3-21-2018

Evaluating the Effects of Utilizing a Mobile Device by Transitioning High School Students with Intellectual Disability to Locate Items from a Grocery List and Improve their Independence

Vanessa Gil
teachdade@aol.com

DOI: 10.25148/etd.FIDC004081

FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

EVALUATING THE EFFECTS OF UTILIZING A MOBILE DEVICE BY TRANSITIONING HIGH SCHOOL STUDENTS WITH INTELLECTUAL DISABILITY TO LOCATE ITEMS FROM A GROCERY LIST AND IMPROVE THEIR INDEPENDENCE

A dissertation submitted in partial fulfillment of the

requirements for the degree of

DOCTOR OF EDUCATION

in

EXCEPTIONAL STUDENT EDUCATION

by

Vanessa Gil

2018

To: Dean Michael R. Heithaus
College of Arts, Sciences, and Education

This dissertation, written by Vanessa Gil, and entitled, Evaluating the Effects of Utilizing a Mobile Device by Transitioning High School Students with Intellectual Disability to Locate Items from a Grocery List and Improve their Independence, having been approved in respect to style and intellectual content, is referred to you for judgement.

We have read this dissertation and recommend that it be approved.

Linda Blanton

Patricia Barbetta

Andy Pham

Kyle D. Bennett, Major Professor

Date of Defense: March 21, 2018

The dissertation of Vanessa Gil is approved.

Dean Michael Heithaus
College of Arts, Sciences, and Education

Andres G. Gil
Vice President for Research and Economic Development
and Dean of the University Graduate School

Florida International University, 2018

DEDICATION

I dedicate this work to my daughter Aracely. Thank you for your patience and support. You have made my life more fulfilled than I could have ever imagined.

ACKNOWLEDGMENTS

I would like to thank to my Major Professor, Dr. Kyle Bennett for guiding and supporting me over the years. There are no words to express my gratitude. You have set an example of excellence as a researcher, mentor, instructor, and role model. I also thank the members of my committee Dr. Linda Blanton, Dr. Patricia Barbetta, and Dr. Andy Pham. Your discussion, ideas, and feedback have been invaluable to my research. Also, thank you to Mashal for being my data collector.

I would like to extend a special thank you to Dr. Linda Blanton, Dr. Elizabeth Cramer, and Dr. Diana Valle-Riestra for creating the Project EDUCATE grant. The financial assistance provided by the grant made the completion of my dissertation possible.

Many thanks to my fellow EDUCATE cohort member Dr. Ruba Monem for her constant encouragement and support throughout this process. Your friendship is dear and special to me.

I would like to thank my mother and brother for encouraging me in my pursuits and inspiring me to follow my dreams. Thank you for listening, offering me advice and supporting me through this entire process.

ABSTRACT OF THE DISSERTATION

EVALUATING THE EFFECTS OF UTILIZING A MOBILE DEVICE BY TRANSITIONING HIGH SCHOOL STUDENTS WITH INTELLECTUAL DISABILITY TO LOCATE ITEMS FROM A GROCERY LIST AND IMPROVE THEIR INDEPENDENCE

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Vanessa Gil

Florida International University, 2018

Miami, Florida

Professor Kyle D. Bennett, Major Professor

Individuals with Intellectual Disability (ID) struggle to learn daily living skills (DLS) required for independent living. One specific skill set that is challenging for individuals with ID is grocery shopping. The current study is one of two investigations that have been undertaken entirely in the community and without the use of booster session simulations in a classroom.

This study investigated the effects of using least-to-most prompting and mobile technology as a tool to assist 18 to 22-year-old adult students with ID to find six items from a grocery-shopping list. Dependent measures included the number of task steps completed correctly, selecting the correct items from the shopping list, and the duration of shopping. Sessions were conducted twice a week in a community grocery store. A single subject, multiple probe design across participants was employed. There were three

phases in this study. The phases included: (a) teaching an initial grocery list, (b) teaching a re-sequenced grocery list, and (c) teaching a replacement grocery list.

Overall, the participants demonstrated improvements in their ability to complete the task steps and locate grocery items during the intervention condition in phase one. Two of the three participants' duration of shopping also improved over the course of the intervention in phase one. However, only one participant advanced to phases two and three of the study as the others did not meet the criterion of achieving 85% or better on the task analysis, which was needed to advance to the subsequent phases of the study.

The results of this study suggest that the use of mobile devices used with least-to-most prompting can have a degree of positive effect on the acquisition of functional skills such as locating grocery items by 18 to 22-year-old students with ID. However, for some students either additional weekly sessions in the community setting or classroom simulations are needed. Alternatively, researchers and practitioners might consider pairing mobile technology with different prompting and prompt fading systems (e.g., most-to-least prompting) for students struggling to acquire this skill set in a community setting.

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CHAPTER I

INTRODUCTION

According to the 2010 census, there are now a little more than 308 million people residing in the United States (Bryant, Seok, & Ok, 2012). Using a conservative 1%–2% prevalence rate for individuals with intellectual disability (ID), Bryant, Smith and Bryant, (2008) estimated that there are between 3 and 6 million Americans with ID who are challenged daily by disability related conditions. The American Association on Intellectual and Development Disabilities (AAIDD) defined ID as significant limitations both in intellectual functioning and in adaptive behavior as expressed in conceptual, social, and practical adaptive skills originating before the age of 18 (AAIDD, 2010). Individuals with ID generally fall within a continuum with some people mildly affected (IQ between 50-70), others moderately affected (IQ between 35-50), and few that are severely affected (IQ between 20-35 by their disabilities (Schalock, Luckason, & Shogren, 2007). Consequently, this disability category encompasses a heterogeneous group of individuals who experience various degrees of success and challenges across many life activities (e.g. home, school, and work; Bowman & Plourde, 2012).

For many years, it was generally assumed that individuals with ID could not or should not be educated (Goldberg & Cruickshank, 1958). During the 1940s and 1950s, many parents of children with ID and concerned others established private day and residential schools (Dunn, 1963). From approximately 1960 to the late 1970s, many public agencies established educational services for previously excluded individuals with ID. Until the 1970s, many students with disabilities were denied any education if their school district claimed an inability to accommodate them (Fleischer & Zames, 2001). A

seminal case that dealt with providing educational rights to individuals with ID during the 1970s was the case of Pennsylvania Association for Retarded Children (PARC) v. Commonwealth of Pennsylvania (1971). PARC vs. Commonwealth of Pennsylvania contested a state law that specifically allowed public schools to deny services to children "who have not attained a mental age of five years" at the time they would ordinarily enroll in first grade (Martin, Martin, & Terman, 1996). Under a consent decree, the state agreed to provide full access to a free public education to children with ID up to age 21. That case also established the standard of appropriateness—that is, that each child be offered an education appropriate to his or her learning capacities—and established a clear preference for the least restrictive placement for each child. In 1975, soon after this seminal case, Congress passed Public Law 94-142 (P.L. 94-142; Education of All Handicapped Children Act), now known as the Individuals with Disabilities Education Improvement Act (IDEA) of 2004. Due to the passage of PL 94-142; PARC vs. the Commonwealth of Pennsylvania, and substantial legal, advocacy, research, curriculum development, and educational policy activities (Ferri & Connor, 2005), practices in the 1980s and 1990s resulted in a drastic increase of students with ID who attended regular school with their non-disabled peers.

In today's educational arena, there exist general parameters for the array of educational and support services available for individuals with ID (Shalock, 2011). The continuum of services available to students with ID varies from (a) separate day schools, (b) segregated classrooms, (c) resource rooms, and (d) schools that provide full inclusion to this population of students. Moreover, support services that exist for students with ID include (a) specialized health and behavior supports, (b) leisure activities, (c)

transportation, (d) assistive technology, (e) rights and advocacy support, and (f) nutritional assistance, to name a few. While there have been improved educational outcomes between the 1980s and today for people with ID, yet too often, the post high school outcomes for young adults with ID are disappointing in terms of independent living skills and quality of life (National Organization on Disability, Harris & Associates, 2004).

Independent Daily Living for Young Adults with ID

Graduating from high school and transitioning to adulthood is a time of heightened opportunities (Bennett, 2013) but also of new risks relating to "the individual, the family, and the social service system" (Blacher, 2001, p. 173). A historical piece by Halpern (1994) provided a comprehensive and frequently cited definition of *transition* for youth with ID: Transition refers to a change in status from behaving primarily as a student to assuming emergent adult roles in the community. These roles include becoming appropriately involved in the community, and experiencing satisfactory personal and social relationships.

Transitioning: High School to Adult Living

Unfortunately, individuals with ID "consistently experience poor post-school outcomes related to transitioning from high school to post school adult living when compared with their peers without disabilities" (Test & Cease-Cook, 2012, p. 30). Brown (1983), a pioneer in the ID arena, posited that although much progress has been made for people with ID, schooling is not sufficiently preparatory for acceptable independent functioning upon graduation at 22 years old in a wide variety of heterogeneous non-school areas such as (a) recreation/leisure, (b) domestic, (c) vocational, and (d) general

community environments. As discussed by Brown (1983), the lack of meaningful transitional skills being embedded in high school instructional programs that prepare young adults with ID for adult living discussed by Brown in 1983 is still of grave concern in the current educational context (Newman, Wagner, Cameto, & Knockey, 2009). The National Longitudinal Transition Survey-2 (NLTS-2) found that students with ID lag behind their peers in all outcome areas including independent living once they transition out of high school (Newman et al., 2009).

Laws

Throughout history, there have been questions on how to establish public policy that aligns societal values with services and supports for individuals with ID (Shalock, 2011). Specific laws have emerged along the way, that have served to facilitate and address the difficulties these individuals have experienced, including issues with transitioning to adult living. In the United States, there is a federal entitlement to educational and related services for individuals with disabilities since 1975, starting with the Education for All Handicapped Children's Act (P.L. 94-142) and its current amended version, IDEA of 2004 (Public Law No. 108-446, HR1350). The IDEA 2004 defines transition services as "a coordinated set of activities for a child with a disability that (a) is focused on improving the academic and functional achievement of the child with a disability to facilitate the child's movement from school to post-school activities, including independent living, or community participation; and (b) is based on the individual's needs, taking into account the individual's strengths, preferences, and interests" (IDEA; 34 CFR 300.43 (a)] [20 U.S.C. 1401(34)]). The law mandates that

services be provided to individuals with ID to overcome numerous barriers; however, there is no entitlement to services after the age of 22.

The Americans with Disabilities Act (ADA) of 1990 was enacted to somewhat remediate issues with transition and services after the age of 22. The ADA reiterates that the primary focus should remain on making individual decisions regarding reasonable modifications on policies, procedures, and practices for individuals with disabilities. Specifically, the ADA provides equal opportunities for individuals with disabilities in the areas of employment, transportation, state and local government, public accommodations, and telecommunications. Title Three of the act relates directly to this study. Public Accommodations (title three) refers to: “Public places (restaurants, grocery stores, retail stores, schools, day care facilities) may not discriminate based on disability and must be made accessible so that people with ID have an equal chance to take part in an organization's goods or services” (ADA, 2014).

Daily Living Skills and Independent Living

Despite the laws that are in place to assist individuals with ID transition out of high school and into adult living, most people with ID still have difficulty with and often struggle to learn skills required for independent daily living (Westling & Fox, 2004). There are multiple definitions of Daily Living Skills (DLS). One proposed by Bennett and Dukes (2014) is that DLS are among the functional skills needed for success in current and future environments, and they consist of those activities needed in domestic, and community settings that allow a person to be as independent as possible.

Although DLS are considered essential to enhancing independent living (Ramdoss et al., 2012), persons with ID too often rely on caregivers or teachers to assist

them with DLS such as cooking, shopping, and basic hygiene (Van Laarhoven & Van Laarhoven-Myers, 2006). Findings from the 2009 NLTS-2 suggest that only 16% of young adults with ID live independently in the community after high school. Moreover, only 25% of individuals with ID will live independently outside the family home after exiting high school (Newman et al., 2009).

A functional curriculum is one that is designed to teach functional daily living skills to live, work, and have fun in an inclusive community (Bouck, 2009). The purpose of a functional curriculum is to ensure the maximum amount of independence, with a focus on individuals being productive members of society (Bouck, Satsangi, Bartlett, & Weng, 2012). One such curricular approach supported by the Council for Exceptional Children (CEC) utilized for teaching daily living skills to individuals with ID is the Life Centered Career Education (LCCE) curriculum (Brolin, 1974; CEC, 2014) and the LCCE Modified Curriculum (LCCE-M; Loyd & Brolin, 1997). The skills within both curricula have been identified as necessary for achieving successful adult adjustment for students with mild or moderate ID.

The LCCE-M is an extension and revision of the original LCCE curriculum. The major difference between the original and modified LCCE Curriculum programs is that the latter focuses on the critical skills and outcomes that individuals with moderate ID need in making the successful transition from school to work and community living (Loyd & Brolin, 1997). Specifically, for purposes of this study, the researcher focused on the following broad LCCE-M competencies: (a) eating at home and in the community; (b) exhibiting socially responsible behavior; and (c) exhibiting independent behavior. The successful implementation of this curriculum requires attention to the importance of DLS

instruction in natural environments. It is strongly suggested that instruction take place in the least restrictive integrated environments, such as is evident in normalized community environments (Gaumer, Morningstar, & Clark, 2004; Loyd & Brolin, 1997).

In summary, for decades, professionals have recognized the importance of teaching functional DLS to individuals with ID (Brown et al., 1979; Ayers et al., 2011). Recognizing the importance of teaching DLS to students with ID, DLS studies have been undertaken that (a) investigated specific categories of daily living skills (e.g., social skills), (b) evaluated specific treatments to develop these skills (e.g., applied behavior analysis), or (c) examined the development of daily living skills among specific populations (e.g., individuals with ASD with an IQ above 70; Bennett & Dukes, 2014).

Daily Living Skill: Grocery Shopping

Teaching DLS is vital to help students with ID live as independently as possible. Of particular importance with regard to DLS is that high school graduates be able to access stores and services within their communities independently (Certo et al., 2008). DLS specifically related to navigating the grocery store to locate items is a challenging skill set for students with ID to acquire (Mechling & Gast, 2003). Mechling and Gast speculated that this is because grocery shopping encompasses many component skills, such as reading to locate items, communicating with other people, knowing which item to purchase, navigation of the store, locating the item in the aisles, and following lists. It is important to build grocery-shopping skills on a consistent basis so that students can grasp and reinforce the skill. Along with consistency, grocery shopping should be taught in the natural environment of the grocery store where they will be expected to locate items independently after they graduate from high school. Individuals with ID who are not

equipped with the fundamental and necessary skill of locating food items in grocery stores risk high levels of dependence throughout their adult lives (Bouck, Satsangi, Bartlett, & Weng, 2012).

Historically, studies with interventions focusing on teaching grocery shopping skills have utilized simulation, Community Based Instruction (CBI), or a combination of both for students with ID. A review of such interventions focusing on grocery shopping skills was undertaken by Morse, Shuster and Sandknop (1996). Specifically, the researchers examined studies involving grocery-shopping skills interventions utilized with individuals with ID and/or Autism Spectrum Disorder (ASD). The studies reviewed by Morse et al. focused on different aspects of grocery shopping such as (a) teaching individuals how to make a grocery list and obtain and purchase groceries; (b) how to make a grocery list and obtain the items in a store while not teaching them how to purchase the items; (c) how to locate grocery items in a store and then purchase them; (d) teaching individuals only how to purchase groceries; and (e) examining whether an adapted number line could enable individuals to select the cheaper of two similar grocery items.

An important finding from the Morse et al. (1996) review was the location of where students with ID were taught to grocery shop. Data from the Morse et al. review showed that training was conducted solely in a school or residential setting in 5 of the 20 studies (25%) and solely in a community store in 4 of the 20 studies (20%). On the other hand, training was conducted in both a school (or residence) setting plus a community store setting in 11 of the 20 studies (55%). Moreover, 14 of the 20 studies (70%) from the Morse et al. review reported generalization data (from the classroom to the grocery

store). From the 14 studies that reported generalization data, only four studies (28%) programmed and assessed generalization across both settings. Generalization data are important because grocery shopping venues can vary significantly across a number of dimensions and there is no guarantee that a store used for training either in vivo or through simulation will be the location where the individual shops for groceries outside of school. In summary, through the above literature review, Morse et al. highlighted the need for teaching grocery shopping skills to individuals with ID. Such skills have the potential to improve the independent functioning among individuals within this population. Morse et al. did not discuss studies that included mobile devices; however, this is not surprising considering the date of the review and the recent development of such technology. As previously mentioned, Morse et al. found few studies (20%) conducted entirely in the natural setting. Such data might indicate another parameter of instruction for practitioners to consider, in part because once students graduate from high school, the natural setting will become the place of instruction throughout adulthood.

A more recent review of the literature focusing entirely on teaching grocery shopping skills and individuals with ID is not available. However, a comprehensive review of the literature was conducted by Walker, Uphold, Richter, and Test (2010) on interventions that taught functional DLS to students in the community since 1990, and one of the skills reviewed included grocery shopping. Walker et al. (2010) revealed that various skills such as purchasing items in the grocery store can be taught in the community. However, they found 72% of the grocery skill acquisition studies show that the most common practice continues to be a combination of classroom and community-based-instruction, with only weekly or monthly exposure to the natural setting to assess

generalization. Such limited exposure to the natural setting where these individuals will be expected to perform the skills, in turn, might create significant obstacles in the education of students with ID (Steere & DiPipi-Hoy, 2012). Providing instruction in the community (such as the grocery store) prepares students for life after high school. Moreover, promoting the individual's ability to function independently can make life easier and more rewarding for the individual and their caregivers.

More recently, researchers have investigated the use of technology to support more independent grocery shopping. For example, Bouck, Satsangi, Muhl, and Bartlett (2013) and Bouck et al. (2012) sought to understand the impact of audio recorders as compared to the use of a written list on 17 to 20-year-old students with ID identification and the selection of grocery items. Both studies used a combination of classroom instruction and CBI. In Bouck et al., teachers recorded one list and students recorded the other. The results of the two studies showed that participants were able to use prerecorded lists to find items in the grocery store. Moreover, in the second study that utilized lists also recorded by the teacher, the researchers found that the audio lists recorded by the students themselves were more effective that those recorded by the teacher in helping students locate items in the grocery store. Although these two studies utilized technology by using audio recorders, none of the studies utilized mobile electronic devices, such as smartphones or tablet computers.

In addition to the two studies that used audio recorders in the grocery store, Yakubova and Taber-Doughty (2013) examined the social skills aspect embedded within grocery shopping for three participants ages 12-15 with ID. In that study, participants viewed a video illustrating an adult approaching the checkout line emphasizing social and

purchasing skills needed at the grocery store (e.g., standing in line, greeting the cashier, smiling, making the purchase, thanking the cashier, and retrieving items). The study by Yakubova et al. was undertaken in both the classroom (where students viewed the video) and the grocery store where students were expected to perform the skills (verbal prompts were used and verbal praise for reinforcement). Results demonstrated that participants were able to learn expected social and purchasing skills but two out of three students had issues with generalizing the skill to an untrained grocery store.

Although the results of the aforementioned studies including those studies covered in Morse et al. (1996) and Walker et al. (2010) reviews were positive, limitations were reported (e.g., length of phases, previous exposure to items, and lack of generalization phases). One common limitation across many of these studies, and worthwhile to mention with regard to this study, was that the exposure to the natural environment of the grocery store was limited. It is understandable due to limited funding, time restraints and a lack of resources encountered in the current educational arena. Nevertheless, the opportunities for simulated instruction decreases once a student exits school, and natural community settings will likely become the primary place of instruction for the development of certain skills (Mechling & Gast, 2003).

For most community-based activities (e.g., grocery shopping or making small purchases), one of the better locations for instruction is within the natural community environments in which the activities will take place (Steere & DiPippi, 2013). The principal advantage of more naturalistic instructional arrangements is that students are taught to respond to the actual stimuli found in those setting, thereby mitigating problems associated with the transfer of stimulus control from simulated conditions (Codding &

Poncy, 2010) and such a focus on generalization of skills was noted as early as 1977 in the seminal work by Stokes and Baer. In that article, Stokes and Baer (1977) stated that *generalized behavior* refers to the transfer of learned responses across time, stimuli, or behaviors, and that specific programming for generalization was needed to achieve this aim. Although it may be necessary for students to acquire skills in practice settings, this alone could be insufficient for some individuals. Students need to be able to respond both accurately and quickly (Codding & Poncy, 2010) in natural environments (Cooper, Heron, & Heward, 2007). Unfortunately, as previously mentioned, much of the recent literature on grocery shopping skills relies on what Stokes and Baer (1977) referred to as the "Train and Hope" method of generalization whereby practitioners merely assess generalization without specifically programming for generalization.

In summary, there is a developing body of research on teaching individuals with ID to locate items independently in grocery stores. Researchers from recent studies shared promising results. However, as a developing research line, multiple limitations were noted. Noted were the limited opportunities for participants to practice the skills in the natural setting, and the limited use of emerging mobile technology by individuals with ID while grocery shopping. The aforementioned issues represented a gap in the research literature on teaching grocery shopping skills to transitioning high school students with ID.

Statement of the Problem

Morse and Schuster (2000) suggested three reasons to teach grocery purchasing skills to students with ID, including that (a) grocery purchasing skills are required to be taught in school and are included in textbooks and in varied assessments (Westling &

Fox, 1995); (b) acquisition of these skills allows students with ID to learn behaviors that are associated with health, nutrition, and self-sufficiency (Morse et al., 1996); and (c) these skills provide various opportunities for students to acquire/practice many other skills such as social, math, and motor skills (Morse et al.). Furthermore, an increase in daily living skills such as finding items from a grocery store can lead to higher levels of independence for individuals with ID and can improve their overall quality of life (Alwell & Cobb, 2009; Gaumer et al., 2004;).

A review of the existing literature demonstrated a gap in research investing the effects of training students with ID solely in the natural setting to use a mobile device to locate grocery store items. Potential advantages of such a study included faster acquisition of skills as a result of not including a simulated or artificial training portion and generalization (Walker et al., 2010). Additionally, removing simulated or video training sessions in the classroom, frees up time for students to visit the natural setting on a regular basis where students will be expected to perform skills. Researchers and teachers usually rely on the "Train and Hope" strategy whereby generalization is measured. In this sense, generalization from simulated to natural environments is welcomed but not explicitly programmed for (Stokes & Baer, 1977; Codding et al., 2010, p. 2). As previously mentioned, "Train and Hope" probes for stimulus and response generalization characterize more than half of the identified literature on grocery skill acquisition for a population of students who already exhibit significant difficulty with learning.

