amount of money and watch the additional VMO, then switch back to the original VMO. In Session 18, Participant 2 performed at 86% correct missing step 4, followed by 100% correctly in Session 19. Performance varied in Sessions 20-22 where he missed step 4 (appropriate combination of bills) two of the three sessions. The other steps he missed during those sessions were different each session, putting the divider down and selecting the shortest check-out lane. Participant 2's performance returned and remained at 100% for Sessions 23-27.

Participant 3

Baseline

Participant 3 participated in nine sessions of baseline with low responding ranging from 14%-57%; with a modal value of of 29% and a mean of 33%. The extended baseline and relatively level rate of responding made it clear that acquisition of purchasing skills is not solely due to repeating the steps at the grocery store.

VMO

Sessions 10-15 involved presentation of VMO alone, during which Participant 4's correct responses increased to 57%-86% with sporadic mistakes, most of them concerning completing the step within the time limit. Participant 3 would slowly walk by the check stands to find the shortest lane. He would take anywhere from 33 s- 62 s to find the shortest lane, resulting in a score of “-“. A supplemental intervention was developed as described below.

VMO + emphasize speed prompt

Participant 3 was told, “Watch the model and do what she does *as fast as she does it*.” After he watched the model, Observer 1 would say to him, “Are you ready to find the shortest lane as fast as she did it?” He would usually respond with a grin and head off to find the shortest lane. Correct responding increased and fluctuated between 86% and 100% for seven sessions. On Session 23-27, Participant 3 performed all the steps with 100% correct.

Generalization

Once participants reached mastery using the VMO in Lee’s Marketplace, they were individually assessed on generalization of purchasing skills in other local grocery stores. That is, the video model was no longer required and no additional training or reinforcement was provided. Though the store layouts, people, and settings were different with each store each participant generalized all the skills in three stores, eventually achieving 100% accuracy.

Participant 2 performed at 100% correct in each new store. However, Participants’ 1 and 3 struggled to select the shortest lane and put divider and groceries down in the time allotted, though they did the step correctly. Participant 1 required 49 s to choose the shortest lane during Session 22 at Macey’s. She chose the correct lane; there were just multiple lanes to choose from that had many customers already in line.

Another aspect that was different at Macey's, Fresh Market, and Theurer's Market was a quick checkout lane that did not have a belt or divider to put down. On Session 23 and 26 at Macey's and Fresh Market, the shortest line was a quick checkout. Because of the physical configuration at the quick checkout, there was no opportunity to place items on a conveyor with a divider. Instead, items were placed directly in front of the cashier. Therefore, step two was eliminated and Participant 1's score was computed as five steps out of six steps correct, or 83%. The same situation occurred with Participant 3 at Theurer's Market and Session 30 was scored similarly.

Participant 1 required three sessions to reach 100% accuracy in Macey's, one session at Smith's Marketplace, and two sessions at Fresh Market. Participant 2 generalized all the skills, performing each task within the time limits, in the three settings, with 100% accuracy the first time. Participant 3 responded with 100% accuracy with two sessions at Macey's, one at Theurer's Market, and one at Smith's Marketplace.

VMO effectively increased responding in all participants to 100%. Some participants needed additional training on certain steps when they reached three or more sessions with an incorrect response (-) on one or more steps. Observer 1 provided additional training in the grocery store. For consistency, Observer 1 used the same script as the VMO to describe the step; however, additional verbal descriptions were necessary on occasion. Recreating a VMO was most beneficial for one participant but was unnecessary for the others.

Unexpected results occurred within baseline when a participant did not have the prerequisite skills necessary to successfully learn from a VMO. Untimely prompting from the cashiers may have effected responding that had no relationship with the VMO.

Observer 1 tried to make sure that this did not occur but occasional prompting was offered nonetheless. Parents were aware of the study, and because of this, could have taken the participant to the store more often for practice. Two out of three parents reported they had not increased their shopping habits with their child. The third parent did not know if she had shopped more than she had before the study started.