With regard to mobile devices and grocery shopping skills, although there were multiple studies using mobile technology within the community focusing on daily

living/functional skills, to the best of this author's knowledge, the literature base on using mobile technology to teach students with ID to locate items in a grocery store conducted entirely in the natural setting was undertaken in only one study (Burckley, Tincani, & Guld Fisher, 2014); however, that study did not use a mobile device during all conditions as this study did. In other words, there was a gap in the research literature. Although the literature on mobile device use in the grocery shopping skills arena was limited, there was technology use through audio recorders (Bouck et al., 2012; Bouck et al., 2013) and pocket calculators (Morse et al., 1996), which were each utilized as a teaching tool in the grocery store. Some previously mentioned studies used color pictures in binders or clipboards, but no studies that used mobile technology to show pictures in the grocery store to participants were found by the researcher.

As an intervention tool, mobile devices seem to have a multitude of potential advantages (Kagohara et al., 2013). Such devices are readily available and portable (Douglas, Wojcik, & Thompson, 2012). Gillette and DePompei (2008) stated that the devices are intuitive and versatile to operate, with their numerous uses as a camera, phone, notebook, and organization tool. The authors go on to mention that electronic devices can provide ongoing support to assist individuals with performing skills (e.g., create new grocery lists as additional items are needed or new items are desired). Mobile devices provided an easy and quick retrieval of lists and students can be taught how to create their own shopping lists without the assistance of another person. Importantly, mobile devices can also act as a prompting device with regards to self-monitoring and self-management of behaviors (Cihak, Wright, & Ayres, 2010), whereby the device replaces an adult and, therefore, potentially increases independence. Spitz (1979), a

pioneer who paved the way for current research in the area of ID, stated that individuals with ID have difficulty with mediational strategies such as grouping or restructuring and organizing information needed to solve problems or complete a task. As such, mobile devices might serve as a valuable tool to provide individuals with unlimited opportunities for repetition and use (Mechling, 2007), thus helping individuals with ID solve problems and perform steps of a complex task (Riffel et al., 2005). Helps and Herzberg (2013) stated that portable devices promote inclusion and ultimately a sense of relatedness and belonging to the community, thereby contributing to an improved quality of life.

This study built on the existing studies relating to using a list to locate items in the grocery store in several ways. First, this study added to the limited research base on the effective use of mobile technology on finding specific items from a list by 18 to 22-year-old students with ID in a grocery store. While portable electronic devices are rapidly increasing in number and advancing in capabilities, research evaluating their applied use with persons with ID in the store remains relatively limited (Mechling & Seid, 2011). The literature base on evidence-based practices likely will always lag behind the newest innovations (Ayers, Mechling, & Sansoti, 2013) because of the fast pace of mobile technology development; therefore, current research in this arena is warranted. The use of portable devices by individuals with ID may result in a decrease of dependence on teachers, job coaches, and peers (Cihak, Kessler & Alberto, 2008). As such, mobile technology is an effective instructional tool to teach life skills, vocational/employment skills, self-management, and self-instruction (Mechling et al., 2013). It is important to mention that there are obvious barriers that are present when incorporating technology. These included acquisition costs, maintenance costs, keeping all devices electrically

powered and available for daily use, and meeting the individualized challenges and needs of students when one size (device) does not fit all (Mechling et al., 2013). In the end, however, increasing independence as previously mentioned can help mitigate these factors if the technology truly leads to greater independence and enhanced productivity.

Second, this study addressed the issue of generalization as a result of the intervention being undertaken entirely in the natural setting, which added to the literature as a means of enhancing transition and independent functioning of students in this disability group and age. Most of the studies found by this author used simulated and/or computer instruction. Hence, the majority of the researchers only measured skill acquisition and assessed generalization in a community grocery store. Only one study (Burckley et al., 2014) was found that focused on teaching students with ID to locate items from a grocery list with no in class instruction but rather teaching the skills from the beginning to the end of the study in the natural setting. Although Burckley et al. conducted their study solely in the grocery store, the researchers only had one participant, and they used a paper list during baseline. This study differed from Burckley et al. in that it used an iPad during all conditions. As previously mentioned, it is understandable that teaching grocery shopping skills were undertaken primarily in the class or home of the individual because of factors such as lack of funding, time constraints, and limited resources. Although it is understandable, it is essential for students to be taught in the natural environment because once students graduate, more than likely there will not be a class available for instruction but rather instruction will occur in vivo. Generalization may not naturally occur simply because a behavior change was accomplished (Stokes & Baer, 1977).

Thus, the need to actively program for generalization, rather than to passively expect it as an outcome of certain training procedures, is a point requiring both emphasis and effective techniques (Reeve, Reeve, Townsend & Poulson, 2007; Smith & Gilles, 2003; Stokes & Baer, 1977). Designing supports and interventions that achieve community integration is of critical importance in the field of ID (Davies, Stock & Wehmeyer, 2002). Completing a study solely in the natural setting was important because the participants are transitioning high school students who may not have simulated instruction available at their assisted living facilities or homes (Walker et al., 2010). Additionally, teaching students in the natural environment was more realistic because individuals can upload lists directly to their mobile devices and go directly to where they are expected to perform the skill (Hansen & Morgan, 2008).

Theoretical Framework

This author drew from the work of Lou Brown, as he was one of the first educators to assist families and school personnel in developing appropriate services for students with ID in integrated school and community environments (e.g., Brown et al., 1979). Specifically, when developing instructional programs for individuals with ID, professionals should keep in mind "the criterion of ultimate functioning" (Brown, Nietupski, & Hamre-Nietupski, 1976). The criterion of ultimate functioning refers to a method of prioritization that may be used in developing programs for learners with ID. Brown et al. recommend this approach based on three major assumptions, which impacted the field of special education and learners with ID. First, the learner with ID should be taught skills that increase independence in and access to less restrictive environments. Second, transfer of training, generalization and maintenance of skills

cannot be assumed to occur with such learners. Third, programming efforts with learners with ID should address the wide variety of individual learning characteristics of this group. Thus, application of the criterion of ultimate functioning requires that skills and behaviors taught should be directly related to the behaviors that will be expected of them in non-school environments.

Keeping in mind the criterion of ultimate functioning described above, there are a variety of skills that are frequently demanded in natural, domestic, and community environments. It will be unfortunate if current educational programs for students with ID only focuses on grade-aligned state academic content standards without providing opportunities for CBI (Courtade, Spooner, Browder, & Jimenez, 2012). Ayers, Lowrey, Douglas and Sievers (2011) proposed developing a meaningful educational curriculum that is individualized and inclusive of each student's needs (both academic and daily functioning) and interests. These authors argued that the attainment of meaningful skills linked to natural environments directly impact an individual's ability to function independently in their future housing, work, community, and relationships. Ayers et al. (2011) concluded that only through a functional approach will students with ID make progress towards meaningful targets that will positively affect their current and future independence in their localized environments. "Not only do students with cognitive disabilities have a right to educational opportunity; they have a right to have successful, productive lives within the community" (Ayers et al., 2011, p. 16).

In the current educational arena, there are many students with ID who are being taught important skills, but only in artificial or simulated environments (e.g., those who are being taught to grocery shop from empty boxes in the classroom store; Brown et al.,

2004). One major assumption underlying training in artificial or simulated environments is that if a student is being taught to perform a functional skill, the student then will be able to perform the same skill in a natural environment. Unfortunately, professionals cannot infer that because individuals perform important skills in simulated environments, they will perform the same skills in natural environments (Stokes & Baer, 1977). In order to be considered successful, most treatments targeted outcomes must be evidenced across time, related behaviors, and/or settings (Codding et al., 2010). As previously mentioned, the older students become, the more natural non-school environments are, since students will be expected to perform in the community for the rest of their lives. Since the major purpose of educational programs for students is to prepare them to function in non-school environments, the task then becomes to ensure that educational time and resources are invested as efficiently as possible in those environments which influenced this study (Brown, Long, Davis, & Jorgensen, 1990). Moreover, as related to this study, it is imperative that individuals with ID receive instruction in functional life skills where they are most likely going to occur through adulthood (Brown, 1983; Certo et al., 2008). In addition to the importance of teaching in the natural setting, shopping skills should receive considerable attention in the curriculum for students with ID (Certo, et al., 2008) since non-disabled young adults frequently make independent purchases at grocery stores, department stores, and drugstores.

Purpose of the Study

The relationship between life skills acquisition and life quality is that when a person's repertoire of various life skills increases, his or her independent functioning, social competence, and quality of life is also thought to increase (Bowman & Plourde, 2012). The lack of integration or the lack of connection between the academic curriculum and meaningful life skills taught in the natural environment creates problems as individuals with ID transition out of high school and into adult living (Bates, Cuvo, Miner, & Korabek, 2001; Steere et al., 2012; Walker et al., 2010). Educators should have high expectations for their students and seek to challenge their students at appropriate levels academically. However, learning only fragments of higher-level academic skills should not be achieved at the cost of learning essential functional skills (Ayres et al., 2011).

Recent studies focusing on grocery shopping skills among individuals with ID recommended the following research topics: (a) testing interventions with direct selection/manipulation by the student (Hansen & Morgan, 2008); (b) examining the use of lists that are out of sequence with the makeup of the grocery store (Bouck et al., 2013); (c) studying the effects of an intervention on having students locate items by the categorical aisle signs (Mechling, 2004); and (d) examining the effectiveness of incorporating emerging technologies in grocery stores with this population of students (Bouck et al., 2012). This study was guided by the increasing number of students with ID in schools with daily living skills challenges (Bouck et al., 2012; & Mechling et al., 2003), specifically in such a fundamental skill as locating items from a grocery list. This study was also guided by the lack of research evaluating effective grocery skills

interventions using mobile technology while conducted solely in the natural setting. The importance of this study also lies in the fact that providing instruction in community-based settings is considered an instructional best practice for students with ID (Alberto, Cihak, & Gama, 2005). CBI provides students with ID an opportunity to acquire skills in the settings in which they will be used, thus increasing the likelihood for skill generalization (Bouck et al.) across stores.

Research Questions

This study looked at the effects of using a mobile device as a tool by students with ID in the natural setting (i.e., grocery store) who were lacking in the basic fundamental skill of locating items from a grocery list. This type of intervention can help increase the individual's independence into adulthood. More specifically, the research questions were:

1. Will students with ID independently complete the steps of a task analysis and locate six items when presented with a teacher-created shopping list on an iPad in a grocery store setting, using least-to-most prompting?
2. Will the students with ID independently complete the steps of a task analysis and locate six items on a list when the order of the original list is changed by re-sequencing four out of six items on the list? If not, will the students follow the new list using the iPad, given least-to-most prompting?
3. Will students with ID independently complete the steps of a task analysis and locate six items on a list when four out of the six items are replaced from the original list? If not, will the students follow the new list using the iPad, given least-to-most prompting?

4. Will the time to complete the steps of the task analysis and the time to find items (i.e., total shopping) decrease over the course of the intervention?

Summary

In summary, a disability can complicate independence, which is why independent living can be an important part of helping a young person with ID get ready for life after high school. The more involved the disability, the more likely it is that independent living will be a subject of serious discussion and preparation. People with ID have "significant limitations both in intellectual functioning and in adaptive behavior as expressed in conceptual, social, and practical adaptive skills" (AAIDD, 2010, p. 1). Unfortunately, "students with ID consistently experience poor post-school outcomes related to transitioning from high school to post-school adult living when compared with their peers without disabilities" (Test & Cease-Cook, 2012, p. 30). Despite the laws that are in place to assist individuals with ID to transition out of high school and into adult living, a majority of people with ID are still having difficulty and often struggle to learn particularly the skills required for independent daily living (Bennett & Dukes, 2014; Collet-Klingenberg & Kolb, 2011; & Westling & Fox, 2004).

Particularly important with regard to DLS is that high school graduates should be able to access stores and services within their communities independently (Certo et al., 2008). Specifically, navigating the grocery store to locate items is one of the most challenging skill sets for students with ID to acquire because it encompasses so many component skills (Bouck, et al., 2013; & Mechling et al., 2003;). Students need to learn to locate items in the actual settings where they are expected to utilize the skill. One study was located by the researcher conducted by Burckley, Tincani, and Fisher (2014),

specifically focusing on using a mobile device to assist young adults with ID to locate items from a grocery list, solely in the natural environment, although it is important to mention that their study used written lists during baseline which differed from this study. Kagohara et al., (2013) mentioned the importance of ensuring that future studies focus on using mobile technologies to teach daily-living skills, such as locating items from a list. Research in this area is pivotal because mobile devices may provide independence especially to those with ID that they may not have experienced it previously (Shah, 2011).

Operational Definitions

In the following section, certain terms that were used frequently in this study are defined. Other terms, which were not frequently used but require definitions, are explained as they were introduced.

Assistive technology

"Any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of a child with a disability." 20 U.S.C. 1401 [25], Sec. 300.5 (Individuals with Disabilities Education Act, 1990). Some examples of assistive technology are: (a) an audio recorder; and (b) an iPad.

Baseline condition

A treatment as a usual condition or a condition without the inclusion of the independent variable. Single subject designs compare performance during the baseline condition, and then contrast this pattern with performance under an intervention condition (Horner, et al, 2005)

Chaining

Breaks a task down into small steps and then teaches each step within the sequence by itself. This technique is helpful in assisting children to learn a routine task that is repetitive, such as using the bathroom, brushing teeth, putting on clothes and shoes, or completing a work task. In utilizing chaining, the teacher must (a) analyze the desired behavior, (b) break it into steps, and (c) plan for the teaching (Dequinzio, Townsend & Poulson, 2008).

Community-based instruction (CBI)

Identified in the literature as an effective means for teachers and personnel to teach students with disabilities skills in the actual place where the skill(s) is to be emitted.

Dependent variables

In single subject design intervention studies, dependent variables are the behaviors targeted for change and are measured (Cooper et al., 2007).

Differential reinforcement

Is a special application of reinforcement designed to reduce the occurrence of interfering behaviors (e.g., tantrums, aggression, self-injury, stereotypic behavior). The rationale for DR is that by reinforcing behaviors that are more functional than the interfering behavior will cause the functional behavior to increase, and the interfering behavior will decrease (Vismara, Bogin, & Sullivan, 2009).

Experimental control

Is when the design documents at least three demonstrations of the experimental effect at three different points in time with the single participant or across different participants (Horner, et al, 2005).

External validity

Single subject designs are used to (a) test conceptual theory and (b) identify and validate effective clinical interventions. A central concern is the extent to which an effect documented by one study has relevance for participants, locations, materials, and behaviors beyond those defined in the study. External validity of results from single subject research is enhanced through replication of the effects across different participants, conditions, and/or measures of the dependent variable (Horner et al., 2005).

Functional life skills

Current references started by Cronin (1996) defined life skills as "those skills or tasks that contribute to the successful, independent functioning of an individual in adulthood" (p. 54). These skills may generally be grouped in five broad clusters (aligned with the definition of comprehensive transition services as originally studied by Halpern, 1994): self-care and domestic living, recreation and leisure, communication and social skills, vocational skills, and other skills vital for community participation such as post-secondary education.

Independent living

Independent living involves participating in the activities of daily life without or with limited assistance from others.

Independent variable

The practice, intervention, or behavioral mechanism under investigation. Independent variables are operationally defined to allow both valid interpretation of the results and accurate replication of the procedures.

Inter-observer agreement (IOA)

A method for ensuring reliability in the collection of data on a target behavior. It involves two or more independent observers observing the same behavioral episode in order to compare the results.

Internal validity

Internal validity is the confidence the researcher can have that the independent variable is responsible for (caused) changes in the dependent variable. Internal validity says nothing about whether the results were what you expected, or whether generalization is possible (Horner et al., 2005).

Multiple probe across subjects design

Multiple-baseline and probe procedures are combined into a "multiple-probe" technique. The technique is designed to provide a thorough analysis of the relationship between an independent variable and the acquisition of a successive approximation or chain sequence across participants.

Pairing

Pairing interventions, items or techniques to increase a behavior. Pairing neutral items, such as toys, teaching materials, and praise is used in order to increase play, pivotal learning behaviors, and many other skills (Dozier, Iwata, Thomason-Sassi, Worsdell, & Wilson, 2012).

Prompting and fading

Prompts are a method used to get a learner from incorrect responding to correct responding. Prompts are used to increase the likelihood that a student will provide a desired response. Fading is gradually reducing the prompt (Alberto & Troutman, 2003).

Self-monitoring

Defined as the practice of observing and recording one's own academic and social behaviors (Hallahan & Kauffman, 2000; Rutherford, Quinn, & Mathur, 1996; Vaughn, Bos, & Schumm, 2000).

Treatment fidelity

To monitor and enhance the accuracy and consistency of an intervention and ensure it is implemented as planned and that each component is delivered in a comparable manner to all study participants over time (Smith, Daunic & Taylor, 2007).

Verbal cueing or voice over

Verbal cues referred to as "voice-overs" in which the person recording the video (operating the digital video camera) or the person performing the task (video model) verbally provides directions or descriptions of how to complete the task. These verbal cues are frequently used along with a visual demonstration or pictures.

Visual analysis

Involves the interpretation of the level, trend, and variability of performance occurring during baseline and intervention conditions. Judgment of (a) the immediacy of effects following the onset and/or withdrawal of the intervention, (b) the proportion of data points in adjacent phases that overlap in level, (c) the magnitude of changes in the dependent variable, and (d) the consistency of data patterns across multiple presentation of intervention and non-intervention conditions.

CHAPTER II

LITERATURE REVIEW

In this chapter, a review of the literature as it relates to this study is presented. Provided is an examination of the literature describing interventions that have been used with students with ID to acquire DLS. Additionally, for purposes of this study, fifteen empirical studies relating to the DLS of grocery shopping are reviewed. Six criteria were used to identify relevant studies for this review: that they (a) be peer-reviewed studies, (b) include students with ID as participants, (c) include grocery shopping skills as the dependent variable, (d) operate in grocery or convenience stores as places for training and/or assessment, (e) use types of grocery lists, and (f) be studies conducted from 1996 to 2014. In accordance with the criteria, fifteen empirical studies were identified for review. These studies were classified based on the approaches they employed. Search terms used to locate these studies included grocery shopping, community skills, technology, electronic mobile devices, community instruction, daily living skills, ID, young adults, high school students, and grocery lists.

First an overview of ID and the characteristics of individuals with ID is presented. Next, there is a discussion of how the proficiency of DLS affects the life outcome of individuals with ID, and then presented is an overview of interventions for teaching DLS to this population. Specifically described are interventions utilized by other researchers to teach a variety of grocery shopping skills to students with ID. This was followed by a review of the literature on the effectiveness of each type of intervention that was found. Next, specific interventions involving grocery lists and students with ID for this study were discussed. Finally, the chapter presents a rationale for the current study.

Intellectual Disability

Over the past 50 years, the definition of ID has changed along with the terminology. As mentioned in chapter one, recently the AAIDD defined ID as being characterized by significant limitations both in intellectual functioning and in adaptive behavior as expressed in conceptual, social, and practical adaptive skills originating before age 18. The definition of ID includes three key criteria: (a) intellectual abilities, (b) adaptive behavior, and (c) age of onset. Even though the term and definitions of ID have changed over the last decades, the definitions have consistently included these key criteria (AAIDD, 2010).

Intellectual abilities entail various abstract skills such as reasoning, problem solving, planning, and thinking (AAIDD, 2010). Usually, these abilities are measured by standardized intelligence tests, which compare one's score to the average scores of people from the normative sample. When an individual scores below two standard deviations on a standardized intelligence test, the individual partially meets the criteria of AAIDD to be identified as an individual with ID (Schalock et al., 2007). Weaknesses in basic abilities would predict weaknesses in resulting everyday task performance summarized as adaptive behavior/skills.

Adaptive behavior is defined as conceptual, social, and practical skills that individuals need to learn and emit for functioning in their everyday lives (AAIDD, 2010). Adaptive behavior includes both skill (i.e., can they do it) and performance (i.e., do they do it; Overton, 2012). As with intellectual abilities, standardized tests, often referred to as adaptive behavior scales, are used to assess adaptive behavior. The scales use interviews and observations to assess an individual's abilities for conceptual, social, and practical

skills such as communication and hygiene (Bowman & Plourde, 2012). A score that is two standard deviations below the mean on these measures may indicate ID, in part (Overton, 2012).

Additionally, in defining ID, age 18 was considered a cutoff point of onset because ID is categorized as a developmental disability and includes mental with the possibility of physical impairments that are diagnosed at birth or during childhood through adolescent years.

In conclusion, together meeting all three criteria may be indicative of an individual having ID. ID is not considered an illness, disease, or disorder; hence, there are no cures. Instead, individualized plans are developed to assess individuals' needs and abilities. The objectives of these assessments are to develop teaching and treatment programs to optimize independent functioning and life satisfaction for individuals with ID. Moreover, outlining adequate supports (e.g., from others, from technology) may help these individuals live meaningful, satisfying, and productive lives within their own communities.

Challenges for Individuals with ID

Individuals with ID present a wide range of characteristics and learning challenges. These challenges can preclude independent functioning during childhood, adolescents, and adulthood. Some examples of the areas where individuals with ID face the most challenges include (a) lack of adaptive skills; (b) lack of self-regulation; and (c) DLS challenges (Bowman & Plourde, 2012).

First, adaptive skills refer to skills required to live in community settings (AAIDD, 2010). Some examples of these skills include taking care of personal needs,

interacting with others, and responding to the demands of the environment (Langone & Burton, 2001). Students with ID have problems not only with acquiring these skills but also with applying them to their particular situations.

Next, self-regulation is another challenging area for individuals with ID. Self-regulation is a broad concept regarding the ability to control one's own behavior (Burrimer & Tierney, 2005). This ability is closely linked to metacognition, referring to an individual's awareness of which strategy is needed to solve a problem, how to use the strategy appropriately, and monitoring whether the strategy works well (Bowman & Plourde, 2012). Students with ID do not develop and/or efficiently use such strategies needed in certain situations (Schalock et al., 2007).

Finally, many individuals with ID struggle with DLS. Competency in life skills promotes the successful transition of students with disabilities into their communities and enhances their quality of life (Loyd & Brolin, 1997). Researchers define life skills as those that are necessary to live independently in everyday life (Bennett & Dukes, 2014), such as, housekeeping, cooking, shopping, and organizing one's own environment (Ramdoss et al., 2012). This definition highlights the fact that the acquisition of life skills is a pivotal step toward independent adult life for students with ID. Along the same lines, researchers have indicated several concerns about adult outcomes for students with ID who do not acquire adequate life skills (Collet-Klingender & Kolb, 2011). Researchers report that students with ID have much more difficulty making the transition from high school to adult life than their peers without disabilities (Blacher, 2001). Others report that students with ID confront segregation from the community and difficulty establishing independent living (Steere & DiPippi, 2012). Test and Cease-Cook (2012) indicated that

these disappointing outcomes are directly connected to the students' proficiency in life skills and that improving these students' life skills can produce better life outcomes. Moreover, teaching DLS has been considered a challenging task for special education professionals due to the previously described characteristics of students with ID. Intervention programs should be designed that teach functional skills and promote generalization of the skills across natural environments (Stokes & Baer, 1977).

Daily Living Skills

Due to the aforementioned challenges faced by individuals with ID and the importance of acquiring DLS for individuals with ID to live as independently as possible in post school environments, attention has been directed towards developing effective instructional strategies for teaching DLS (Westling & Fox, 2004). Bennett and Dukes (2014) mentioned in their DLS literature review that several behavior analytic techniques have been utilized to teach DLS including, but not limited to, chaining, prompting and fading, video-based instruction, pairing, self-monitoring, and differential reinforcement. Furthermore, current research demonstrates that various technology-based interventions have been used to teach DLS to students with ID, such as computer based intervention programs (CB) and mobile devices (Bouck, Satsangi, Muhl, & Bartlett, 2013; Bouck, Satsangi, Bartlett, & Weng, 2012; & Burckley, Tincani, & Guld, 2015).

In a recent review of the literature, Bennett and Dukes (2014) examined DLS instruction among students with Autism Spectrum Disorder (ASD) and ID. Their review spanned the years 2000-2012, and 14 studies were identified. Recognizing the importance of teaching DLS to students with ASD and ID, Bennett and Dukes included studies that (a) investigated specific categories of DLS, (b) evaluated specific treatments to develop

these skills (e.g., applied behavior analysis), and (c) examined the development of DLS among specific populations. They examined a variety of dependent variables including behaviors related to eating, domestic skills, purchasing and solving money related math problems, safety and health skills, and independent routines. As previously mentioned, various teaching strategies used to develop these skills were reviewed by Bennett and Dukes, which included chaining, prompting and fading, video-based instruction, pairing, self-monitoring, and differential reinforcement procedures, to name a few. Furthermore, the research studies reviewed were conducted in several different types of settings including therapy rooms, classrooms, school facilities (e.g., bookstore), homes, outdoors, and community sites. Most of the reviewed studies yielded positive results, but with varying degrees of certainty of evidence (a reference to the quality of the reviewed studies' research designs and conduct). Considering the results of the review by Bennett and Dukes, additional research is needed examining effective strategies to develop and maintain DLS among young adults with ASD and ID. Bennett and Dukes go on to mention that many individuals in this population can likely achieve greater independence, provided families and professionals have a variety of evidence-based procedures to use to teach DLS.

In a related review on DLS, Walker et al., (2010) examined 23 transition intervention studies since 1990 that identified vocational, community, DLS, and recreation skills taught across grade levels using CBI. The studies included 161 participants with ages ranging from 5 to 21 years. Individuals in the studies had a variety of disabilities, including ID, ASD, Orthopedic Impairment, Traumatic Brain Injury (TBI), and one participant with Emotional and Behavioral Disability (EBD). The review

included 10 (43.5%) studies dealing with DLS, 8 (34.8%) related to community skills, 4 (17.4%) studies dealing with vocational skills, and 2 (8.7%) related to recreation skills. Various teaching strategies were mentioned as part of the review by Walker et al. including prompting and modeling (3 studies), prompting (7 studies), Least-to-Most Prompting (6 studies), Constant Time Delay (4 studies), Progressive Time Delay (1 study), Graduated Assistance Hierarchy (1 study), and Concurrent and Serial Sequencing (1 study).

Moreover, studies in the review by Walker et al (2010) were conducted in various locations that included 10 (43.5%) studies at grocery stores, 4 (17.4%) studies on public streets, 3 (13.0%) studies at department stores, 3 (13.0%) studies at shopping malls/centers, 2 (8.7%) studies at restaurants, 2 (8.7%) studies at convenience stores, 2 (8.7%) at bowling alleys, and 2 (8.7%) studies conducted at home settings. Results from the Walker et al. review showed that, using the above-mentioned teaching strategies, students demonstrated acquisition of DLS independently and that several students were able to maintain the skills. Furthermore, results from the 23 DLS intervention studies reviewed by Walker et al provide additional evidence that students with disabilities can learn skills in natural environments. The studies revealed that various skills such as purchasing items, grocery shopping, and banking skills can be taught in the community. One important life skill that students with ID need to acquire for better life outcomes is grocery-shopping skills (Morse et al., 1996).

Daily Living Skills-Grocery Shopping

Morse and Schuster (2000) suggested three reasons why teaching grocery shopping skills is important for improving the prospects of independent life for students with ID: (a) grocery purchasing skills are required to be taught in school curricula and are included in textbooks and in varied assessments (Westling & Fox, 1995); (b) acquisition of these skills allows students with ID to learn behaviors which are associated with health, nutrition, and self-sufficiency (Morse et al., 1996); and (c) these skills provide various opportunities for students to acquire many other skills such as social skills, math skills, and motor skills (Morse et al.).

Although Morse et al. (2000) stressed the importance of teaching grocery shopping skills, teaching these skills to individuals with ID is especially challenging because of the learning, social, and adaptive difficulties they face. Spitz (1979), a pioneer in the ID arena, indicated that students with ID are generally not competent in utilizing conceptual strategies such as (a) grouping or restructuring information for solving problems and completing tasks; (b) using their acquired strategies efficiently in certain situations; (c) transferring acquired skills across novel situations; and (d) responding properly to changing situations. These difficulties are worsened by various distractions within community settings (e.g., crowds, noise, competing activities; Morse et al., 1996). Moreover, grocery shopping is also one of the most challenging skill sets for students with ID to acquire because it encompasses many component skills, such as requiring reading to locate items, math to calculate payment, communication with other people, and other basic skills (e.g., self-regulation) with which students with ID struggle with.

Due to the challenges faced by individuals with ID, various interventions have

been used to teach grocery shopping skills to students with ID, such as, classroom simulations, video technology, concurrent instruction, computer technology and instruction delivered in the community (CBI). Additionally, several behavior techniques, including chaining, prompting and fading, video-based instruction, pairing, self-monitoring, and differential reinforcement, have been used to teach grocery shopping skills to this population of students (Bennett & Dukes, 2014). Finally, Bowman and Plourde (2012) recommended tasks involved in acquiring functional skills to be broken down into smaller steps to help students with ID master each critical step and focus on the relevant stimuli to make discriminations more easily.

In an earlier review of the literature, Morse et al. (1996) examined studies involving grocery-shopping skills interventions utilized with individuals with ID and/or Autism Spectrum Disorder (ASD). The data indicated that 105 individuals participated in the 20 studies. Participants ranged in age from 8 to 49 years, and included 63 secondary students (60.0%), and 7 adults (6.6%). The studies reviewed by Morse et al. focused on different aspects of grocery shopping such as (a) 4 (20%) studies that focused on teaching individuals how to make a grocery list and obtain and purchase groceries; (b) one (5%) study that examined procedures to teach the participants how to make a grocery list and obtain the items in a store, but did not teach the participants how to purchase the items; (c) 4 (20%) studies that showed participants how to locate grocery items in a store and then purchase them; (d) 5 (25%) studies where participants where taught to purchase groceries at the check-out line; (e) one study (5%) which investigated the effectiveness of a behavior management technique on grocery shopping skill acquisition; (f) 4 studies (20%) that examined locating items at the grocery store; and (g) finally, one (5%) study

which examined if, through the use of an adapted number line, participants were able to discriminate between the cheaper of two similar grocery items.

The studies reviewed by Morse et al. (1996) used several adaptations or aids while in the grocery store to assist the participants to engage in grocery shopping activities. Pocket calculators were utilized in a few of the studies as a budgeting tool. Moreover, the participants in 11 of the 20 studies (55%) employed some form of a pictorial grocery-shopping list when they located grocery items in a store. These pictorial lists included (a) a pictorial, mnemonic shopping list which consisted of pictures that the participants drew to cue them to purchase the grocery item of their choice from within a category of items; (b) a pictorial shopping aide, which consisted of a three-ring binder that contained pictures of the items to be purchased, color codes indicating the nutritional value of the items, and a budget gauge that could be used to total the cost of the groceries; and (c) pictures or wrappers of the items to be purchased. Furthermore, 4 of the 20 studies (20%) used the next dollar strategy to teach grocery purchasing skills to participants. Picture prompt money cards were used in 2 of the 20 studies (10%) to assist participants to account for sales tax. These cards contained a picture of the dollar bill denomination (e.g., a $1, $5, or $10 bill) that was given to the participants and the printed worth of that bill after a specified percentage of sales tax had been subtracted (e.g., $5 minus 3% sales tax) to calculate which groceries they could afford to purchase. An adapted number line was utilized by participants in one study from the Morse et al. review to select the lower priced of two similar grocery items.

Finally, in one other study from Morse et al. (1996) that used adaptations or aids, the participants constructed and used a handwritten grocery-shopping list. This list

contained subheadings (each item's approximate location in the store) under which the participants printed the names of the grocery items they were going to purchase. Participants received instruction using most to least prompting with stimulus fading strategies and completed probes approximately two times per week until they achieved criterion. Six of seven participants were able to purchase ten items in an actual store. The following limitations were mentioned from this particular study in the Morse et al. review including the following: (a) participants did not purchase produce, meat, or taxable nonfood items (e.g. detergents, pet supplies, etc.) which might be purchased by a typical household; (b) participants were not taught to prioritize the food items printed on their shopping list rather items were in order of how they would be encountered at the store; and (c) participants were taught in only one store.

In addition to those studies that used adaptations or aids, another important finding from Morse et al. (1996) was the location of where students with ID were taught to grocery shop and data about generalization measures. Data from the review showed that training was conducted solely in a school or residential setting in 5 of the 20 studies (25%) and solely in a community store in 4 of the 20 studies (20%). On the other hand, training was conducted in both a school (or residence) setting plus a community store setting in 11 of the 20 studies (55%). Generalization data were also reported in Morse et al. 14 of the 20 studies (70%) reported generalization data (from the classroom to the grocery store). Only 4 of the 20 studies (20%) assessed generalization across both settings and stimuli. Several studies from Morse et al. (1996) specifically investigated how to teach skill generalization within the context of shopping for groceries. Ferguson and McDonnell (1991) compared the relative efficacy of serial and concurrent

sequencing strategies in teaching their participants how to locate ten grocery items across three grocery stores. Ferguson and McDonnell also assessed whether each participant could locate the items in three non-trained stores and found that the concurrent sequencing strategy resulted in better generalized performance. Haring et al. (1987) programmed for generalization by having their participants view videotapes of non-disabled peers modeling purchasing behaviors in generalization settings, while McDonnell and Homer (1985) taught their participants how to locate 15 target grocery items in 4 non-trained stores by showing their participants slides of the grocery items in various shelf positions that sampled the range found in the stores. Likewise, one study from the Morse et al. review had their participants purchase items that sampled the range of possible stimuli within each of three categories of items (grocery, clothing, and personal hygiene items), and one other study used slides of cash registers that represented a variety of cash registers that might be found in the local community when they taught their participants how to purchase groceries. Lastly, Homer et al. (1986) taught their participants how to discriminate between 10 target grocery items and 20 non-target grocery items in a novel grocery store.

Overall, Morse et al. (1996) reported that interventions included in the review were successful with 99 of the 103 participants (96.1%). Even though 105 participants received training in the 20 studies, one of the participants moved prior to completing the study, and one of the participants failed to complete one component of the training package due to problem behaviors. Otherwise, only 4 (3.9%) of the participants reportedly failed to either obtain the targeted skills or objectives that were established for their study, make significant progress toward obtaining them, or both. Specifically, one

participant did not master the skill of independently constructing a shopping list, one adult participant failed to reach the training criterion following 33 training sessions and was subsequently dropped from the study, one participant partially mastered the skills of constructing an item grocery shopping list and shopping for the items, and one participant actually increased the number of actions he took to locate items in a real grocery store.

Morse et al (1996) reported a variety of successful strategies for teaching grocery shopping skills, including verbal instruction with modeling and role playing, serial and concurrent sequencing strategies, and backward chaining. Several prompting strategies were also reported as effective, including verbal and physical prompts, least intrusive prompting systems, constant and progressive time delay, and stimulus fading. Adaptations, aids, and task simplification strategies were also reported by Morse et al. as key components of the instruction that was provided in the various studies. Adaptive shopping aids, pictorial and handwritten shopping lists, pocket calculators, and the next-dollar purchasing strategy, all of which were employed in some fashion in the majority of studies that were reviewed, can reduce the complexities of grocery shopping and allow individuals with moderate, severe, or profound intellectual disabilities to participate more independently in this activity.

In summary, through the above literature review, Morse et al. (1996) highlighted the need for teaching grocery shopping skills to individuals with ID. Morse et al. did not discuss studies that included mobile devices; however, this is not surprising considering the date of the review and the recent development of such technology. Additionally, Morse et al. only identified four studies conducted entirely in the natural setting, and such data might indicate another parameter of instruction for practitioners to consider.

More recently, Walker et al. (2010) conducted a review of DLS and CBI studies that included 10 grocery studies. The 105 participants from the grocery studies had ID and/or ASD and ranged in age from 5 to 19 years. Purchasing grocery items was the most common dependent variable found by Walker and colleagues. Four (40%) of the 10 grocery studies involved purchasing items at the grocery store check-out line, 2 (20%) grocery studies examined both locating and purchasing items simultaneously, 2 (20%) studies involved calling for assistance, and one study (10%) taught participants how to locate items using a list. Similar to the Morse (1996) review, the majority of the locations for the ten grocery studies reviewed by Walker et al. (2010) included both simulation and the grocery store (70%), while 3 grocery studies taught skills at a community site only (30%). Six (60%) of the 10 grocery studies from the Walker et al. review collected generalization measures. From the 6 studies, 5 of these studies (83%) measured participant's ability to generalize the skill at a new site, and one (16%) measured generalization with a new person other than the researcher.

All studies in the Walker et al. (2010) review demonstrated positive results and increases in the targeted skills for all participants, except for two studies. One study by Morse and Schuster (2000), stated that 2 students out of 8 did not reach criterion as a result of the intervention. Another study by Domaracki and Lyon (1992) indicated that all students increased the target skill, but students only reached criterion in the naturalistic training phase, not the simulation-training phase. Overall, students exhibited the highest scores in the skill taught in the combination of simulated and CBI settings on the same day, followed by the skills taught in the CBI-only setting receiving the second highest scores. Students exhibited lower scores on the skill taught with simulated and CBI

instruction on subsequent days. The lowest scores were identified for the skill taught in the simulated-only setting. Five of the 6 studies (83%) that measured generalization from the Walker et al. review demonstrated positive results with all participants meeting criterion. One study had mixed results with regard to generalization (Bates et al., 2001), due to health issues of one of the participants.

Six of the studies from the Walker et al. (2010) CBI review assessed generalization. Despite its obvious value, generalization measures are frequently categorized by a lack of comprehensiveness and depth of the generalization analysis (Stokes & Baer, 1977). Stokes and Baer (1977) go on to mention that even though generalized behavior change was frequently reported, extensive, wide ranging, and practical generalization was not often sought or noted. After reviewing the Morse et al. (1996) and Walker et al. (2010) reviews, that is still the case with the current literature base in this arena. Difficulties with generalization of skills are well known in individuals with ID and to those who work with them. These difficulties often will mean that generalization will not just occur, but rather will need to be explicitly programmed and planned. Although the reviews by Morse et al. and Walker et al. demonstrated positive results for the most part, individuals with ID frequently cannot generalize the skills learned in a structured teaching situation in other similar settings or with different materials and people when they are on their own after high school graduation (Steere & DiPippi, 2012).

In summary, although the results of the literature reviews by Morse et al. (1996) and Walker et al. (2010) showed that simulations and CBI demonstrated positive results, simulation and CBI combinations will not be available once the students graduated from

high school. Also, although adult service agencies may have services available that can provide such instruction, it is difficult for them to receive services because as adults the services are limited compared to a 7-hour school day.

Teaching students in the natural environment is of critical importance. Brown et al. (1979) stated that as students with ID become young adults, the outcome of such curricular strategies often results in the delivery of instruction, which is nonfunctional, artificial, and inappropriate for their chronological age. As noted in the Walker and colleagues review, simulation may work but a very real question still remains. Given a limited number of years remaining in school programs, can the student possibly progress fast enough or far enough to acquire the skills needed for the most independent functioning possible in complex, heterogeneous post school environments (Brown et al., 1979) by continuing to use artificial and simulated interventions? Moreover, if educators are to teach them to perform functional skills in natural environments, it is necessary either to teach skills in those natural environments or to empirically verify that the skills are, in fact, being performed in those environments (Brown, Nietupski, & Hamre-Nietupski, 1976).

Individual Studies on Grocery Shopping

In addition to the reviews by Morse (1996) and Walker et al. (2010), a total of 12 individual studies were found by the researcher that dealt with teaching grocery shopping skills and participants with ID. Three studies examined the effectiveness of computer-based instruction to prompt grocery-shopping skills; and one study utilized concurrent instruction to teach grocery shopping skills. Also, eight studies used shopping lists with their participants. One of the 8 studies used picture lists to complete grocery

related tasks; 5 of the 8 studies used a combination of picture and typed grocery lists; one of the 8 studies used a list on an iPad created by the Book Creator app; and 2 of the 8 studies used audio lists. All 12 studies included in the review of the individual studies spanned from 1999 to 2014.

Computer Assisted Instruction and Grocery Shopping

Computer assisted instruction (CAI) is defined as the use of the computer in the delivery of instruction. Common categories of CAI included drill and practice, tutorial, simulation, instructional game, and problem solving. CAI is a common practice in the educational arena due to time constraints, which can limit the availability for students to attend CBI on regular basis. With regard to grocery shopping skills and CAI, three studies were located.

First, Ayres, Langone, Boon, and Norman (2006) investigated the use of computers and video technologies to teach four, 14-year-old students with ID to correctly make purchases in a community grocery store using the dollar plus purchasing strategy. The dependent variable of the study was accuracy of response and was defined as a student beginning payment for an item within 5 seconds of the cashier announcing the total and completing the response by handing the cashier the correct amount of money within 20 seconds of beginning the response chain. The study took place mainly in the classroom. Prior to CAI, there were approximately 10 direct instruction sessions where the teacher utilized a plastic cash register to teach students about the value of different bills. Following the direct instruction sessions, CAI took place during about 20 to 25 sessions. Finally, community probes occurred 6 times throughout the study but were not concurrent with instruction (one of the six probes was at the last session in a different

grocery store to assess generalization).

Results indicated that the program was effective at teaching the dollar plus purchasing strategy to three out of four participants and promoted generalization to the natural environment. Participant one performed at 100% correctly after CAI during computer and two community probes. Participant two's performance was variable throughout the study never reaching stable performance because she had difficulty controlling her medical condition, which likely affected her concentration and attention during the study. Participant three performed at 80% correctly after CAI during computer probes and 100% correctly during community probes. Participant four performed at 60% correctly during both computer and community probes. The authors recommended for future studies to explore the degree to which genuine practice and simulated practice influence student outcomes since integration of various modes of instruction may impact how rapidly participants acquire targeted skills.

In a related study, Hansen and Morgan (2008) researched the effects of CAI designed to teach grocery store purchasing skills to three high-school students with ID. This study extends the Ayres et al. (2006) study by (a) assessing the effects of CBI (on a regular basis) according to a five-step purchasing sequence (from choosing shortest check-out line to taking coin change, receipt, and groceries), (b) probing generalization in one initial grocery store and subsequently in three different ones, and (c) probing maintenance of skills 30 days following conclusion of the study. There were five steps of grocery purchasing skills were measured as dependent variables during the CAI and generalization conditions. These included (a) choosing a checkout stand; (b) placing three items (which varied on a weekly basis) on the checkout stand; (c) paying the correct

amount using the dollar plus strategy; (d) responding to a cashier's question; and (e) obtaining change, the receipt, and the purchased items.

The instruction was delivered through computer instruction using DVD (one 30-minute session per week) and CD-ROM (4 to 5 days a week in 30-minute sessions that presented video clips). After several CAI sessions, assessments for generalization from computer sessions were conducted at an actual grocery store. Following the completion of 4 to 8 grocery store probes at a specific store, individual participants were taken to 3 different stores to assess generalization of skills.

Hansen and Morgan (2008) reported that CAI is an effective means of teaching grocery purchasing skills to students with ID. Results of the study show that computer-based stimuli were apparently similar enough to those encountered in the initial probe store and 3 different stores to produce generalized responding. All 3 participants performed at 100% correct in the grocery store by the end of the intervention. Additional generalization measures in three different stores yielded 100% correct responses for all participants except in one session. All participants performed at 100% correct responses in 30-day maintenance probes. Hansen and Morgan explained that perhaps the participants learned to discriminate new stimuli in the original grocery-store, such as actions of other shoppers or cashiers, as cues for new responses. Participants in this study demonstrated more rapid skill acquisition on computer and grocery store generalization probes in comparison to the Ayers et al. (2006) study where researchers only examined the Dollar Plus component of the purchasing sequence.

Hansen and Morgan (2008) mentioned 4 limitations in their study. First, the study provided no evidence of whether generalization may occur to situations in which no

familiar person is present. Thus, more research is needed, to assess generalization across a variety of settings, teachers, and times of day. Second, all purchases were less than $10.00. This study did not provide evidence of whether generalization would occur if purchase amounts were greater than $10.00. More research is needed to investigate the generalization effects with varying amounts of money. Finally, on a related note, there were no variations in numbers of items purchased. In all cases, participants placed and paid for the three items. This study did not provide evidence of whether generalization would occur to more extensive purchases. More research is needed to examine purchasing differing quantity of items.

In another computer-based study, Langone, Shade and Clees (1999) investigated the effectiveness of CAI in teaching the discrimination of target grocery items (cereals) to four middle school students with ID. The purpose of the study was to evaluate the effectiveness of CAI in facilitating generalization of learned skills to the natural setting. Specifically, the CAI used photographs depicting target stimuli (i.e., cereal boxes as they appear on grocery store shelves) in an attempt to increase the likelihood that selection of cereal boxes would generalize to grocery stores in the community. Two dependent variables were used: (a) time to locate correct items, and (b) percent of correct item selections across the conditions. The study took place on the classroom computer. Grocery store probes were taken at two different grocery stores during pre-intervention and post intervention to assess generalization of skills.