Anecdotal Observations

There were multiple observations from this study that were not represented in the data but were important to mention. The confidence shown by the three participants when they generalized the skills without needing to review the VMO as frequently, as a teacher, was very rewarding. On the last session, both Participant 1 and 3 had huge smiles on their faces, knowing that they checked out correctly. Each of the participant's parents reported an increase in appropriate behavior when their children would accompany them to do the family grocery shopping. The cashiers and customers that we encountered at the grocery stores have a better understanding of the need for independence with our students. Students with disabilities do not need to be prompted as frequently. Observations we also made concerning when VMO works and why.

DISCUSSION

This study demonstrated that using VMO delivered through an *iPod Touch* is an effective intervention in the acquisition of purchasing skills. However, supplemental interventions were necessary to achieve 100% accuracy in purchasing skills. This finding is similar to that of Mason et al. (2012) who found that VMO was generally more effective when combined with reinforcement or within a package (reinforcement and additional instruction).

This study also investigated the extent that the skills acquired through iPod-delivered VMO generalize across three different local grocery stores. Findings indicated these skills generalized with a participant who achieved 100% accuracy the first session in all three stores, and the other two participants required two to three trials per store to achieve 100% accuracy. This research has many implications: (a) findings demonstrated the use of VMO in the acquisition of functional, social, and community-based skills for individual participants; (b) it revealed characteristics necessary for a student to learn from VMO, (c) findings illustrated for educators and researchers a practical method for using VMO; and (d) it fostered new research questions on the effects of how VMO could be adapted to teach different skill acquisition.

Findings provided a better understanding of the characteristics a student needs to learn from a VMO. In order to successfully learn from a VMO, the participant needed to pay close attention to the video, pay attention to the actions of the model within the video, and then sequence their actions identically to the model. Prerequisite skills needed were generalizing from the video to checkout line, following explicit directions, using gross motor movements within a time limit, and willingness to communicate whether through own voice or through augmentative communication devices.

This research also indicates for educators and other professionals that using VMO alone is not as effective as pairing it with additional instruction. Data showed increased performance when the VMO was initially implemented, but mastery was not reached until VMO was paired with additional instruction. This implies that VMO should be used as a supplement to instruction given to students with disabilities. A general sentiment in recent literature suggests that VMO is a revolutionary teaching method for individuals with disabilities, when this research clearly shows the need for more instruction in addition to the VMO and could never replace a teacher's instruction in the classroom.

One limitation of this study was that the numbers of participants were few. Only three students participated. Future research may want to consider other experimental designs using groups of students, the comparison of the effects of different VM techniques with certain disability populations, or target specific skill sets. Another limitation to this study was that I did not remove the framework of support (e.g., teacher, aide, or classmates) that served as discriminative stimuli serving as the occasion for a response. The study was not designed to determine whether participants performed independently. Future research may want to use remote cameras or independent observers to determine whether participant responses were correct when no familiar observers were nearby. A third limitation to the study concerned the pre-assessment. As stated above certain characteristics need to be assessed for in order to successfully benefit from VMO; the pre-assessment should have included a gross-motor movement element where the student was required to move from point A to point B within a time limit. Thus, eliminating those that may have a time requirement, which may impede results. However, this research does contribute to the literature on the effects of a practical and mobile method of using VMO.

Overall, this study generated findings suggesting that VMO can be a useful and efficient means of assisting in teaching skills to students with severe cognitive disabilities. In reviewing the limitations of this study, future research could be conducted to isolate different aspects that impeded learning purchasing skills more efficiently from the VMO including (a) focusing on specific disability populations (size and diagnosis), (b) teaching prerequisite skills, (c) removing the framework of support for independent functioning in the grocery store; and (d) recording and organizing the VMO in a more systematic, research based manner.