Results indicated that 3 of the 4 participants all correctly matched above 80% across all pre-intervention probes, as well as their post-intervention repeated probes at a second grocery store all at 100%. One of the four participant's pre-intervention

performance was variable. The same three students that reached criterion during community probes reached the computer-based criterion (i.e., three consecutive sessions at or above 90% correct matches) on their third instructional session. Each participant received a post-intervention full probe on the computer. Three students all matched with 100% accuracy across all levels of difficulty. The same one participant who struggled throughout the study averaged 66% accuracy in matching from his pre-intervention score. Duration data were taken for the grocery store probes across all participants. Participant one's data represented a 54.7% (mean) and 47.3% (median) decrease in the time it took to locate the target cereals. Participant two's data represent a 48% (mean) and 54.7% (median) decrease in the time it took to locate the target cereals. Participant three's data represent a 48.2% (mean) and 90.2% (median) decrease in the time it took to locate the target cereals. Participant four's data revealed a 19.8% (mean) and 0% (median) decrease in the time it took to locate the target cereals. Specifically, the study by Langone, Shade, and Clees (1999) addressed an important issue also highlighted by Morse et al. (1996) who stated that a focus of future research should be on finding ways to ensure that skills which are learned in school-based training sites readily transfer to grocery stores in the community as seen with the participant whom struggled throughout the study. Additionally, Langone et al. (1999) suggest that future research efforts should address the effectiveness of current and emerging technologies on improving generalization of skills to natural settings more efficiently.

Although the results from the studies by Langone et al. (1999), Ayers et al. (2006), and Hansen and Morgan (2008) seemed positive regarding generalization in the natural setting, researchers and educators must be cautious. Stokes and Baer (1977)

warned that individuals with ID were less likely to see generalization happen as predictably. Therefore, exposure to the natural setting where individuals with ID are expected to perform for most of their lives should not be limited because of results such as these or risk decreased outcomes for these individuals.

Concurrent Instruction

Concurrent instruction refers to providing systematic, direct, and individual instruction in both school and non-school environments within daily or weekly time intervals (Brown et al., 1983). For example, a teacher provides instruction on certain skills through simulation experiences at school and others in an actual grocery store. Brown et al. mention that advocates of concurrent instruction rationalize that by providing both school and non-school instruction within a short time frame, the risks of not progressing from school to non-school environments are neutralized. With concurrent instruction, participants' access the grocery store on a daily or weekly basis rather than a few times throughout the study as was seen in all of the computer-based studies reviewed.

One study by Yakubova and Taber-Doughty (2013) examined the effectiveness of video modeling combined with verbal prompting on social skills within a purchasing task sequence. In their study, three students with ASD and ID (ages 12-15) were to make purchases in local grocery stores. The dependent variables of the study were standing in line, greeting a cashier, smiling, paying, saying "thank you," and retrieving purchased items. The independent variables were video modeling and verbal prompts. Activities took place in three settings: the classroom and two local grocery stores. As part of this study, participants attended CBI two days per week, one hour per day; and received daily

instruction in the classroom. Intervention sessions occurred in the checkout line of a large chain superstore, while generalization sessions took place in a second similar yet novel local grocery store. Video intervention sessions viewed by the participants prior to attending the actual store occurred two days a week for three weeks and lasted six sessions per student. While in the grocery store, each student located two items (varied on a weekly basis) on a shopping list then proceeded to the cashier's checkout lane to purchase the items.

Results of the Yakubova and Taber-Daughty (2013) study demonstrated the existence of a functional relation between the independent and dependent variables. When generalizing target skills to an untrained grocery store setting, the mean level of independent performance increased for all three students; however, with two participants, performances varied during generalization probes. The variations occurred because two students did not demonstrate "smiling," and one of the two students with varying results did not demonstrate independent performance when "thanking the cashier" during the entire intervention phase. One limitation of this study was the small number of participants. Replicating this study with a larger number of participants might produce further insights into teaching social skills and behaviors within functional tasks in community settings. It was recommended that future studies might examine data on how people usually interact with cashiers at the grocery store, which might provide greater insight into the necessary skills students with ID need to be fully integrated into society.

Grocery List Interventions

Variables such as making a list, getting to the store, locating items, purchasing items, and putting away items encompass the grocery shopping experience in its entirety. Practitioners many times used task analysis for multi-step behavior such as the grocery shopping process to divide the process into individual parts to not confuse participants. In addition to the interventions found using computer-based instruction and concurrent instruction, eight studies incorporated interventions using shopping lists as their dependent variable between 1999 and 2014. With regard to the reviewed grocery studies that included grocery lists, the type and construction of lists across studies were analyzed to determine how participants utilized grocery lists to locate specific grocery items. In total, (a) one study was identified as using photographic lists to complete community-related tasks; (b) 4 studies were identified as using a combination of picture and typed lists; (c) one study used an iPad with, and (d) 2 studies were identified as using only audio lists. Moreover, the studies reviewed that included grocery lists revealed a variety of methods for creating and using shopping lists in a grocery store with students with ID. Specifically, the following section discusses how shopping lists were generated and supported the shopper with ID.

Picture Lists

Picture lists have been a common intervention utilized for students working on community skills. Students who are nonreaders may need visual prompts or pictures to remind them of what to shop for or how to carry out a task. Picture lists are similar in format to traditional written grocery lists or step-by-step instructions. One benefit in today's technological arena with relation to picture lists is that technology can be

incorporated with picture lists by using digital cameras to take photographs, or using portable electronic devices as the format to deliver the pictures. One study was found that utilized picture lists (e.g., Taylor & Orielly, 2000). They developed an intervention using pictures to promote generalization of grocery shopping skills in an applied community setting. Six young adults with ID, ages 17 to 20 years old, participated in this study. The dependent measures were (a) number of correct responses in supermarket training settings and (b) number of correct responses-in generalization supermarket settings. Participants were taught 21 steps of a supermarket shopping task analysis (e.g., step 1 walks from car to supermarket; step 2 enters the market through the correct door; step 3 lifts a basket). Steps of the supermarket shopping task analysis were taught in the classroom and one supermarket training setting.

Training sessions were conducted 4 days per week (Monday to Thursday) over a 2-month period. Each training session consisted of group classroom training in the morning for 90 minutes followed by training on an individual basis in a grocery store setting in the early afternoon for 45 minutes. Participants were given a two-item shopping list (brought in by a parent or guardian on a weekly basis) and three pounds of a variety of monetary coins to use to purchase the two items.

Results demonstrated that all participants reached criterion responding in supermarket training settings (M =19.5 correct steps per session across all participants). There was little difference in the level of correct responding in training settings between experimental conditions. Generalization probes indicated that stimulus equivalence and multiple exemplar training produced similar levels of generalized task analysis responding whereas single instance training resulted in lower levels of generalized task

analysis responding.

The study had several limitations. One limitation is that the experimental design did not allow the researchers to determine precisely the effects of the established natural setting on generalization. Another limitation not mentioned by the researchers but worthwhile to mention was the authors lack of including if the amount of time provided in the intervention phase was too much or just right. Such information would have provided valuable insight for future researchers who might want to duplicate this study. Finally, the researchers demonstrated the potential of the equivalence model with the hope that it can be incorporated into a general taxonomy of strategies for promoting generalization and maintenance of behavior since they did not actually program for generalization.

Multiple Presentation and Types of Shopping Lists

Aside from the one study by Taylor and Oreilly (2000) that utilized a picture list with their participants, 4 studies incorporated a combination of video, picture and/or typed lists rather than using only one type of list. First, Mechling, Gast, and Langone (2002) conducted a study to teach generalized reading of words found on grocery store aisle signs, the location of the corresponding grocery items within those aisles, and how to locate grocery items at actual stores to participants using a list. Four students participated in the study, aged 9 to 17 years old. Entering the correct aisle and locating correct items for target items the dependent variables. This investigation included the use of sight words and aisle signs rather than photographs or memorization as the key strategy for independent shopping.

The study took place in the classroom or private center of the participants and

four grocery stores. Of the four grocery stores; three of them were videotaped and embedded into the CAI, which took place two to three days per week. The remaining grocery store was not videotaped and was used to assess the generalizations of the acquired skills to untrained settings. Two types of lists were used to address reading comprehension. The photograph list allowed students who read the written word on the aisle sign corresponding to the printed word. During training conditions, each participant used a grocery list on the computer containing 4, 8, or 12 grocery-item photographs. A total of 12 overhead grocery aisle sign words were included which did not vary throughout the study.

Results of the study showed that all 4 students demonstrated gains in their correct responding within natural settings following CAI for each set of words. All 4 students using the photograph list increased performance in the number of aisles entered correctly and correctly selected items. Three of the 4 students entered and located 10 to 12 of the words on their 12-item photograph and word lists during the final generalization condition in the grocery store. Results from both shopping lists indicated comparably higher levels of performance on the final generalization probe to those of grocery probes prior to instruction. All 4 students were able to generalize the reading of overhead signs and locating grocery items to a novel store. The researchers suggested that future studies could enhance their shopping strategy by addressing the skills of associating product categories with each other. Additionally, future studies could include locating items not listed on the aisle sign by reading the words with which they are associated in order to determine which aisles to enter.

Hutcherson, Langone, Ayres, and Clees (2004) also used a combination of shopping lists in their study. The purpose of their study was to evaluate the effectiveness of a computer program called Project Shop to increase the percentage of correctly selected grocery store items by 4 participants with ID aged 14 to 16 years old and to assess their ability to generalize to the natural setting. The dependent variables measured included the percent of correctly selected items, the duration to select each item, and generalization from the computer program to the natural environment. Each session consisted of 16 trials. Sessions occurred four to five days a week with one to three sessions per day depending on the condition. Grocery store sessions occurred at least three times for all participants before computer sessions began and after criteria was met for pre- and post-testing on the computer.

The results indicated that the number of correct responses during the computer condition increased for all students, and all students' performances in locating the target items correctly improved during the grocery store condition. To summarize community probe performance, student one correctly located 27.57% of target stimuli before intervention and 61.1% of stimuli following treatment. Student two's improvement was larger, averaging 19.67% in pre-intervention and 71.53% following intervention. Student three responded accurately on only 9.2% of occasions prior to intervention compared 46.52% of occasions following intervention. Student four, already responding correctly to 78.86% of stimuli during pre-intervention probes, improved and accurately located 92.7% of the items following intervention. The researchers recommended that future researchers could include more of a complete grocery shopping experience instead of focusing on an isolated skill, which was mentioned as a limitation in the study.

Another study that used a variety of shopping lists was Mechling and Gast (2003), who investigated the effectiveness of combining audio, video, and/or typed grocery list in teaching the location of grocery items with three students, ages 12-18 years old, with ID. Mechling and Gast investigated how to best match grocery aisle sign words with grocery items associated with the words, as well as the location of grocery items. Locating the target items and removing items from the shelves correctly were the dependent variables in this study. In order to teach these skills, the researchers created a computer program containing text, photographs, and video clips which was used during the intervention condition. All CAI occurred two to three days per week at the private office of the primary investigator. A local grocery store was used to create the CAI and another novel grocery store was used only for generalization measures. For generalization conditions in the stores, a list of all 9 grocery words was used. Words were typed in the sequence in which they appeared in the aisles of the store.

The results of the study demonstrated that all participants performed better in locating the target grocery items during the computer training and post-generalization conditions. Store generalization measures, immediately following CAI with student one to three, show the following mean percentage of correct responses for each word: Set 1 – 96.3%; Set 2 – 48.1%; and Set 3 – 74.1%. 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. During the initial probe condition, 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%. Mechling and Gast (2003) mention that 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 create a shopping list, which has not been pre-arranged in sequence, by location of items in the store.

In another study, which was an extension of the Mechling and Gast (2003) study, Mechling (2004) examined the effectiveness of a multimedia program (i.e., interactive computer program, video captions, and still photographs) and a grocery list to increase the grocery shopping fluency of three students aged 13 to 19 years old with ID by teaching these individuals how to read aisle signs and locate items. The researcher measured the correct responses and the amount of time required to complete ten steps for locating and obtaining the target items. The participants had prior experience by participating in Mechling and Gast study on locating grocery items. The 12 items on the grocery list were organized by categories (e.g., dairy, frozen foods, and canned foods) and fluency of skills was assessed through shopping at a local grocery store. Each student and his/her mother participated in the selection of 12 items that were included on individual shopping lists. Moreover, 6 items per list were included whose names appeared directly on the aisle sign, and 6 items were those which had associated names on aisle signs. Individual computer-based instructional sessions took place in each participant's home. Instruction occurred 4 to 5 days per week, 1 to 2 times per day (morning and/or afternoon), and lasted approximately 23 minutes. Three generalization trials before intervention and three after intervention were conducted at a local grocery store, which was also used to make video recordings and still photographs used with the computer program.

The results of Mechling (2004) indicated that all participants showed progress in the location and selection of grocery items, and the acquired skills were generalized to

the actual grocery store. In addition, the amount of time each student required to locate and select the target grocery items decreased. Student one needed 12 sessions to reach criterion while student two needed 16 sessions, and student three needed only 10 instructional sessions. Limitations of the study mentioned by Mechling (2004) included limiting generalization measures to three sessions, including only one store, and failure to measure maintenance of skills. By limiting the generalization measures to three sessions, it is unclear whether student performance would have continued to improve. Generalization measures were also limited to one store, the store depicted during CAI. It is therefore unclear whether students would be able to apply these strategies to different stores. Finally, the authors suggested for future research to examine the use of CAI taught simultaneously with instruction in the natural environment.

As shown, combining a variety of lists was shown to be effective in all four studies. A common theme that emerged from the literature was the number of items selected for the list, use of aisle signs and only locating items as the targeted skill. In 3 of 4 studies, there were 12 items used on the grocery lists for participants to locate. All four studies used aisle sign words on their lists to assist participants in locating items rather than having participants locate random items not shown on the aisle signs. Although, Mechling (2003) did have participants find 6 of 12 items that were not on the aisle signs. Finally, all four studies that used lists in their studies, focused solely on the locating items aspect of grocery shopping rather than focusing on the entire shopping experience.

Lists using Self-Operated Prompting Mobile Device

Self-operated mobile devices have a rich history of research in the field of ID (Mechling, Gast, & Seid, 2010). Researchers continue to investigate use of self-operated prompting systems, operated by persons with ID, as tools for increasing independence and decreasing reliance on external prompts delivered by adults or peers (Mechling et al). A total of three studies were found by the researcher that utilized a mobile device as a teaching tool with their participants.

iPad

One study that used a mobile device for their study was Burckley et al. (2014). The researchers evaluated the iPad with the Book Creator app to teach shopping skills in the community to an 18-year-old female participant with ASD and ID. The purpose of the study was to evaluate the use of visual cues and video prompting delivered by an iPad 2. The study took place at three local grocery stores. During intervention, the participant was taught to shop for the same two items using the iPad with Book Creator app to provide visual cues and video prompting. Then, a maintenance probe was conducted to evaluate the participant's independence in shopping for the same two items without the iPad 2. Finally, a generalization probe was conducted to assess the participant's independence in shopping for two novel items. Data were collected on the percentage of steps out of a total of nine steps in the shopping task analysis independently completed without instructor prompting.

Results of the study suggested that the iPad 2 with Book Creator app increased the participant's independent shopping in the community with evidence of maintenance and generalization in locations two and three. During baseline, the participant independently

completed an average of only 22% of the nine steps of the shopping task analysis in the first location, 17% in the second location, and 21% in the third location. Upon implementation of the intervention in the first location, the participant's percentage of independent shopping increased, but was variable with an average of 49%. Due to variable performance, medication changes and closure of the grocery store at the first location, intervention was discontinued at the first location on session forty-three. When the intervention was implemented in the second location, she performed 66% of steps independently. While her performance was initially variable, in later sessions her performance increased and became more stable, and thus intervention was introduced in the third location. When intervention was implemented in the third location, she performed 62% of steps independently. During the maintenance probe the participant was able to independently complete 88% of the shopping steps in the second location, and 88% of steps independently in the third location. In the generalization probe, in which she shopped for two novel items using the iPad with Book Creator app, she was able to independently complete 88% of steps of the shopping steps in the second location, and 88% of independent shopping steps in the third location.

Results of the study suggested that the iPad, a readily available technology device that many people without disabilities use, can be effectively adapted to teach functional DLS directly in the community. Furthermore, data suggest that shopping skills taught with the iPad maintained when the iPad was withdrawn, and the shopping skills generalized to novel shopping items. As seen in past studies, researchers have sought to establish shopping skills in non-community contexts, and then to evaluate for generalization in the community. The current study is one of few to employ CBI

exclusively to establish shopping skills using a mobile device such as the iPad. Although their study is similar to the current study, Burckley et al. differed in that they utilized a paper list during baseline and they utilized video prompting during intervention. Burckley et al. (2014) mentioned three limitations in this study. First, there were several medication changes that could have affected the participant's performance during the study. Second, while the participant acquired independent shopping skills, the instructor continued to hold the iPad and to forward the video frames during intervention; future studies should attempt to completely fade instructor assistance with the iPad. Lastly, preference assessments to identify shopping items were conducted once at the beginning of the study; however, the participant's preferences could have shifted over the course of the study, potentially decreasing her motivation to shop for the chosen items. Future researchers could employ more frequent preference assessments to identify different preferred items to be used in daily shopping trips.

Audio recorder

Two additional studies examined the effectiveness of mobile devices by utilizing audio recorders to create lists that support grocery shopping. First, Bouck, Satsangi, Bartlett and Weng (2012) sought to explore the effectiveness and efficiency of a low-cost, more commonly accessible technology to support grocery shopping skills with students with ID, with a particular focus on identifying and locating grocery items. Three male students older than 18 years of age with ID participated in this research project. The research project occurred in two settings: the classroom and a local chain grocery store. The classroom was used for training, interviews, and recording on the audio recorders. All of the shopping occurred in the same grocery store. Each weekly grocery list

consisted of ten items selected by the teacher. Across the weeks, items might repeat, but a whole list in its entirety was never repeated. During the two intervention phases, students were provided the grocery list using picture symbols and words in advance and recorded the 10 items into their audio recorders. The audio recorders were the only form of a grocery list they had in the store. The dependent variables were the correct number of items identified from the 10-item grocery list, the correct number of items obtained from the 10-item grocery list, the number of times items on the 10-item grocery list were listened to, and the time to complete the ten-item grocery list. The independent variables for the study were the audio recorders and the number of prompts (verbal and/or listening to each item on the recorder more than once). Students typically were allotted 30 minutes to complete their grocery shopping.

The results of the study suggested the students could use the audio recorders to correctly identify and locate ten-items from a grocery list. For participant one, the audio recorder was a challenging technology, particularly when he recorded the list him-self. He did show an increase in the number of correctly identified items from seven at the beginning to nine although his time to locate items did not improve going from 28 to 29 minutes to located items. Participant two appeared overall to do similarly well with both the picture list and the audio recorders. He also showed an increase in the number of correctly identified items from eight at the beginning of the study to nine items and his time to locate items improved from 20 minutes to 16 minutes. Participant three, similar to student two, had a lot of overlapping data points between the baseline and intervention phases. He showed improvement in the number of correctly identified items from 8 to 10 items and his time to locate items improved from 20 minutes to 14 minutes. The

researchers listed several limitations in this study. For one, the lists changed each week, although there were some consistent items across weeks. However, some items proved to be more challenging than others, both in terms of identifying them from the list or locating them within the store. Another limitation to the study involved the intervention condition and that students went over the list with the researchers prior to recording. A final limitation mentioned by the authors was the lack of either a maintenance or generalization phase; future research should include one of these phases.

In a related audio recorder study, Bouck et al. (2013) conducted a study to better understand the potential impact of self-prompting devices on the task of grocery shopping across the spectrum of students with ID who possess varying reading abilities. In comparison to Bouck et al (2012), the element of who records—student or another individual—was added for the purpose of exploring whether that variable impacted student success identifying and/or selecting the items. Three high school students between 17 and 19 years old with ID participated in this study. All three participants had extensive experience in grocery shopping but none of the students had used any self-operated prompting devices previously, including an audio recorder for school purposes.

As with Bouck et al (2012), the study took place across two settings: the classroom and the local chain grocery store. Each week the classes went on a grocery store trip and shopped in small groups. Training, interviews, and recording on the audio recorders took place in the students' classrooms while grocery shopping took place in the designated local grocery store. On a weekly basis, participants alternated between using an audio recorder with a grocery list they had recorded and using an audio recorder with a prerecorded list. This contrasted with their traditional means of grocery shopping, which

involved using handwritten grocery lists. Multiple dependent variables were assessed though the data collection process, including the correct number of items identified from the 10-item grocery list, the correct number of items selected from the list, and the time to complete the list. The independent variables were the audio recorder and the number of prompts needed to identify an item. Maintenance data were collected for two sessions. During maintenance, students used their audio recorder and the method found to be most effective for them during intervention (i.e., prerecorded vs. self-recorded).

The results of the study demonstrated that use of the audio recorder resulted in the students becoming more successful at correctly identifying grocery list items. All three students also required fewer prompts to correctly identify items on the list. All participants showed increases in identifying items. Participant one increased from six to nine items identified, participant two increased from three to nine items identified and participant three increased from eight to ten items identified. In addition, the students were more successful in identifying and selecting grocery items when they recorded the list prior to entering the store as opposed to when they received a list that was prerecorded by a researcher upon arriving at the store. The study did have some limitations. Student two was a more proficient reader than the teacher initially led researchers to believe. Hence, she did not struggle in baseline with identifying grocery list items as did the other two students. Another limitation may have been the length of the phases and conditions. Due to timing (the end of the school year), four sessions rather than five occurred for each intervention phase. A final potential limitation was the lack of a generalization phase. While the study included a maintenance phase, the study may have been strengthened with the inclusion of a generalization phase, in which students

went into a novel grocery store with the audio-recorded lists.

In summary, even though the aforementioned 8 studies that involved students and shopping lists, the majority of studies provided students with lists. Typed lists were provided to students in five studies (Bouck et al. 2012; Bouck et al. 2013; Mechling, 2004; Mechling & Gast, 2003; & Mechling et al., 2002;), only one study solely used picture lists (Taylor & O'Reilly, 2000), Hutcherson et al (2004) used picture cards and Burckley et al (2014) used a list on an iPad with video prompting during the intervention phase. Of the studies that used lists, three studies used a 2-item list, two utilized a 12-item list, two used a 10-item list and one study used a 9-item list. Only a few of the identified studies collected maintenance data. Of the studies reviewed 78% tested for generalization, and only a few collected maintenance data. These studies assess generalization in different ways. Some students demonstrated their ability to generalize shopping skills to actual grocery stores after receiving instruction through classroom simulations or CAI. Other students generalized their skills to novel stores or items. The majority of the studies reviewed, stressed the importance of incorporating CBI and incorporating advanced generalization variables in a study.

Summary

Upon review of existing literature, several themes emerged. First, there is a lack of research in the grocery-shopping arena that used mobile devices as a teaching tool for participants with ID while at the grocery store. Moreover, there were only three studies found that evaluated the effects of using mobile technology as a tool for creating grocery-shopping lists that may improve the ability of individuals with ID to locate items independently in a grocery store. Grocery shopping is a vital component of everyday life

for most adults. Therefore, in order for individuals with ID to be able to meet such a basic need of gathering food items they need to survive, it is essential that they become as efficient as possible in the grocery store.

Individuals with ID have been taught many components of grocery shopping such as obtaining a cart or hand basket, locating items in vivo and/or in simulated settings, and purchasing items. However, while the literature base on grocery shopping contains a fair number of articles, the literature review demonstrates that additional research is needed relating to student independence, specifically in developing shopping lists and effectively using lists without assistance. Given their weaker reading and writing abilities along with deficits in short term memory, students with ID need to learn an easy way to generate a list without manipulating hundreds of picture cards or large, bulky photo albums. This skill set can potentially be enhanced with the use and efficiency of technology such as portable electronic devices. While the literature supported using pictorial adapted aids, others supports may be effective with the use of technology in addition to pictures. The features available on portable electronic devices may be able to assist in increasing the independence, motivation, and abilities of individuals with ID. Portable, electronic devices have been shown to increase the ability of students with disabilities to perform functional skills independently in a variety of settings (Mechling et al., 2010). Supports that best suit the individual can be programmed into the device or the individual can learn to program in their own supports by recording an audio memo, taking pictures, or shooting a video all within one device. The grocery store is a common setting frequented by most people, but it becomes a difficult task for people unable to read a traditionally written list. People who are nonreaders and have memory deficits need adapted lists

including pictures to shop for groceries. Therefore, this study added to the current literature by evaluating the effects of using mobile technology as a tool to assist students with ID to locate items in a grocery store.

This study built upon the existing studies related to using a list to locate items in the grocery store in several ways. First, this study added to the limited literature base on the effective use of mobile technology relating to 18 to 22-year-old students with ID finding specific items from a list. While portable electronic devices are rapidly increasing in number and advancing in capabilities, research evaluating their applied use with persons with ID in the grocery store remains relatively limited (Mechling, 2011). The use of portable devices by individuals with ID may result in a decrease of dependence on teachers, job coaches and peers (Cihak, Kessler, & Alberto, 2008), and therefore, promote greater independence among this population of individuals.

Second, this study addressed the issue of generalization as a result of the intervention being undertaken entirely in the natural setting, which added to the literature as a means of enhancing transition and independent functioning of students in this disability group and age. Most studies (60%) found on grocery shopping skills mentioned additional generalization probes in the natural setting incorporated throughout the study not just in the beginning or end of the intervention is needed in future studies to assess its influence on learner outcomes. Generalization may not naturally occur simply because a behavior change was accomplished (Stokes & Baer, 1977). Thus, the need to actively program for generalization, rather than to passively expect it as an outcome of certain training procedures, is a point requiring both emphasis and effective techniques (Reeve, Reeve, Townsend, & Poulson, 2007; Smith & Gilles, 2003; & Stokes & Baer, 1977).

CHAPTER III

METHOD

During this study, the researcher examined the effects of using mobile technology as a tool to assist 18 to 22-year-old adults with ID in finding six items from a grocery-shopping list to improve their independence. In this chapter, information about the study's participants, setting, materials, dependent measures, general procedures, experimental design, and data analysis is presented. A summary of the methodology is included at the end of the chapter.

Participants

The three participants chosen were young adults in Grade 12 enrolled in a public high school located in an urban community. The school's student population, grades 9-12, is 97% Hispanic. The researcher requested that parents not take their child shopping during this experiment.

Several factors were considered when selecting participants for this study. Each participant selected was from ages 18 to 22 years, and each was identified by the school as having ID. The participants' psycho-educational evaluations were reviewed for verification of special education eligibility of ID. The researcher followed school board procedures for accessing student records and written parental consent was secured. A demographic description of each participant is presented in Table 1 followed by a more detailed description of each participant (pseudonyms used) in the narrative.

Table 1

Participant Demographic Information

Participant	Gender	Age	Grade	Primary Exceptionality	Intelligence Score	Adaptive Behavior Score****
Jesus	M	19	12	ID	58*	11-2*****
Logan	M	21	12	ID	55**	12-4*****
Ivis	F	19	12	ID	54***	12-1******

Note. *Intelligence score obtained using the Leiter International Performance Scale.
** Intelligence score obtained using the KABC.
***Intelligence score obtained using the PPS.
**** Scale score is displayed in age-equivalence
***** Adaptive score obtained using the VABS
******Adaptive score obtained using the SIB-R

Jesus

Jesus was a 19-year-old male with a moderate ID (Leiter International Performance Scale-Revised (Leiter-R) standard score equaled 58). His adaptive behavior score on the Vineland Adaptive Behavior Scale (VABS) was 11-2 (age-equivalent), placing his independent functioning at about 11 years old. He communicated his needs by composing full sentences. He was friendly and cooperative throughout the study.

Logan

Logan was a 21-year-old male with moderate ID (Kaufman Assessment Battery for Children-second edition [KABC-II] non-verbal index standard score equaled 55). His adaptive scores on the VABS was 12-4 (age equivalent), placing his independent functioning at about 12 years old. Logan communicated using 3- to 4-word sentences. He

was friendly and cooperative on most days of the study. Some days he was off task and playful.

Ivis

Ivis was a 19-year-old female with moderate ID (PPS Full IQ equaled 54) and a secondary exceptionality of ASD. Her adaptive behavior scores on the Scales of Independent Behavior-Revised (SIB-R) was 12-1 (age equivalent), and this placed her independent functioning at about 12 years old. She communicated using 3- to 4-word sentences. Sometimes she would not communicate clearly and the researcher would ask her to clarify what was said. She was friendly and cooperative throughout the study. She would get frustrated at times if people where in her way when navigating through the store.

Additionally, each participant was enrolled in the Successful Transition Education Program for Students (STEPS), which teaches students with ID between the ages of 18 to 22 years functional daily skills – including going into the community on a consistent basis – to increase their independence and overall quality of life once they graduate. The particular school was chosen when selecting participants because of the STEPS program housed at the school. Teacher nomination was considered in the selection of the participants. This approach was considered an effective method for finding the participants most in need of the intervention by single subject design researchers (Cooper, Heron, & Heward, 2007).

Moreover, participants that met the above inclusion criteria were further screened for prerequisite abilities necessary to complete the study activities, including (a) being engaged in a task for up to 5 minutes continuously, (b) attending to the iPad and gazing at

images displayed on screen, (c) possessing an independent range of motion of several inches with one hand or finger to interact with the iPad, and (d) possessing symbolic communication ability through picture recognition. The technology skill needed to meet the study's eligibility criteria included the ability to use the basic features and applications of an Apple iPad. An assessment was conducted in order to assess the participants' knowledge and ability to use an iPad.

Each participant had to be able to participate in weekly CBI outings during school hours 7:20 a.m. to 2:20 p.m. An informed written consent form was signed and received from each parent; each student signed a consent or assent form. Consent and/or assent was obtained following approved procedures by the Florida International University (FIU) and the local school districts' Institutional Review Boards.

Setting

The study was conducted at a local supermarket during weekly CBI outings in the early morning between the hours of 7:30 AM and 9:30 AM. The researcher received approval from the store to conduct the study. The store is located approximately 3-minute walking distance from the participants' school. It is a large store with a size of approximately 35,900 square feet with 17 aisles. This grocery store was chosen because of the store's close proximity to the school where the participants attend. The supermarket is in a community setting; along with the participants, researcher, and an independent observer, the public (e.g., shoppers, store workers, delivery persons) was at the supermarket at any given time throughout the study.

Materials

Data Forms

Data forms were kept on each of the participants. These forms collected data on the dependent variable, prompting sequence (see Appendix A), Task analysis form (see Appendix B), Inter-observer Agreement (IOA; see Appendix C), treatment fidelity (see Appendix D), Social Validity form (see Appendix E), iPad technology assessment form (see Appendix F), participant consent form (see Appendix G), parental consent form (see Appendix H), and participant assent form (see Appendix I).

iPad 2nd Generation and Application Software

One iPad was used in this study because participants used it one at a time. The iPad was kept in the classroom and was distributed at the grocery store during the CBI outing when participants arrived at the store. The iPad2 is the second generation of Apple's iPad tablet series. It features a 9.7-inch LED-backlit touch screen, 16-gigabyte hard drive, front and rear facing cameras, and built-in Wi-Fi capability (Apple Press Info, 2011).

The First-Then Visual Schedule application (Version 1.4; Good Karma Inc., 2014) (henceforth referred to as *App*) is a mobile application that allows caregivers and/or educators to provide positive behavior support through the use of visual schedules. Picture shopping lists along with item names were created through the application.

Additional Material

In addition to the data forms, the iPad, and App software, a grocery cart and grocery items to be selected at the store were utilized for the study.

Dependent and Independent Measures

Dependent measures included the number of task steps completed correctly and independently from the task analysis (see Appendix B), selecting the correct items from

the shopping list, and the duration of shopping. Independent variables in the study were the use of the shopping list on the iPad and the teaching of that list using least-to-most prompting. The prompts were in the following order: (a) first prompt-verbal prompt; (b) second prompt-gesture prompt; (c) third prompt-partial physical prompt; and (d) fourth prompt-full physical prompt (see Appendix A for the task analysis and prompting sequence for each step).

Data Collection

Data were collected on the number of task steps completed correctly and independently from the task analysis (see Appendix B). A plus (+) was scored when participants completed a correct step on the task analysis, which included selecting the correct items on the shopping list. A minus (-) was scored for topographical errors (i.e., doing the step wrong), latency errors (i.e., taking more than 10 seconds to start a task step), and duration errors (i.e. took longer than 60 seconds to complete a step not including finding items or took longer than 180 seconds to complete a step that involved finding items). The percentages of task steps correct were calculated by dividing the number of task steps correct by the total number of tasks multiplied by 100.

Data were also collected on the duration of shopping. When collecting duration data of grocery shopping, the researcher noted the time that a session began and the time that a session ended. The total duration was written on the data collection form.

Experimental Design

A single subject, multiple probe design across participants was employed using three participants. This design was used because it allowed for simultaneous measurement of the same target behavior exhibited by the participants under the same

environmental conditions. Additionally, a multiple probe design was selected for several reasons. First, treatment does not have to be withdrawn in a multiple probe design (Cooper et al., 2007). Withdrawing treatment in this project would not only be unethical, but nearly impossible, seeing as one cannot withdraw what has been learned (Cooper et al., 2007). Second, a multiple probe design allows for replication and verification of predictions of behaviors (Cooper et al., 2007). Prediction refers to the idea that if there is no effect attributable to the independent variable, the dependent variable's data path will remain unchanged from baseline. Verification is the confirmation that the dependent variable is changing in a predictable fashion as the independent variable is systematically applied. Replication refers to the repeating of the observed verifications within the same study. Replication and verification were achieved by comparing the treatment results of the first participant to that of the second participant, who had not received the treatment yet, and so on with other participants (Richards, Taylor, & Ramasamy, 2014). When prediction, replication, and verification can be demonstrated within a single subject design study, the functional relationship between the independent and dependent variables is demonstrated.

Multiple-baseline and probe procedures are combined into a "multiple-probe" technique. The technique is designed to provide a thorough analysis of the relationship between an independent variable and the acquisition of a successive approximation or chain sequence. It provided answers to the following questions: (a) What was the initial level of performance on each step in the training sequence? (b) What happened if sequential opportunities to perform each next step in the sequence were provided before training on that step? and (c) What happened when training was applied?

Since the study had three participants, a standard multiple baseline design would have kept the last participants in baseline for an extended timeframe. Therefore, in comparison to continuous baseline data collection, collecting baseline data intermittently minimized the effects of testing and maturation on the students (Cooper et al., 2007).

Sessions were held two days a week for approximately 16 weeks. There were two conditions to this study. The first was baseline. During baseline, participants were given a shopping list on an iPad with six items for them to locate independently with no prompting or corrections delivered by the researcher. Next was the intervention condition, which consisted of three phases. Participants started the intervention with phase one, which was learning to use a shopping list consisting of six items. Then, participants started intervention phase two (re-sequenced list), which is where the order of four of the six items was switched on the list. The third, and final phase, in the intervention condition was a third list where four of the six items on the initial list were replaced with new items.

If any probe datum showed the potential for an ascending trend, more probes for that participant would have been conducted. If the ascending trend was observed, the researcher would have switched to a continuous baseline procedure for that participant. The intervention was introduced to the participant only after stability. For this study, stability equaled 80% of the data occurring within 20% of the median (Gast, 2010). When the first participant reached criterion in the intervention and the second participant's baseline data were stable, the intervention was introduced to the second participant. This continued until each participant was receiving the intervention.

Data Analysis

Visual analysis of the data points was conducted after each session. A graph was included to show how many correct items were chosen. Verification occurred when the data points began to change at predictable times as each participant received the intervention. If baseline behaviors changed as intervention is applied, then a functional relation existed. The percent of task steps completed correctly from the task analysis and the numbers of items chosen correctly were the primary dependent variables. Duration of shopping was the secondary dependent variable. The researcher made research design decisions (e.g., changed conditions and phases) based on the primary dependent variables.

When analyzing the data, the researcher looked at several factors. To assess the effects within the study conditions, features were used to examine within and between data patterns: (a) level, (b) trend, (c) variability, (d) immediacy of the effect, and (e) overlap of data points between adjacent A-B conditions/phase contrasts (Kratochwill et al., 2010). When looking at level, the researcher analyzed if the amount of the target variable changed from baseline to intervention by calculating the absolute level change. The absolute level between two adjacent conditions is computed by comparing the values of the last data point of the condition to the first data point value of the second condition, subtracting the smallest value from the largest value and noting whether the change in level is in an improving or deteriorating direction relative to the intervention objective (Gast, 2010). Trend is another way to view the data and compare trends from baseline to intervention. A trend refers to the direction of the data paths. A shift in trend is generally an indicator that the intervention is having the desired effect or the opposite of the desired

effect. For this study, the researcher analyzed the trend using the split middle line of progression (Cooper et al., 2007).

Another way to view the data is inspecting the stability, or variability, of the data points. The researcher analyzed how divergent the scores were within the baseline and intervention conditions by using Gast's (2010) algorithm, 80% of the data falling within 20% of the median performance of the condition/phase. In addition to comparing level, trend, and variability of data within each phase, the researcher examined immediacy of change between conditions, which referred to the change in level between the last three data points in one phase and the first three data points of the next. The more rapid the effect, the more convincing the inference that change in the outcome measure was due to manipulation of the independent variable. Finally, the researcher examined the degree of overlap among adjacent A-B phase contrasts. This analysis permits researchers to determine the magnitude of change across conditions/phases of the study. The less overlap among data paths, the more convincing the argument for a functional relation between the variables under examination.

Regardless of the type of single subject design used, visual analysis of (a) level, (b) trend, (c) variability, (d) immediacy of the effect, and (e) overlap of adjacent data paths are included. If the criteria are met, the data are deemed to document a causal relation, and an inference may be made that change in the outcome variable is functionally related to manipulation of the independent variable (Kratochwill et al.,2013).

Procedure

Pre-Baseline

Assessment of reading skills

In the classroom prior to the baseline and intervention sessions, the researcher assessed the students' reading skills for aisle sign words associated with the grocery items and for grocery item words because they needed to read these words during the study (Mechling & Gast, 2003). To assess these skills, aisle sign and grocery item words on flashcards were presented and the participants were asked to read each word on a one to one basis. A correct response was worth one point, and an incorrect response was worth zero points. Therefore, the total possible points for this assessment was 10 points. Individuals who scored 7 points (i.e., 70 %) in the assessment were included in the study.

Assessment of matching skills

In the classroom prior to the baseline and intervention sessions, the researcher asked the students to match ten grocery item words (flashcards) with photographs of the grocery items and with actual grocery items (Mechling & Gast, 2003) on a one to one basis. During the assessment, the researcher presented each individual three photographs (1 target and 2 non-target) for each of the grocery words. Then, the potential participants were asked to choose a photograph that represented the word presented. The researcher randomized placement of the photographs so that the target was in a different position during the assessment. After this, the participant was asked to match the same 10 grocery words with the actual grocery items located on the desk. There were three actual grocery items placed in front of them on a desk. Two of the items were incorrect and one was the right answer. Participants were asked to pick the correct item from the desk that matched the grocery word flash card. The total possible score for this assessment was twenty points (ten points for matching the grocery item words with the correct grocery item photograph and ten points for matching the grocery item words with actual grocery

items). Participants who scored fourteen points (i.e., 70%) in the assessment were included in the study.

Assessment of iPad skills

The researcher assessed the skill of using an iPad prior to commencing baseline. In order to assess these skills, an iPad technology skills assessment checklist (see Appendix F) was utilized on a one to one basis with each participant. Specifically, the researcher assessed whether the participant could: (a) use the wake mode; (b) turn the iPad to change orientation from portrait to landscape; (c) use one finger to scroll up and down, as well as left and right; (d) adjust the volume using the buttons on the side of the iPad; (e) single tap to access or launch applications; and (f) turn the iPad screen off using the power button on the side of the iPad.

Baseline

Baseline probe sessions began following the completion of the pre-baseline condition. In accordance with the current classroom curriculum, the special education classroom teacher chose six specific grocery items from different aisles to be used during baseline. The researcher developed a shopping list with these six grocery items. Participants could have been exposed to shopping with others using lists (e.g., teacher or caregiver). However, participants did not shop independently at the grocery store using a list on the iPad. All six-grocery items' names were taken directly from the aisle signs. Items were recognizable to the participants. The items on the shopping list were sequentially presented according to the layout of the grocery store. At the grocery store, the researcher gave the participants an iPad with a list presented using the First-Then

Visual Schedule App and had them independently shop for the six items (see Appendix I).

Participants worked with the researcher individually. The participants performance completing the steps in the task analysis, selecting the items from the list, and the duration of shopping were recorded as described in the data collection section. After the participants arrived at the grocery store, the researcher started the timer (i.e., started the timer as soon as they walk into the store and stopped the timer at the end of 20 minutes) and handed the participants the iPad with a list presented using the First-Then Visual Schedule App. The researcher gave the directions, "Find the items on the list." No assistance of any kind was given. If the student was correct with a step, we proceeded to the next step. Participants could have completed the steps out of order relative to the task analysis when applicable (e.g., find item two on the list before item one). At the end of 20 minutes or upon completion of all steps of the task analysis (whichever comes first), the session ended. The session could also have ended after 3 minutes of non-responding. In that case, the researcher asked the participant if he or she as finished shopping. If he or she responded, "yes," the session ended and the researcher logged the duration of that session. Once the participant exited the store, the researcher returned all the items in the cart to the appropriate aisle of the grocery store. Potential unforeseen interruptions occurred such as, spillage in the aisle, a person stocking items where an item needs to be located, or a customer in the way of an item. If a spillage occurred, the participant waited until it was almost cleaned up or went to the next aisle to look for another item and return to the aisle with the spillage later. If a customer or stock person was in the way of an item, the researcher asked the person to briefly move while the participant reached for the

item.

iPad and First-Then Visual Schedule training

Before the intervention, participants were trained on using the First-Then Visual Schedule App and the iPad. They reviewed the basic functions of the iPad needed to complete the intervention. Participants were trained on navigating the First-Then Visual Schedule App and checking off items found. Least-to-most prompting was used. Verbal praise was given for each step completed correctly. The following prompt sequence was implemented to train participants on using the iPad and the App: (a) first prompt-verbal prompt; (b) second prompt-gesture prompt (researcher pointed to the task); (c) third prompt-partial physical prompt (researcher moved participant's finger to the task); (d) fourth prompt-full physical prompt (researcher moved participant's finger to task and completed the task with the participant using hand-over-hand assistance).

Intervention

Each participant began the intervention condition after baseline, and they were worked with individually. Intervention was carried out in three phases including instruction on an initial grocery list, instruction on a re-sequenced grocery list, and then instruction on a replacement grocery list (see below; MacDuff, Krantz, & McClannahan, 1993).

Initial grocery list

Once the participants arrived at the grocery store, the researcher started the timer (i.e., started the timer as soon as they walked into the store and stopped the timer at the end of 20 minutes) and handed the participants the iPad with a list presented using the First Then Visual Schedule App. The researcher gave the direction, "Find the items on

the list." Participants were taught the steps of grocery shipping from a list (see Appendix A) using least-to-most prompting. Verbal praise statements were given for each step completed correctly. The following prompt sequence was implemented by the researcher contingent on topographical (i.e., incorrect responses), latency errors (i.e., not starting a step within 10 seconds), or duration errors (i.e., not completing a step within 60 seconds, including finding items) by the participant: (a) first prompt-verbal prompt followed by a 5-second delay; (b) second prompt-gesture prompt followed by a 5-second delay; (c) third prompt-partial physical prompt followed by a 5-second delay; (d) fourth prompt-full physical prompt to complete the task step (see Appendix A for specific prompting sequences for each step). On those steps where the participants had to read as part of the response requirement, verbal and a progressive time delay was used. The researcher said read me the word, for example "rice" as she pointed to the correct answer. On the next trial, the researcher said, "read me the word, for example "rice" but waited 2 seconds. On subsequent trials the time delay was expanded to 2, 4, 6, and 8 seconds contingent on participants' success reading the word.

To move to the next phase of the intervention, there needed to be 3 to 5 consecutive sessions whereby participants completed 85% of the task analysis and retrieved 5 out of 6 items on the grocery-shopping list. At the completion of all the tasks on the task analysis, the researcher returned all items in the cart to the appropriate aisle of the store. This was completed away from the participants.

Re-sequenced grocery list

After participants reached the above criteria for the initial shopping list, the researcher conducted a three-session baseline probe to determine if participants were able to find items on the list once the list was re-sequenced (MacDuff et al., 1993). Two items remained in the original sequence and four items were re-sequenced on the list. All items on the re-sequenced list were located on the aisle signs and were recognizable by participants. Participants followed this new list throughout this second phase of the intervention. Probe sessions were conducted identical to baseline. After stability, and if needed, the intervention procedures used to teach the initial list to the participants were implemented during this phase. To move to the next phase of the intervention, there needed to be 3 to 5 consecutive sessions whereby participants completed 85% of the task analysis and retrieved five out of six items on the grocery shopping list.