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APPENDICES

Appendix A

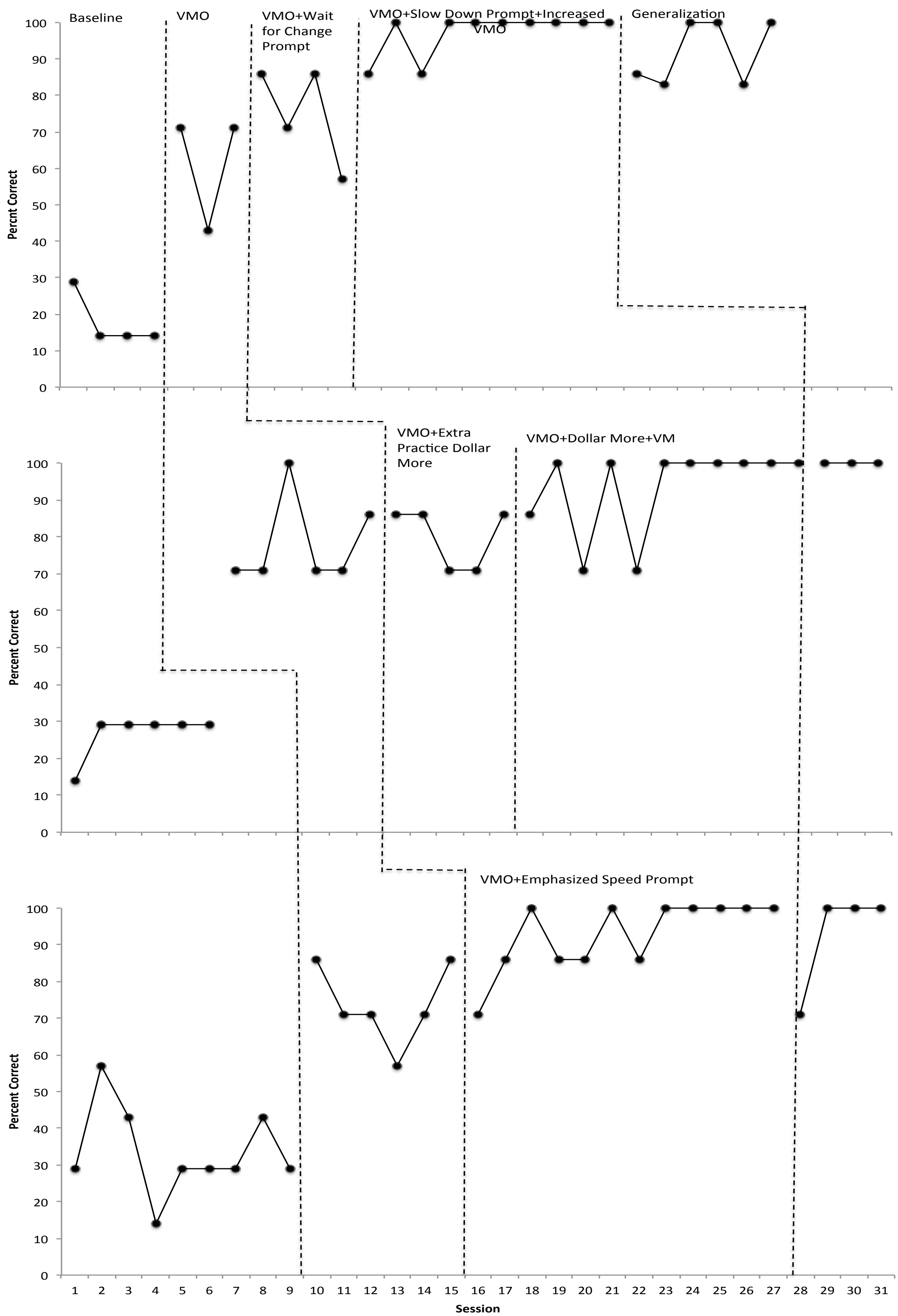

Figure 1. Data of each participant's acquisition of purchasing skills during baseline, VMO intervention, VMO + instruction, and generalization.