Replacement grocery list

Once the participants met the mastery criteria for re-sequenced shopping list, the researcher conducted a 3-session probe to determine if participants were able to find new items on the list (MacDuff et al., 1993). Two items on the original list remained and four new items were added on the list. All 6 items on the replacement grocery list were located on the aisle signs and were recognizable to the participants. Participants followed this new list throughout this phase of the intervention. Probe sessions were conducted identical to baseline. After stability, the intervention used to teach the initial list to the participants was implemented during this third and final phase of the intervention condition. After 3 to 5 sessions, whereby participants completed 85% of the task analysis and retrieved five out of six items on the grocery shopping list, this phase concluded.

Interobserver Agreement

Interobserver agreement (IOA) refers to the degree to which two or more independent observers or raters agree after observing or scoring the same events (Cooper et al., 2007). In this study, a trained rater collected IOA on the dependent variables on approximately 30% of the sessions in each condition (Cooper et al., 2007). One independent rater, a doctoral student from FIU, was trained to measure and rate the participants' number of task steps completed correctly – including selecting the correct items from the shopping list – and duration of shopping. The training was scheduled for a 2-hour session. At this training, the rater was provided with verbal and written instructions on the documentation of data scoring sheets for the dependent variables. Moreover, the independent rater and the researcher role-played collecting data while observing another adult (faculty member) simulate the task steps. Both reviewed the criterion and continued practicing on the sample data until at least 80% agreement was obtained. At this point, the independent rater was considered trained (Copper et al., 2007).

The IOA data were collected during baseline and intervention conditions. A minimum IOA of 90% was obtained for each sample. The researcher used a point-by-point agreement method (Kennedy, 2005) to calculate IOA whereby both observers had to record the code on the same task step and recorded the same duration time frame of grocery shopping (within 5 seconds of each other). The following formula was used for task steps: divide the number of agreements by the number of agreements plus disagreements and then multiply by 100.

Additionally, the following formula was used to calculate total duration IOA data: the percentage of agreement equaled the shorter duration divided by the longer duration multiplied by 100 (Richards, Taylor, & Ramasamy, 2014).

Treatment Fidelity

Treatment fidelity (TF) refers to the extent to which the independent variables are carried out as planned by the researcher (Cooper, et al., 2007). To ensure that TF is maintained, a TF checklist was used daily by the researcher. This served as a measure to ensure that procedures were being carried out as planned.

The independent observer who was used for the IOA data was also trained to collect TF data. The observer was trained to use the Treatment Fidelity Procedure Checklist (see Appendix D) in a training session before the beginning of the study. Training was provided in the same 2-hour session. During this session, the rater was given a copy of the TF checklist. The independent observer was asked to observe the researcher as she executed the steps of the Treatment Fidelity Procedure Checklist during a session with the teacher or a university faculty member. Upon completing the checklist, the rater and researcher compared checklists and calculated TF. Training continued until 100% accuracy was obtained.

After the training, the observer observed 20% of sessions during baseline and intervention, and assessed the sessions using the TF checklist. Data were collected and recorded from each of the conditions of the study. Treatment fidelity data were calculated by dividing the number of observed researcher behaviors during a session by the number of planned/possible researcher behaviors and multiplying by 100 (Gast, 2010).

Social Validity Measure

At the end of the intervention condition, the participants' teacher was interviewed using a rating scale to complete a social validity questionnaire (see Appendix E). On the questionnaire, the teacher was asked about her perceptions of using the iPad, the App, and the intervention to help participants locate items in the grocery store.

Summary

This study examined the effects of using mobile technology to grocery shop using a list on item acquisition percentages of 18 to 22-year-old adults with ID who have difficulty in locating items in a grocery store. The research questions focused on whether or not the iPad App as a tool had an effect on the total number of items acquired with an initial list of six items, when four items are re-sequenced, and when four items are replaced from the initial list using least-to-most prompting. Additionally, the research focused on the percentage of task steps completed correctly from a task analysis, number of items selected, and shopping duration.

The participants were three high school transitioning adults' ages 18 to 22 years attending the STEPS program who participated in weekly CBI. The setting was in one grocery store. The materials included consent forms, technology assessments, TF procedure sheets, data sheets, a task analysis form, iPad 2nd generation, IOA forms, grocery list (using First-Then Visual Schedule App), grocery cart, and a social validity interview protocol.

The dependent variables were the percent of task steps completed correctly from the task analysis, the number of items selected correctly and independently from a list,

and the duration of shopping. The independent variables of the study were the use of the shopping list on the iPad and the teaching using least-to-most prompting. A single subject, multiple probe design across participants was used in this investigation. A multiple probe baseline design was selected for several reasons. First, treatment does not have to be withdrawn in a multiple probe design (Cooper et al., 2007). Second, a multiple probe design allows for replication and verification of predictions of behaviors (Cooper, et al.). Third, some participants did not have to remain in baseline for longer periods of time, which could have affected the results of the study.

A steady state of item acquisition was maintained before the first participant began the intervention. Upon reaching steady state in the intervention stage of the first participant, the intervention was then applied to the second participant provided their baseline data were stable. This continued for the third participant in the study. Data were collected and graphed after each session. Visual analysis of the data was conducted daily.

Pre-study procedures included obtaining parental consent and participant consent/assent; technology, matching, and reading assessments administered to participants; and training of raters on all forms and procedures. Upon obtaining steady state with a participant during baseline, the intervention condition began with said participant after training in the use of the iPad. During baseline, participants located items using an iPad independently and were not corrected if there was an error in locating items or no response. Once in intervention, participants located six items from an initial list using the First-Then Visual Schedule App. Verbal praise was given to participants if they completed a step correctly from the task analysis. If there was an error or no response from participants in locating items, least-to most-prompting was utilized. The prompts

were (1) verbal prompt, (2) gesture prompt, (3) partial physical prompt and (4) full physical prompts. Reading of the aisle signs was prompted with a verbal prompt and faded out using a progressive time delay. The same procedure followed in the next phase of re-sequenced list where four items from the initial list were re-sequenced. Finally, the same procedure was followed with the third phase using a replacement list where four items were replaced from the initial list. To move between phases of the intervention, there needed to be 3 to 5 consecutive sessions with 85% or better independent responding.

CHAPTER IV

RESULTS

This chapter details the results of the study, which used a multiple probe design to explore the effects of least-to-most prompting and a mobile device as a tool to locate items from a grocery list by transitioning students with ID. There was a baseline condition followed by one intervention condition with three phases used in this study. The three phases were (a) an initial grocery list, (b) a re-sequenced grocery list, and (c) a replacement grocery list. The dependent variables were percentage of task steps completed correctly and independently from the task analysis, number of grocery items selected correctly, and duration of shopping. Each of the grocery lists in the three phases of the intervention contained six items and the task analysis contained 20 steps. Overall, all participants demonstrated improvements in their ability to complete task steps and locate grocery items during the intervention condition. Two of the three participants' duration of shopping also improved by decreasing over the course of the intervention. However, only one participant advanced to phases two and three of the study as the others did not meet criteria of achieving 85% or better on the task analysis and obtaining at least 5 out of 6 items from the list, which was needed to advance to the subsequent phases of the study.

Figure one displays the data for percent of task analysis steps completed correctly. Percent of task steps correct is presented along the y-axis and sessions are presented on the x-axis. Figure two depicts the data for number of items selected correctly. Number of items selected is displayed on the y-axis and sessions are presented on the x-axis. Figure

three displays the data for total duration of shopping. Total duration is presented on the y-axis and sessions are presented along the x-axis.

Figure one displays the data for percent of task analysis steps completed correctly. Percent of task steps correct is presented along the y-axis and sessions are presented on the x-axis. Figure two depicts the data for number of items selected correctly. Number of items selected is displayed on the y-axis and sessions are presented on the x-axis. Figure three displays the data for total duration of shopping. Total duration is presented on the y-axis and sessions are presented along the x-axis.

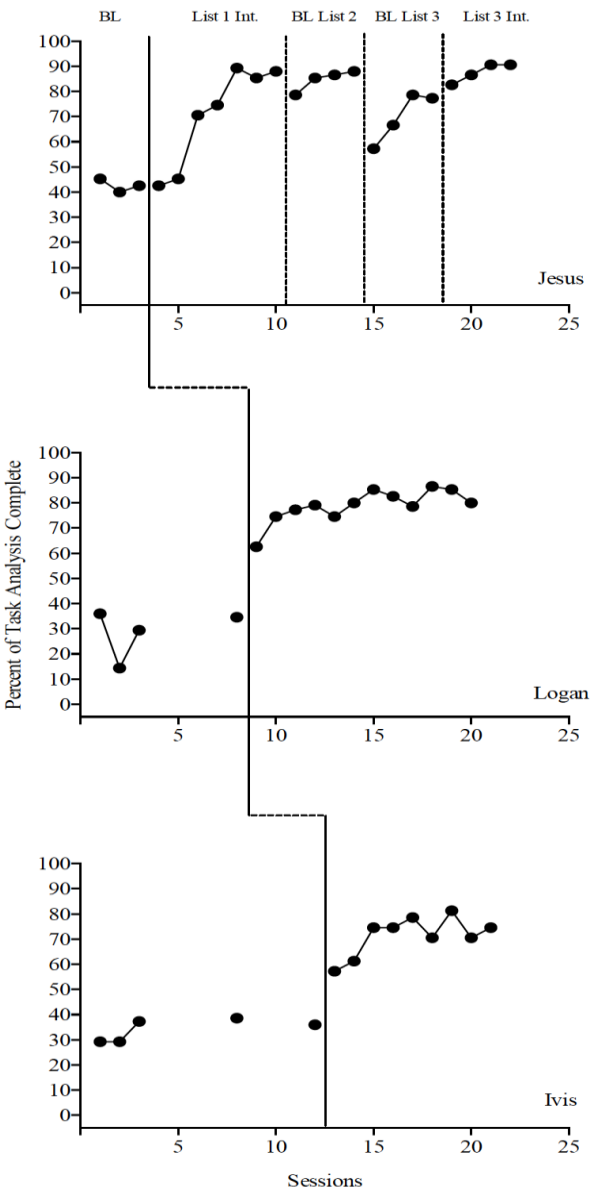

Figure 1. Percentage of task steps correct in all phases during grocery shopping.

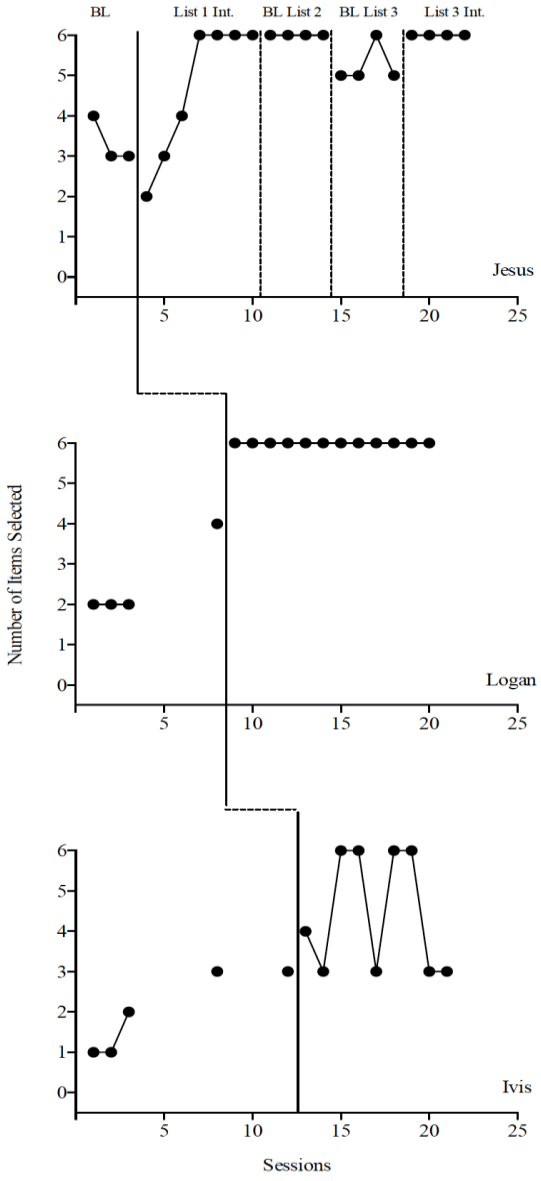

Figure 2. Number of items selected from the grocery list.

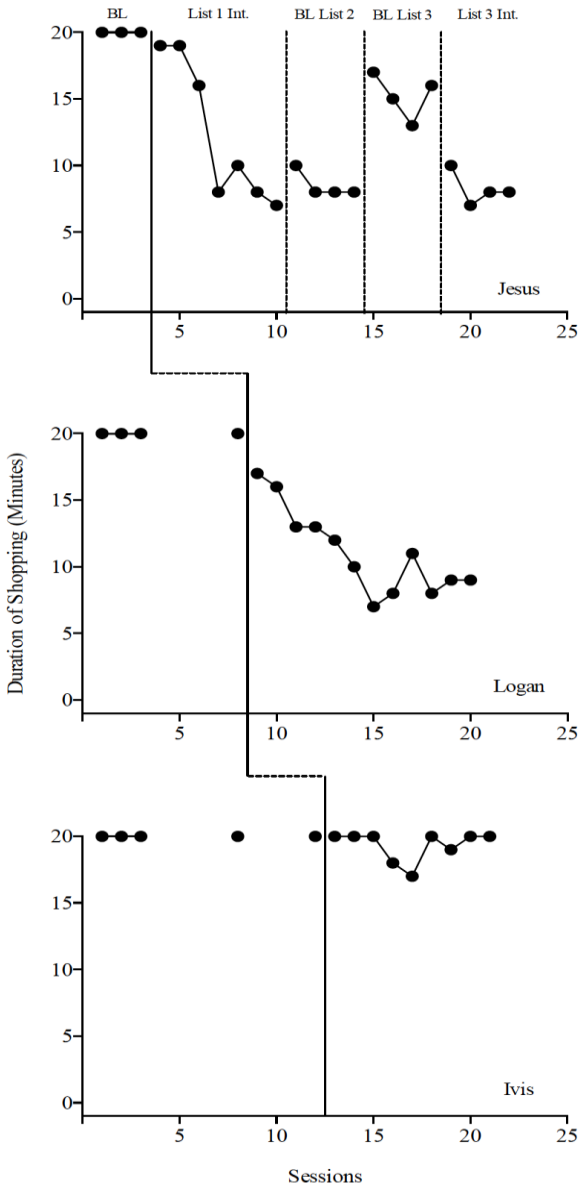

Figure 3. Grocery shopping duration.

Interobserver Agreement

The researcher and an additional observer collected interobserver agreement (IOA) data. Data were collected for 40.3% of sessions for all participants and across all conditions and phases of the study and equaled 96.7% (range 90-100%). During the initial list baseline condition across all participants, IOA data were collected 40% of

sessions and equaled 96.8% (range 90-100%). During the intervention condition for list one, and across all participants, IOA data were collected 39.2% of sessions and equaled 96.3% (range 90-100%). During baseline for list two (Jesus only) IOA data were collected 50% of sessions and equaled 95% (range 90-100%). The IOA data for list three baseline (Jesus only) were collected 50% of sessions and equaled 100%. During the intervention for list three (Jesus only), IOA data were collected for 50% of sessions and equaled 97.5% (range 95-100%).

Treatment Fidelity

The researcher and an independent observer collected treatment fidelity (TF) data for 40% of sessions for all participants and across all conditions/phases of the study and equaled 100%. During the initial baseline list, and across all participants, TF data were collected during 40% of sessions and equaled 100%. During the intervention for list one, and across all participants, TF data were collected for 39.2 % of sessions and equaled 100%. During baseline for list two (Jesus only), TF data were collected 50% of sessions and equaled 100%. Treatment fidelity data for the baseline of list three (Jesus only) were collected 50% of sessions and both equaled 100%. During intervention for list three (Jesus only), TF data were collected for 50% of sessions and equaled 100%.

Jesus

Percentage of task analysis. Jesus' data are presented on the first tier of Figure 1. During the initial list baseline, Jesus' mean percentage of task steps completed was 42.6% correct (range 40-45.3%; see table 2). These data were stable with a slight descending trend.

During intervention list one, his mean percentage of task steps completed was 70.8% correct (range 42.6-88%; see table 2). The data were stable and showed an ascending trend. This trend stabilized to a zero trend for the last three data points of the phase. There was slight overlap in the percent of task analysis steps completed between the baseline list one and intervention list one data points. The overlap of data paths was for the first two data points of the list one intervention. After session three of the list one intervention, the data showed a greater spread between the two conditions with no additional overlap.

During list two baseline, Jesus' mean percentage of task steps completed was 85% correct with a range of 78.6-88% (see table 2). He met criterion (response rate of 85% or higher on the task analysis and locating at least five out of six items from the list for three sessions). The data for list two baseline demonstrated a gradual ascending trend during this phase with little variability.

During list three baseline, Jesus' mean percentage of task steps completed was 70% (range 57.3-78.6%; see table 2). There was an overall ascending trend for this phase; however, the last data point demonstrated a decrease in performance. Moreover, each data point during list three baseline was below the criterion for mastery.

During the list three intervention, Jesus' mean percentage of task steps completed was 87.6% correct (range 82.6-90.6%; see table 2). For list three, the data showed an ascending trend in the data path. These data were stable with the last two data points being identical. There was no overlap in data between the list three baseline and the intervention phase for that list.

Number of items selected. Jesus' data are presented on the first tier of Figure 2 for number of items selected. During the initial list baseline, Jesus' mean of number of items selected was 3 items with a range of 3-4 items (see table 3). A descending trend of the data path was evident for this condition.

During the list one intervention, Jesus' mean number of items selected was 5 (range 2-6 items; see table 3). The data showed an ascending trend until data point four, at which point the data showed a zero trend. There was overlap between the data in baseline and the first three intervention data points; however, this was not the case for the remainder of the data points.

During list two baseline, Jesus' mean of number of items selected was 6 (range 6-6 items; see table 3). He met the criterion (response rate of 85% or higher on the task analysis and locating at least five out of six items from the list for three sessions). There was no variability observed and there was a zero trend.

During list three baseline, Jesus' mean number of items selected was 5 items with a range of 5-6 items (see table 3). These data were stable with a slight ascending trend. During list three intervention, his mean number of items selected was 6 (range 6-6 items; see table 3). For the number of items selected during intervention phase three of the study, the data path showed stability for all sessions and a zero trend was evident. There

was, however, a slight overlap in the data point from session three of the baseline list three phase and the data path of all sessions of intervention phase three.

Duration of shopping. Jesus' data are presented on the first tier of Figure 3. During the initial baseline list, Jesus' mean duration of minutes shopping was 20 (range 20-20 minutes; see table 4). These data were stable with a zero trend.

During list one intervention his mean duration of minutes shopping was 12 (range 7-19 minutes; see table 4). The data showed a descending trend except for data point five, which showed a 2-minute increase in shopping time. There was no overlap in the data between list one baseline and list one intervention.

During list two baseline, Jesus' mean duration of minutes shopping was 8.5 (range 8-10 minutes; see table 4). The last three data points were stable with a zero trend. Moreover, Jesus met criteria for list two during these baseline sessions.

During baseline list three, Jesus' mean duration of minutes shopping was 15 (range 13-17 minutes; see table 4). There was an overall descending trend with the last data point ascending. During list three intervention, his mean duration of minutes shopping was 8 (range 8-10 minutes; see table 4). His duration of shopping data for intervention list three showed a descending trend. Moreover, there was no overlap in the data paths between baseline list three and the intervention for list three.

Logan

Percentage of task analysis. Logan's data are presented on the second tier of Figure 1. During the initial baseline list, Logan's mean percentage of task steps completed was 28.6% correct with a range of 14.4-36% (see table 2). These data were stable with the final probe data point being in the range of the first and third data probes.

During the list one intervention, Logan's mean percentage of task steps completed was 79% correct (range 62.6-86.6%; see table 2). There was no overlap in data between the list one baseline and list one intervention. Additionally, the overall data path demonstrated an ascending trend. However, a pattern of variability was evident whereby Logan's performance would increase for several sessions and then decrease. Consequently, he was unable to maintain a stable response rate of 85% or better for at least three consecutive sessions on the percentage of task analysis complete. Therefore, although Logan showed substantial improvement between the list one baseline and list one intervention, he did not meet the criterion to move on to phases two and three of the study.

Number of items selected. Logan's data are presented on the second tier of Figure 2. During the initial list baseline, Logan's mean number of items selected was 2 (range 2-4 items; see table 3). The first three data points were stable with a zero trend, however, the fourth data point ascended (note that research design decisions were based on the percent of steps correct data).

During the list one intervention, the mean number of items selected was 6 (range 6-6 items; see table 3). The data for the list one intervention showed no performance variability and the data were stable with a zero trend. Moreover, there was no overlap between the data from the list one baseline and intervention. Although Logan met the criterion of locating at least five out of six items for each session of intervention for list one, he did not meet criterion of a response rate of 85% or more for at least three consecutive sessions on the task analysis. Therefore, he did not move on to phases two and three of the study.

Duration of shopping. Logan's data are presented on the second tier of Figure 3. During the initial list baseline, Logan's mean duration of minutes shopping was 20 (range 20-20 minutes; see table 4). These data were stable with a zero trend.

During list one intervention, his mean duration of minutes shopping was 11 (range 7-17 minutes; see table 4) There was an overall descending trend during the condition; however, the last several data points became level. Finally, there was no overlap of the data between the list one baseline and intervention conditions.

Ivis

Percentage of task analysis. Ivis' data are presented on the third tier of Figure 1. During the initial list baseline, Ivis' mean percentage of task steps completed was 34.1% correct (range 29.3-38.6%; see table 2). The last three data points demonstrated stability with a zero trend.

During the list one intervention, her mean percentage of task steps completed was 72% correct (range 57.3-81.3%; see table 2). There was an initial ascending trend that became level as the session progressed. There was no overlap between the data paths for the baseline and initial list conditions. However, after nine intervention sessions, Ivis' performance data remained under the criterion to advance to the phase two and three lists. Although Ivis showed improvement between baseline and intervention conditions for list one, she did not meet the criterion to move on to phases two and three of the study.

Number of items selected. Ivis' data are presented on the third tier of Figure 2. During the initial list baseline, Ivis' mean number of items selected was 2 with a range of 1-3 items (see table 3). These data had an overall ascending trend with the last two probe data points demonstrating the start of a zero trend. During the list one intervention, her

mean of number of items selected from the list was 4 with a range of 3-6 items (see table 3). These data were variable with considerable overlap between the initial list baseline and the initial list intervention conditions.

Duration of shopping. Ivis' data are presented on the third tier of Figure 3. During the initial list baseline, Ivis' mean duration of minutes shopping was 20 (range 20-20 minutes; see table 4). These data were stable with a zero trend.

During list one intervention, her mean duration of minutes shopping was 19 (range 17-20 minutes; see table 4). Ivis' data showed that her duration of shopping minutes remained stable throughout the list one intervention except for three data points, which showed variability among the data. Moreover, there was considerable overlap of the data paths between the initial list baseline and intervention conditions.

Social Validity

A social validity questionnaire was administered to the teacher at the end of the study. The teacher reported that the intervention focused on an important behavior. The teacher reported that she felt that the iPad was a successful tool to help individuals with ID locate grocery items at the grocery store. Moreover, the teacher reported that she felt the intervention was enjoyable and was not socially stigmatizing for participants. She reported that she understood the intervention steps and that she would use this intervention in the future with her students. The participants were not surveyed because they were not part of the social validity protocol outlined in the procedures section of this study. The measure for social validity was the teacher's perception of the intervention used in this study and its use with her students in the future, thus participants were not surveyed.

The doctoral student that assisted during the study with data collection was unable to complete the social validity questionnaire. He left the country the same day the study concluded.

Table 2

Percentage Correct Task Analysis

Participant	Baseline one Task %	Phase one Task %	Baseline two Task %	Baseline three Task %	Phase three Task %
Jesus	42.6	70.8	85	70	87.6
	(40-45.3)	(42.6-88)	(78.6-88)	(57.3-78.6)	(82.6-90.6)
Logan	28.6	79	N/A	N/A	N/A
	(14.4-36)	(62.6-86.6)			
Ivis	34.1	72	N/A	N/A	N/A
	(29.3-38.6)	(57.3-81.3)			

Note. The top number represents the individual mean for percent correct and the bottom numbers represent the range of scores.

Table 3

Number of Items Found

Participant	Baseline one # of Items	Phase one # of Items	Baseline two # of Items	Baseline three # of Items	Phase three # of Items
Jesus	3	5	6	5	6
	(3-4)	(2-6)	(6-6)	(5-6)	(6-6)
Logan	2	6	N/A	N/A	N/A
	(2-4)	(6-6)			
Ivis	2	4	N/A	N/A	N/A
	(1-3)	(3-6)			

Note. The top number represents the number of items found and the bottom numbers represent the range of scores.

Table 4

Duration of Shopping

Participant	Baseline one Duration	Phase one Duration	Baseline two Duration	Baseline three Duration	Phase three Duration
Jesus	20 (20-20)	12 (7-19)	8.5 (8-10)	15 (13-17)	8 (8-10)
Logan	20 (20-20)	11 (7-17)	N/A	N/A	N/A
Ivis	20 (20-20)	19 (17-20)	N/A	N/A	N/A

Note. The top number represents duration of shopping in minutes and the bottom numbers represent the range of scores.

Summary

This study was conducted to explore the effects of least-to-most prompting and a mobile device (iPad) as a tool to locate items from a grocery list by transitioning high school students with ID. This study measured percent of task analysis completion, the number of items selected, and duration of shopping. This study had three phases of grocery lists: (a) the initial list, (b) the re-sequenced list, and (c) the replacement list.

The results of this study indicated that all participants made learning gains from the initial baseline to the initial intervention phase of the intervention condition. One participant (Jesus) made learning gains in both phases two and three of the intervention condition. Two participants (Logan and Ivis) did not meet criteria to move to phases two and three of the study.

CHAPTER V

DISCUSSION

This chapter presents a discussion of the results of this study. This study examined the effects of using least-to-most prompting and a mobile device (i.e. an iPad) as a tool to locate items from a grocery list by transitioning students with ID. The following research questions were posed:

1. Will students with ID independently complete the steps of a task analysis and locate six items when presented with a teacher-created shopping list on an iPad in a grocery store setting, using least-to-most prompting?
2. Will the students with ID independently complete the steps of a task analysis and locate six items on a list when the order of the original list is changed by re-sequencing four out of six items on the list? If not, will the students follow the new list using the iPad, given least-to-most prompting?
3. Will students with ID independently complete the steps of a task analysis and locate six items on a list when four out of the six items are replaced from the original list? If not, will the students follow the new list using the iPad, given least-to-most prompting?
4. Will the time to complete the steps of the task analysis and the time to find items (i.e., total shopping) decrease over the course of the intervention?

Data were collected on the following variables: (a) percentage of correct responses on the task analysis, (b) number of items located, and (c) duration of shopping. A single subject, multiple probe design with two conditions was used in this study. The conditions included baseline and intervention. During intervention, there were three

phases that included: (a) an initial grocery list, (b) a re-sequenced grocery list and (c) a replacement grocery list using the First-Then Visual Schedule App on the iPad. All participants had varying degrees of learning gains during the first phase of the intervention on the task steps completed. Jesus had learning gains during phase three in this area, as well. Additionally, all the participants demonstrated an increase in items found during phase one of the intervention and a decrease in shopping time for phase one. Jesus also demonstrated an increase in items found and a decrease in shopping time for phase three of the intervention. Even with these gains, only one of the three participants (Jesus) made it to phase three of the intervention to complete the study.

Percentage Correct on the Task Analysis and Number of Items Found: Phase One

In answering the research question, "Will students with ID independently complete the steps of a task analysis and locate six items when presented with a teacher-created shopping list on an iPad in a grocery store setting using least-to-most prompting?" (phase one of the study), the results suggest that pairing the iPad with least-to-most prompting in the grocery store had varying degrees of effectiveness.

Task analysis. During phase one of the intervention, all three participants had gains from baseline to intervention on the task analysis. For some participants, these gains were more considerable than others. For example, Jesus and Ivis made moderate gains while Logan made significant gains between baseline and intervention. Jesus had mean scores of 42.6% during baseline and 70.8% during intervention. Logan made substantial gains (M = 28.6% during baseline and M = 78.8% during intervention phase one). Ivis had mean scores of 34.1% during baseline and 71.7% during intervention.

A visual examination of the data showed that Jesus' data showed some overlap between phase one baseline and the first two data points for phase one intervention on his percent correct for the task analysis. There was no overlap of data points for Logan or Ivis on the task analysis. Moreover, regarding least-to-most prompting for Jesus during phase one, there was no effect of using least-to-most prompting to complete the task analysis until data point three.

On the other hand, the effects of using least-to-most prompting for Logan were immediate on the task analysis. For Logan, his data showed an ascending trend on his percent correct on the task analysis but then he demonstrated a decrease during data points five, eight, nine, eleven, and twelve. Most of his last seven data points – except for data point nine – were at 80% or higher. During data point ten and eleven it seemed as though he would meet criteria to move on to phase two; however, data point twelve fell below the threshold of 85%. Finally, for Ivis, her data showed an ascending trend for most of the data points except for data point six and eight, which showed a decrease in response rate. For both Logan and Ivis, neither student met the criteria for moving on to the next intervention phase of the study. Despite their initial progress, these two participants had a consistent pattern of responding that remained below the criterion of 85% of the task steps completed independently to move forward in the program.

Number of items located. During phase one of the intervention, all three participants showed gains over their baseline scores for locating items from their grocery lists. Jesus made moderate gains with mean scores of three items found during baseline and five items found during intervention. Logan made substantial gains (M = 3 items during baseline and M = 6 items during intervention). During phase one of the

intervention he could locate six items throughout all sessions. Ivis made moderate gains with a mean score of two items found during baseline and four items found during intervention.

A visual examination of the data showed that for the number of items found, Jesus' data for the items located showed some overlap between all the data points in baseline and data points two and three of intervention phase one. For Jesus, the effects of the least-to-most prompting on locating grocery items were not shown until data point four of the intervention, when he then selected six out of six items correctly for the remainder of this intervention phase.

Logan had no overlap shown in the data for phase one. Although he met the criteria for phase two of the study for the number of items located, his pattern on the steps correct on the task analysis led to Logan not meeting both criteria to move on to phase two of the study. Ivis' data showed overlap on data points four and five in baseline and data points two, five, eight, and nine of the intervention for phase one. For Ivis, the data were not stable and there was considerable variability. This pattern, along with not meeting the criterion on percent of task steps completed correctly, precluded Ivis from advancing to the next phase of the intervention.

Percentage Correct on the Task Analysis and Number of Items Found: Phase Two

Data collection was limited to one participant in answering the research questions, "Will the students with ID independently complete the steps of a task analysis and locate six items on a list when the order of the original list is changed by resequencing four out of six items on the list? If not, will the students follow the new list using the iPad given least-to-most prompting?" Jesus' data showed that he was able to meet criteria during

baseline for phase two of the study without intervention (*M* = 84.6% on the task analysis and *M* = 6 items located). There were no baseline data collected on Ivis or Logan for phase two of the study because they did not meet criteria.

Percentage Correct on the Task Analysis and Number of Items Found: Phase Three

Again, data collection was limited to one participant in answering the research question, "Will students with ID independently complete the steps of a task analysis and locate six items on a list when four out of the six items are replaced from the original list? If not, will the students follow the new list using the iPad given least-to-most prompting?" There was no data collected on Ivis or Logan for phase three of the study because they did not meet criteria.

Task analysis. Jesus made moderate gains in his correct responses on the task analysis during phase three of the study (*M* = 69.9% during baseline and *M* = 87.6% during intervention). A visual examination of the data showed that during phase three for Jesus, there was no overlap shown in the data. For Jesus, during phase three, the effects of using least-to-most prompting were immediate and he met criterion.

Number of items located. For the number of items located, Jesus made a slight gain during phase three (*M* = 5 items located during baseline and *M* = 6 items found during intervention). Jesus' data for phase three showed that there was overlap between data points three in the baseline for this phase and all the data points in the intervention phase. The data for Jesus in this phase demonstrated an immediate effect and he met the criterion.

Summary for All Phases

The effect for Jesus was clear and resulted in ascending trends or stable data at the criteria during phases one and three of the study for his percent correct on the task analysis and number of items found. He met criteria for all phases of the intervention and was able to complete the entire study. Although Logan and Ivis made improvements during their participation in phase one of the intervention, they did not meet the criterion to advance to the later phases of the intervention. It is not clear if Logan and Ivis would have met criteria for phase one of the intervention had they been given additional time to continue. Their data patterns suggest otherwise. That is, Ivis and Logan made gains but their responses remained in a pattern below the criteria to move to the next phases of the study. Without additional intensity of intervention (e.g., going to the store to practice more during the week or practice in the classroom) or the addition of other interventions (e.g., introduce additional response prompts or implement additional contingencies of reinforcement), it is likely that their responding would remain unchanged. Finally, although Logan met mastery for locating five or more items during all data points during intervention phase one, he was not able to emit critical steps of shopping which may have caused his data on the task analysis to vary. Due to this variation, Logan was unable to reach the criteria of 85% or better for at least 3 consecutive sessions.

Duration of Shopping

In answering the research question, "Will the time to complete the steps of the task analysis and the time to find items (i.e., total shopping) decrease over the course of the intervention?" the results suggest that pairing the iPad with least-to-most prompting had varying degrees of effectiveness for the three participants.

Phase one. During phase one of the intervention, two of the participants (i.e., Jesus and Logan) showed a significant decrease in shopping time. Jesus had a mean total shopping time of 20 minutes during baseline and 12 minutes during intervention phase one. Logan had a mean total shopping time of 20 minutes during baseline and 11 minutes during intervention phase one. Ivis struggled to locate items during phase one of the study. Her shopping time only showed a decrease on data points four, five, and seven, which caused her total mean score to decrease by about 1-min during intervention (M = 20 minutes during baseline and M = 19.3 minutes during intervention). The rest of her duration data did not show a decrease in shopping time from baseline to intervention.

A visual examination of the data showed that there was no overlap of data points for Jesus or Logan on the duration of shopping data. Ivis' data for phase one showed significant overlap in most of the data points from baseline to intervention except for intervention data points four, five, and seven. For Jesus, during phase one, there was an immediate effect of using least-to-most prompting on his shopping time from baseline to intervention. The effects of using least-to-most prompting for Logan on his shopping time were immediate for phase one, as well. For Logan, his data showed a descending trend on his shopping time from the first intervention data point. For Ivis, data showed a descending trend for data points four and five with a small one-minute decrease in

shopping time with data point seven, as well. The rest of her data showed a total shopping time of 20 minutes for the intervention and baseline conditions.

Phase two. Data collection was limited to baseline data for one participant. Jesus met criteria on the task analysis and number of items found during phase two baseline. His duration data during baseline showed a decrease from 10 minutes total shopping time in session one to 8 minutes for sessions 2 to 4. His baseline data showed a mean of 8.5 minutes total shopping time. There were no duration data collected for phase two of the study for Ivis or Logan as they did not meet criteria to enter this phase of the study.

Phase three. Jesus' duration data showed a significant decrease in shopping time during phase three of the study. His mean shopping time decreased from 15.3 minutes during baseline to 8.3 minutes during intervention phase three. For Jesus during phase three, there was no overlap shown in the duration of shopping data. Finally, the effects of using least-to-most prompting on Jesus' total shopping time were immediate.

Summary for All Phases

The effect for Jesus was clear and resulted in a descending trend in all data points for duration of shopping for phase one and three of the study. Jesus demonstrated more efficiency in his time to locate items not only during intervention phases but also during baseline phase two where no intervention was implemented. Additionally, the duration data suggests that although Logan did not meet criteria to enter phases two and three of the study, he was able to locate items faster, which demonstrated he was becoming more efficient at locating items in the grocery store. Unfortunately, Ivis' duration data showed little improvement and remained variable during her participation in phase one intervention.

Least-to-Most Prompting and Mobile Technology in the Grocery Store

While literature in the field of education does support using mobile technology and prompting in the grocery store (Burckley et al., 2014; Bouck, Satsangi, Bartlett, &Weng, 2012; Bouck et al., 2013), to this authors' knowledge there were no empirical studies found that explored the effectiveness of using mobile technology and least-to-most prompting to locate items solely from a list on an iPad undertaken in the grocery store. The current study is the first exploring the effects of utilizing mobile technology and least-to-most prompting as a tool to teach daily living skills such as locating grocery items solely in the grocery store and without booster sessions being conducted in school settings. The data gathered during the current study adds to the budding literature on this important yet under-studied strategy.

The results of this study link back to the theoretical framework of Lou Brown (Brown et al., 1979) that was previously discussed in chapter one, as well. Brown and his colleagues posited that learners with ID should be taught skills in the less restrictive environment, and that programming efforts with these learners should address the wide variety of individual learning characteristics of this group. Moreover, skills and behaviors taught should be directly related to the behaviors that will be expected of them in non-school environments. These principles are consistent with the intervention utilized in this study. The least-to-most prompting and the iPad allowed students to address the wide variety of learning characteristics of this group (AAIDD, 2010). Furthermore, it taught them skills and behaviors that will be expected of them in non-school environments. Once students "age-out" of the school system, caretakers might not have access to creating simulated activities to teach learners how to find items in the grocery store. They

will most likely be expected to go out to the community and exhibit these skills directly at the store as this study had the participants do.

The results of this study also supported the results of the studies by Bowman and Plourde (2012) and Taylor and Orielly (2000). In those studies, it was recommended when teaching functional skills to individuals with ID, that tasks be broken down into smaller steps to help them master each critical step more easily. The strategy of least-to-most prompting to teach the steps of the task analysis and help locate items was embedded in this study. This study broke down the steps of grocery shopping, specifically to finding six items from a grocery list. The task analysis broke down required steps (i.e., entering the store, obtaining a cart, etc.) so that the learner could become more independent in their ability to perform the larger skill of grocery shopping for all six items. All participants made learning gains in their response rate on the task analysis and locating items from the list in phase one of the study. Although two participants did not meet criteria for phases two and three, the study supports that breaking down a larger task, such as grocery shopping, into smaller steps is a valuable teaching method as demonstrated by the results of all participants in phase one. Jesus' results in phase three of the study also support breaking down larger tasks into smaller steps as a valuable teaching strategy. Grocery shopping is a complicated skill set to acquire (Morse, 2000), and students with ID tend to be struggling learner's (Bouck et al., 2012). Overall, the data from this study provided further support that simplifying tasks into smaller steps improved comprehension of the skills required to grocery shop for some participants.

The finding of this study extends the suggestion by researchers such as Hansen and Morgan (2008) and Bouck et al. (2013) that future research should test interventions with direct selection/manipulation by the student. The First-Then Visual Schedule App with the grocery list allowed participants to select items as they found them. It allowed them to search through different items with pictures from the six items on the list independently. This is a vital skill for adults with ID to increase their independence, as they will be expected to complete this skill as they are out in the community looking for items throughout different stores (Kagohara et al., 2013).

It is important to examine the use of lists with learners that are out of sequence with the make-up of the grocery store. Bouck et al. (2013) conducted a study with the use of audio recorders in which the nine items were out of sequence with the layout of the grocery store. Phase two of this study supported the above study in that the participant, Jesus, was able to locate items when they were out of sequence with the layout of the grocery store. This is an important skill to increase independence of individuals with ID because when out in the community, different stores will have different layouts. It is important for them to be able to learn these skills as was evident in this study with the re-sequenced grocery lists. It is implied that when learners with ID learn skills to find items that are out of sequence with one particular store, that skill can transfer more readily to other stores with different layouts in the community (Bouck et al., 2013).

Finally, as stated in chapter two, previous research in this arena focused on desktop computers, audio recorders, hand written or typed lists, and multimedia web-based programs, while the current research examined the utility of mobile devices, specifically the iPad, for all of the conditions of the study. The findings of this study

suggest that using mobile devices, such as iPads, may increase learners' abilities to locate grocery items among students with ID. Moreover, these results support the findings of Burckley et al. (2014). In that study, the participant independently shopped in the community. The results of the study by Burckley (2014) suggested that the iPad can be effectively adapted to teach functional daily living skills directly in the community. Although that study was undertaken solely in the community, this study differed from Burckely et al in that the iPad was used during both baseline and intervention phases. The study by Burckley et al only had one participant and the participant used a paper list during baseline. Additionally, they utilized video prompting during intervention sessions. Although the current study and the study by Burckley et al. had some differences, results from this study continue to support the findings from Burckely et al. All participants in the study made gains in locating items and in the task analysis at the grocery store during intervention phase one when using the iPad as did the one participant from the Burckely et al study. Prior to this study, there was no research focused on the use of iPads solely in the natural setting, during all conditions, teaching students with ID how to locate items from a list; thus, the current findings extend the literature on the effects of such technology on student learning.

Social Validity

Social validity is important in a research study to determine if the intervention had practical outcomes for key stakeholders (Wolf, 1978). On the social validity questionnaire, the classroom teacher responded that she understood and enjoyed the intervention. Furthermore, she felt that the intervention produced a positive effect on grocery shopping skills and was not socially stigmatizing. Finally, she reported that she

would be willing to use this intervention with her students in the future. Although these social validity results represent one person's opinion, they provide initial evidence of the perceived acceptability and the results of the study.

Implications

The results of this study have implications for classrooms serving students ages 18 to 22 years with ID. This study suggests that the use of a mobile device such as the iPad paired with least-to-most prompting may help adult learners with ID to learn how to locate items from a list and increase their independence in the natural setting of the grocery store. Although all participants made progress during phase one intervention, two out of three participants did not move beyond phase one. They might have benefited from more time in the community. However, with all of the other activities throughout their day (i.e., Special Olympics and cooking lab) it is not practical to go to the grocery store more than twice weekly. Therefore, simulated sessions in school might be needed for some participants to practice their skills before going to the grocery store like other researchers have done (e.g., Hansen & Morgan, 2008; Mechling, Gast & Langone, 2002; & Langone, Shade & Clees, 1999). Researchers have recommended that well designed classroom simulations be used in combination with CBI (Bates et al., 2001). Classroom computers or iPads can be used for simulations in class. Students can receive the tutorials and/or simulations independently and practice the skill more often than twice a week while on CBI. Moreover, aside from the extra practice, simulations can enhance the learning environment by permitting teachers to work in small groups or individually with students while the rest of the class works using their iPads, and felt satisfied that the students are still receiving instruction even when their attention is focused elsewhere.

Another implication from the results of this study, as mentioned earlier in the chapter, is that professionals might utilize other prompting strategies. Least-to-most prompting was one strategy that exists out of many prompting strategies. There are other prompting methods that may be more successful in helping students with ID acquire daily living skills such as locating items in the grocery store. For instance, students can go twice weekly to the grocery store and use most-to-least prompting as it has been shown to be effective in teaching other skills to people with moderate to severe disabilities. Research by Mechling et al. (2010) showed that individuals with mild to moderate disabilities self-faded instructional cues using more intrusive prompts in the beginning and less intrusive prompts as they acquired the steps in the task. The current study used least-to-most prompting, but teachers might want to try most-to-least prompting with this population as Mechling et al. did when teaching grocery shopping skills to their students with moderate to severe ID.

Finally, using a mobile device such as the iPad and create picture lists to grocery shop for students with moderate to severe ID might require a caretaker and/or parent to help create the list on the device. That may be cumbersome or not an option once the students leave high school. Hence, teachers should explore if students can be successful with the use of a simple technology such as an audio recorder. While there are no pictures on audio lists, teachers might try to see if students can record familiar items on their audio recorders and shop for those items in the store independently as researchers have done (Bouck et al., 2012; Bouck et al., 2013). If students could successfully and independently use the audio recorders, the strategy might increase independence in their adult life and might be an option for students when mobile devices such as the iPad

and/or caregivers might not be available. However, teachers should be cautious in relying too heavily or solely on mobile devices as they are not the singular determining factor in student achievement. Although instructional technology did have a positive effect on learning gains, it is not a solution for helping students with ID overcome substantial deficits in academic abilities and daily living skills. Regarding instruction while out in the community for students with ID, teachers should continue to employ evidence-based instructional practices and consider using mobile devices as a supplement to those practices.

Limitations

Although the results of this study are promising, there are limitations that must be considered. One major limitation in this study is that it took place in one supermarket. Therefore, the results from the current study may not generalize to other stores. The study may have been strengthened with the inclusion of a generalization phase, in which students went into a novel grocery store with their iPad and grocery list. Another limitation is the small number of participants in this study. However, this is typical of single subject research design whereby external validity is developed through direct and systematic replications (Bennett, 2017).