Appendix B

Pre-Assessment

Date:_______________ Teacher:___Sarah Stone_________________

Key: Correct (within time limit) + Incorrect (past time limit) -

	Pre-Assessment	Student Number																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14			
Simulated Grocery Stor	Select shortest checkout lane (shown a picture- Which one has less?)																	
	Put divider down and place items from the cart on the belt																	
	Greet cashier																	
	Pay cashier appropriate bill or combination of bills																	
	Wait and take change and receipt from cashier																	
	Thank cashier																	
	Take bag and carry belongings to the exit.																	
	Total Correct																	
	Percent Correct																	

Number Correct	1	2	3	4	5	6	7
Percentage Guide	14%	29%	43%	57%	71%	86%	####

		1	2	3	4	5	6	7	8	9	10	11	12	13	14			
Imitating Peer Model	Puts right hand in pocket																	
	Picks up pencil																	
	Says hello																	
	Raises hand above head																	
	Sits down																	
	Total Correct																	
	Percent Correct																	

Number Correct	1	2	3	4	5
Percentage Guide	20%	40%	60%	80%	####

imitation teaching needs to happen before VM.

Appendix C

Purchasing Skills

Student________________________ Program: Grocery Shopping

Data Collector___Sarah Stone_____________________

Key: Correct (within time limit) + Incorrect (past time limit) -

Grocery Shopping																	
Select shortest checkout lane	Baseline										Video Model							Emphazised speed
Put divider down and place items from the cart on the																	
Greet cashier																	
Pay cashier appropriate bill or combination of bills																	
Wait and take change and receipt from cashier																	
Thank cashier																	
Take bag and carry belongings to the exit.																	
Date																	
Raw Score																	
Percent Correct																	

Grocery Shopping																		
Select shortest checkout lane													Gen: Macey's, Theurer's, Smith's Marketpl					
Put divider down and place items from the cart on the belt																		
Greet cashier																		
Pay cashier appropriate bill or combination of bills																		
Wait and take change and receipt from cashier																		
Thank cashier																		
Take bag and carry belongings to the exit.																		
Date																		
Raw Score																		
Percent Correct																		

Number Correct	1	2	3	4	5	6	7
Percentage Guide	###	29%	43%	57%	71%	86%	####

Appendix D

Interobserver Agreement

Primary Data Collector___Sarah Stone____ _____________

IOA Collector___Kjerstin Mourra__________________

Program: Interobserver Agreement Grocery Shopping

Key: Correct (within time limit) +　　　Incorrect (past time limit) -

Interobserver Agreement-Grocery Shopping																		
Select shortest checkout lane	Baseline				VM									Generalization				
Put divider down and place items from the cart on the																		
Greet cashier																		
Pay cashier appropriate bill or combination of bills																		
Wait and take change and receipt from cashier																		
Thank cashier																		
Take bag and carry belongings to the exit.																		
Date																		
Raw Score																		
Percent Correct																		

Interobserver Agreement-Grocery Shopping																		
Select shortest checkout lane																		
Put divider down and place items from the cart on the belt																		
Greet cashier																		
Pay cashier appropriate bill or combination of bills																		
Wait and take change and receipt from cashier																		
Thank cashier																		
Take bag and carry belongings to the exit.																		
Date																		
Raw Score																		
Percent Correct																		

Number Correct	1	2	3	4	5	6	7
Percentage Guide	###	29%	43%	57%	71%	86%	####

Appendix E

Treatment Integrity

Teacher_Sarah Stone_____________________________

Program:Treatment Integrity- Grocery Shopping

Data Collector___Kjerstin Mourra_____________________

Key: Correct + Incorrect -

Treatment Integrity-Grocery Shopping																		
Deliver task instruction																		
Provide appropriate prompt levels																		
Wait the appropriate time limit before prompting																		
Respond to student errors																		
Deliver reinforcement																		
Date																		
Raw Score																		
Percent Correct																		

Treatment Integrity-Grocery Shopping																		
Deliver task instruction																		
Provide appropriate prompt levels																		
Wait the appropriate time limit before prompting																		
Respond to student errors																		
Deliver reinforcement																		
Date																		
Raw Score																		
Percent Correct																		

Number Correct	1	2	3	4	5
Percentage Guide	20%	40%	60%	80%	100%