There were several other limitations in this present study. This present study was limited to 18 to 22-year-old students in Grade 12 participating in an adult transition program who were identified as having ID. Therefore, the results of this study cannot be generalized to students in other grades, with other disabilities, and different age groups. Furthermore, this study employed a specific application on a specific type of mobile device (i.e., the First-Then Visual Schedule App on the iPad) and a limited length of time

spent using the application on the device (20 minutes per session). Therefore, the results of this study cannot be generalized to other mobile devices, applications, and various lengths of time spent using other applications/devices. There may be other applications that offer more effective features than those found in First-Then Visual Schedule App. Additionally, given more time in the store, participants may have made greater learning gains but this remains a practical issue for educators. Another study limitation was there was only one female participant. Future studies could include more female participants.

Suggestions for Future Research

There are several recommendations for future research. Future research studies could focus on different applications on different mobile devices. This study used an application called, First-Then Visual Schedule. Perhaps other studies could explore different interactive, multimedia applications designed for uploading lists like the application used in this study. Additionally, future studies could include locating items not listed on the aisle sign by reading the words with which they are associated in order to determine which aisles to enter. The data from this study supports that students struggle to read the aisle signs. The data showed that all three participants performed poorly on question nine on the task analysis form, which asked participants to read the aisle signs aloud when looking for items. Future researchers can focus on having participants locate items not found on the aisle signs and see if it makes a difference in their response rate.

There were no variations in number of items purchased. In all cases, participants located six items from the list. Future research can examine purchasing differing quantity of items. Moreover, aside from exploring differing quantity of items, future researchers

might study other prompting methods. This study focused on least-to-most prompting and the iPad. Future studies can focus on other prompting methods such as most-to-least prompting with the iPad.

Finally, future researchers might want to conduct a study where all of the participants have ID with a secondary disability of ASD to see if having ID and ASD creates more difficulty to locate items. The results of this study indicated that Ivis, whose secondary exceptionality was ASD made the least learning gains of all the participants during phase one intervention. Although she showed significant improvement on the task analysis from baseline to intervention in phase one, the gains in locating items from the list and the duration of shopping were minimal, and in some cases, negligible. Perhaps this is due to the learning characteristics associated with students with ASD which include, but are not limited to, difficulty with comprehension of verbal and written language and difficulty understanding abstract concepts (Bennett, Ramasamy, & Honsberger, 2013).

Summary

The results of this study suggest that the use of mobile devices used with least-to-most prompting can have a degree of positive effect on the acquisition of functional skills such as locating grocery items by 18 to 22-year-old students with ID. In this study, students used the First-Then Visual Schedule App on an iPad with least-to-most prompting to locate items from a list in the grocery store. For all participants, learning gains were evident with completing steps on the task analysis. When locating items, learning gains were varied. One participant made some learning gains, the other one made moderate gains, and one participant made significant gains when locating items.

This study supports the theoretical framework of Lou Brown (Brown et al., 1979) who posited that learners with ID should be taught skills in the less restrictive environment. Furthermore, the study supports the existing literature (Bowman & Plourde, 2012; Taylor & Orielly, 2000) that when teaching skills to individuals with ID, skills should be broken down into smaller steps to help them master each critical step more easily. Least-to-most prompting and a task analysis were employed in this study and expanded the research in this arena to support the use of these strategies to a limited degree.

Moreover, in this study the effects of mobile devices such as iPads as a tool may increase leaner's abilities to locate grocery items among students with ID (Buckley et al., 2014). The study's results also support Buckley et al (2014) in that the iPad can be effectively adapted to teach functional daily living skills directly in the community and extends the literature on the effects of such technology on student learning. While gains were noted and the findings for this study are promising and provide support on utilizing the iPad in the grocery store for learners with ID, two of the three participants did not meet criteria to complete the study. This finding is notable since there is a limited research base and more research is needed to gather data on why some of the participants struggled to move on to phases two and three of the study.

Social validity results suggest that the classroom teacher understood and enjoyed the intervention. She felt that the intervention produced a positive effect on grocery shopping skills and the tactics were not socially stigmatizing. Finally, she reported that she would be willing to use this intervention with her students in the future.

This study is important because its results suggest that the use of mobile technology such as the iPad paired with least-to-most prompting may help some adult learners with ID learn how to locate items from a list and increase their independence. Recommendations for future research include (a) including items not listed on the aisle signs, (b) exploring the use of other interactive applications, (c) focusing on purchasing different quantity of items, (d) including students with a secondary disability of ASD, and (e) a study pairing most-to-least prompting with mobile technology.

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APPENDIX A

Prompting sequence

Task Analysis with Prompts

Task	Prompting
1. Enter the supermarket.	V-"come in" G-researcher's hand indicates to come in. P-turn participant toward store entrance F-grab their shoulder and escort them inside the store.
2. Obtain a shopping cart.	V-"Get a cart" G-point to cart P-move participant toward the cart F-place the participants hand on cart
3. Open baby seat lid in cart.	V-"open baby seat" G-point to the baby seat P-put their hand on the baby seat F-place hand on seat and guide their hand to open the seat
4. Place the iPad in the seat (iPad will be turned on and the app will be open on the iPad by the researcher).	V-"place iPad in the seat" G-point to iPad and the seat P-get iPad with participants hand on it and move toward the seat in the cart F-grab iPad and guide hand to place it in the open cart seat
5. Read the entire list aloud from First-Then visual schedule app.	V-"read the list aloud" G-point to the list P-place finger on first item and researcher says "read"

		F-place finger on first item and go down the list one by one guiding the participant's finger to read full list aloud.
6.	Point to the item on the First-Then visual schedule app list and read that item aloud.	V-"look on your list" and "read the item aloud" G-point to list without touching screen and "read the item aloud" P-Guide participants finger to point to the list and "read the item aloud" F-grab participants finger and guide it to the list and "read the item aloud"
7.	Walk to the aisle sign.	V-"go to aisle" G-point toward aisle P-tap shoulder F-Grab shoulders of participant and physically guide them to the aisle
8.	Read aisle sign aloud to locate target item.	V-"read the aisle sign" G-point toward aisle sign P-look up and read the aisle sign aloud in front of participant F-tap participants shoulder and turn participant toward the aisle sign to read the aisle sign one by one until the item on the list is located on aisle sign.
9.	Locate item.	V-"find the item" G-point to the item on the shelf P-prompt participant's hand to point to the item F-physically guide participant's hand to grab the item.

10.	Obtain item from shelf.	V-"take the item" G-point to the item P-guide the participant to point to the item on the shelf. F-put participant's hand on item.
11.	Place item in the cart.	V-"place the item in your cart" G-point to the cart P-guide their hand toward the item F-physically prompt them to grab the item on the shelf and place it in the cart.
12.	Update shopping list (checks off retrieved item from list.	V-"check off item found from your list" G-point to the app P-guide their finger to the screen. F-physically guide finger to check off the item on the iPad app
13.	Go to start of the aisle to exit aisle.	V-"walk to beginning of aisle" G-point toward the end of the aisle P-tap their shoulder and point them in the direction to exit the aisle. F-physically guide them out of the aisle.
14.	Point to the next item and read it aloud.	
Prompting Sequence: (a) Verbal prompt (b) Gestural prompt (c) Partial physical prompt (d) Full physical prompt		**REPEAT SAME PROMPTING DURING TASKS 8-14 FOR ITEMS ONE THROUGH SIX**

15.	Locate check out area.	V-“let’s check out” G-point toward checkout P-tap shoulder and point them in the direction of the check out. F-physically guide them to the check-out area
16.	Bring items to check out area and leave with researcher.	V-“leave the items here” G-point down to indicate location where to leave cart with items. P-tap their shoulder and point down indicating to leave their items there F-physically guide them to leave items and walk away from cart.
17.	Remove iPad from cart and Return iPad to the researcher.	V-“give me the iPad” G-point to the iPad P-place participant’s hand on the iPad F-guide their hand to grab the iPad and return to the researcher
18.	Walk out of the store.	V-“let’s leave the store” G-point toward the exit P-tap their shoulder and guide them in the position toward the exit F-physically guide them out of the store.

APPENDIX B

TASK ANALYSIS AND DATA COLLECTION FORM

Participant _____ Date _____

Task Analysis and Data Collection Form

Put a + or – to indicate correct or incorrect response by participant.

Task	**Task Performance**					
1. Enter the supermarket						
2. Obtain a shopping cart.						
3. Open baby seat lid in the cart.						
4. Place the iPad in the seat (iPad will be turned on and the app will be open on the iPad by the researcher).						
5. Read the list aloud from the First-Then Visual Schedule app.						
	ITEM ONE	ITEM TWO	ITEM THREE	ITEM FOUR	ITEM FIVE	ITEM SIX
6. Point to the item on the First-Then Visual Schedule app list.						
7. Read the item aloud.						
8. Walk toward the aisle sign.						

9. Read the aisle sign aloud to locate the target item.						
10. Locate the item.						
11. Obtain item from shelf.						
12. Place grocery item in the cart.						
13. Update shopping list (checks off retrieved item from list).						
14. Go to the start of the aisle to exit.						
15. Point to the next item on the First-Then Visual Schedule app list and read it aloud.						
16. Walk to the next aisle.						
	REPEAT SAME TASKS 6-16 FOR ITEMS ONE THROUGH SIX					
17. Locate check out area.						

18. Bring items to check out area and leave with researcher.	
19. Remove iPad from cart and return iPad to the researcher.	
20. Walk out of the store.	

+ or – indicates correct/incorrect response by participant

APPENDIX C

IOA DATA FORMS-ALL THREE CONDITIONS

Participant_____ **Date**_____

IOA DATA FORM-FIRST CONDITION-initial grocery list

Directions: This form compares the data collected by the researcher with the data collected by the second observer.

TASK	OBSERVER 1	OBSERVER 2	AGREE/DISAGREE (A OR D)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Participant _____ Date _____

IOA DATA FORM-SECOND CONDITION-re-sequenced grocery list

TASK	OBSERVER 1	OBSERVER 2	AGREE/DISAGREE (A OR D)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Participant _____ Date _____

IOA DATA FORM-THIRD CONDITION-replacement grocery list

TASK	OBSERVER 1	OBSERVER 2	AGREE/DISAGREE (A OR D)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Number of Agreements _____

Number of Disagreements_____

IOA Formula:

Total # of Agreements ___ ÷ Total # of Disagreements and Agreements ___ × 100 = ___ % IOA

Participant _____ Date _____

DURATION DATA IOA SUMMARY FORM

Directions: This form compares the data collected by the researcher with the data collected by the second observer.

Rater 1: _____

Rater 2: _____

IOA Formula:

Total Shorter Duration Responses_____ ÷ Total Longer Duration Responses _____ × 100 = ___ % IOA

APPENDIX D

TREATMENT FIDELITY CHECKLIST

Treatment Fidelity Form

Completed by: _____ Date: _____

	Condition One **Baseline**	**Implemented**	
1	Set timer for 20 minutes.	+	−
2	Distribute iPad with a list opened on the First-Then visual schedule app.	+	−
3	Tell participants "Find the items on the list."	+	−
4	Turn off the timer at the end of 20 minutes or upon completion of all of the steps on the Task Analysis and Data Collection Form.	+	−

	Condition B Intervention **Phase One-Initial Grocery List**	**Implemented**	
1	Set timer for 20 minutes.	+	−
2	Distribute iPad with a list opened on the First-Then visual schedule app	+	−
3	Tell participants to read shopping list aloud.	+	−
4	Tell participants to "Find the items on the list."	+	−
5	Provide verbal praise for each step completed correctly.	+	−
6	Upon error, not starting a step within 10 s, or not completing a step within 60 s or finding an item within 180 s, begin the prompt sequence.	+	−
7	Turn off the timer at the end of 20 minutes or upon completion of all of the steps on the Task Analysis and Data Collection Form.	+	−
	Condition B Intervention **Phase Two Re-sequenced Grocery List**	**Implemented**	
1	Set timer for 20 minutes.	+	−
2	Distribute iPad with a list opened on the First-Then visual schedule app.	+	−
3	Tell participants to read the shopping list aloud.	+	−
4	Tell participants to "Find the items on the list."	+	−
5	Provide verbal praise for each step completed correctly.	+	−
6	Upon participant error, participant not starting a step within 10 s, or a participant not completing a step within 60 s or finding an item within 180 s, begin the prompt sequence.	+	−
7	Turn off the timer at the end of 20 minutes or upon completion of all of the steps on the Task Analysis	+	−

Condition B Intervention Phase 3-Replacement Grocery List		Implemented	
1	Set timer for 20 minutes.	+	−
2	Distribute iPad with a list opened on the First-Then visual schedule app.	+	−
3	Tell participants to read the shopping list aloud.	+	−
4	Tell participants “Find the items on the list.”	+	−
5	Provide verbal praise for each step completed correctly.	+	−
6	Upon participant error, participant not starting a step within 10 s, or a participant not completing a step within 60 s, begin the prompt sequence.	+	−
7	Turn off the timer at the end of 20 minutes or upon completion of all of the steps of the task analysis.	+	−

APPENDIX E

SOCIAL VALIDITY QUESTIONNAIRE

Social Validity Questionnaire

Rate the following questions by circling the correct response: (1) strongly disagree; (2) disagree; (3) neutral; (4) agree; (5) strongly agree.

Questions	Rating Scale				
The intervention focused on an important behavior.	1	2	3	4	5
The target behavior is of sufficient concern to warrant the use of this intervention.	1	2	3	4	5
I understand the intervention steps.	1	2	3	4	5
I enjoyed the procedures used in the intervention.	1	2	3	4	5
The intervention produced a positive effect on grocery shopping skills.	1	2	3	4	5
The intervention was socially stigmatizing for participants.	1	2	3	4	5
I feel that I would be able to use this intervention in the future.	1	2	3	4	5
I would be willing to use this intervention with my students in the future.	1	2	3	4	5

APPENDIX F

IPAD TECHNOLOGY ASSESSMENT FORM

Pad Technology Skills Assessment

Participant ID: _____

Date: _____

A plus sign (+) denotes tasks performed accurately by the student.

A minus sign (-) denotes tasks performed incorrectly or no response by the student.

1.	Student can set up and adjust the iPad stand.	+ –
2.	Student can use the wake mode.	+ –
3.	Student can turn the iPad to change orientation from portrait to landscape.	+ –
4.	Student can use one finger to scroll up and down, left and right through information.	+ –
5.	Student can adjust the volume using the buttons on the side of the iPad.	+ –
6.	Student can single tap to access or launch applications.	+ –
7.	Student can turn the iPad screen off using the power button on the side of the iPad.	+ –

APPENDIX G

PARTICIPANT CONSENT FORMS

CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Evaluating the Effects of Utilizing a Mobile Device by Transitioning High School Students with Intellectual Disability to Locate Items from a Grocery List and Improve their Independence

PURPOSE OF THE STUDY

You are being asked to give your permission to be in a research study. The purpose of this study is to see if a teaching method and the use of an iPad with a grocery-shopping list can help you find items independently while at the grocery store.

NUMBER OF STUDY PARTICIPANTS

If you agree to participate in this study, you will be one of ten people in this research study.

DURATION OF THE STUDY

Your participation will require 20 minutes per grocery store trip, 2 times per week for about 16 weeks.

PROCEDURES

You will be asked to do the following things:

1. Check your ability to use an iPad.
2. Check your ability to read grocery words.
3. Check your ability to match names and pictures to grocery items.
4. Arrive at the grocery store and obtain an iPad.
5. At first, we will give you a grocery list and ask you to find the items on the list. We will not help you during this time. This is done to see how well you do before the intervention begins.
6. Next, the researcher will prompt you to use and follow the grocery lists. The prompting may include visual prompts, gesture prompts, or physical assistance (the researcher will guide your child's hand to use the tablet computer and/or get the grocery items on the list). These prompts will be used if you are incorrect or you do not respond in a timely manner. Three different lists will be used: (a) the initial grocery list: (b) a resequenced grocery list (four of the six items will be presented in a different order); and (c) replacement list (four of the six items will be replaced with different items. After the 20 minutes are done you will return the iPad and shopping cart to the entrance of the store where the carts are returned.
7. We will ask you what you thought of the intervention.

RISKS AND/OR DISCOMFORTS
The following risks may be associated with your participation in this study: There will be no more than minimal risk. You will be engaged in activities that are currently practiced in your community-based instruction on a weekly basis as part of your educational program. However, it is possible that you might not learn the skill or learn the skill at a slower pace.

BENEFITS
The following benefits may be associated with your participation in this study: You may be able to locate items in the grocery store using an iPad. This can increase your independence while shopping. Also, professionals might learn about another strategy to help teach these skills.

ALTERNATIVES
There are other procedures that can be used to teach you to obtain grocery items for a list. These teaching strategies include using pictures, video or taking your hand without the use of an iPad.
These alternatives are not part of this study, however. Any significant new finding developed during the course of the research which may relate to your willingness to continue participation will be provided to you.

CONFIDENTIALITY
The records of this study will be kept private and will be protected to the fullest extent provided by law. In any sort of report we might publish, we will not include any information that will make it possible to identify you as a subject. Research records will be stored securely and only the research team will have access to the records. However, your records may be reviewed for audit purposes by authorized University or other agents who will be bound by the same provisions of confidentiality.

COMPENSATION & COSTS
You will not receive a payment for participation in the study. You will not be responsible for any costs to participate in this study.

RIGHT TO DECLINE OR WITHDRAW
Your participation in this study is voluntary. You are free to participate in the study or withdraw your consent at any time during the study. Your withdrawal or lack of participation will not affect any benefits to which you are otherwise entitled. The investigator reserves the right to remove you from the study without your consent at such time that they feel it is in the best interest.

RESEARCHER CONTACT INFORMATION

If you have any questions about the purpose, procedures, or any other issues relating to this research study you may contact Vanessa Gil at G. Holmes Braddock Sr., vgil003@fiu.edu or Dr. Kyle D. Bennett, Florida International University, kyle.bennett@fiu.edu.

IRB CONTACT INFORMATION

If you would like to talk with someone about your rights of being a subject in this research study or about ethical issues with this research study, you may contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

PARTICIPANT AGREEMENT

I have read the information in this consent form and agree to participate in this study. I have had a chance to ask any questions I have about this study, and they have been answered for me. I understand that I will be given a copy of this form for my records.

_____ _____

Signature of Participant Date

_____

Printed Name of Participant

_____ _____

Signature of Person Obtaining Consent Date

APPENDIX H

PARENTAL CONSENT FORM

PARENTAL CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Evaluating the Effects of Utilizing a Mobile Device by Transitioning High School Students with Intellectual Disability to Locate Items from a Grocery List and Improve their Independence

PURPOSE OF THE STUDY

You are being asked to give your permission for your child to be in a research study. The purpose of this study is to see if a teaching method and the use of a tablet computer with a grocery shopping list can help students with intellectual disability locate items independently while at the grocery store.

NUMBER OF STUDY PARTICIPANTS

If you agree to allow your child to participate in this study, he/she will be one of ten people in this research study.

DURATION OF THE STUDY

Your child's participation will require participation 20 minutes per grocery store trip, 2 times per week for about 16 weeks.

PROCEDURES

If your child participates in this study, we will ask your child to do the following things:

8. *We're going to assess your child's ability to use the iPad*
9. *We're going to assess your child's reading ability of grocery words*
10. *We're going to assess your child's matching ability of grocery items*
11. Arrive at the grocery store and obtain an iPad.
12. At first, we will give your child a grocery list and ask them to find the items on the list. We will not help them during this time. This is done to see how well they do before intervention begins.
13. Next, the researcher will prompt your child to use and follow the grocery lists. The prompting may include visual prompts, gesture prompts, or physical assistance (the researcher will guide your child's hand to use the tablet computer and/or get the grocery items on the list). These prompts will be used if your child is incorrect or does not respond in a timely manner. Three different lists will be used: (a) the initial grocery list; (b) a re-sequenced grocery list (four of the six items will be presented in a different order); and (c) replacement grocery list (four of the six items will be replaced with different items). After the 20 minutes are done, students will return

the iPad and shopping cart to the entrance of the store where the carts are returned.

14. We will ask your children to see what they thought of the intervention.

RISKS AND/OR DISCOMFORTS

The following risks may be associated with your child's participation in this study: There will be no more than minimal risk. Participants will be engaged in activities that are currently practiced in their community based instruction on a weekly basis as part of their educational program. However, it is possible that participants might not learn the skills or learn the skill at a slower pace.

BENEFITS

The following benefits may be associated with your child's participation in this study: Your child may be able to locate items in the grocery store using an iPad. This can increase his or her independence while shopping. Also, professionals might learn of another strategy to help teach these skills.

ALTERNATIVES

There are other procedures that can be used to teach your child to obtain grocery items from a list. These teaching strategies include using visual, gesture, and physical prompts without the use of a tablet computer. Additionally, videos of people grocery shopping can be used to teach your child this skill. These alternatives are not part of this study, however. Any significant new findings developed during the course of the research which may relate to your child's willingness to continue participation will be provided to you.

CONFIDENTIALITY

The records of this study will be kept private and will be protected to the fullest extent provided by law. In any sort of report we might publish, we will not include any information that will make it possible to identify your child as a subject. Research records will be stored securely and only the research team will have access to the records. However, your child's records may be reviewed for audit purposes by authorized University or other agents who will be bound by the same provisions of confidentiality.

COMPENSATION & COSTS

Your child will not receive a payment for participation in the study. Your child will not be responsible for any costs to participate in this study.

RIGHT TO DECLINE OR WITHDRAW

Your child's participation in this study is voluntary. Your child is free to participate in the study or withdraw his/her consent at any time during the study. Your child's withdrawal or lack of participation will not affect any benefits to which he/she is otherwise entitled.

The investigator reserves the right to remove your child from the study without your consent at such time that they feel it is in the best interest.

RESEARCHER CONTACT INFORMATION
If you have any questions about the purpose, procedures, or any other issues relating to this research study you may contact Vanessa Gil, vgil003@fiu.edu or Dr. Kyle D. Bennett, kyle.bennett@fiu.edu.

IRB CONTACT INFORMATION
If you would like to talk with someone about your child's rights of being a subject in this research study or about ethical issues with this research study, you may contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

PARTICIPANT AGREEMENT
I have read the information in this consent form and agree to allow my child to participate in this study. I have had a chance to ask any questions I have about this study, and they have been answered for me. I understand that I will be given a copy of this form for my records.

_____ _____
Signature of Parent/Guardian Date

_____
Printed Name of Parent/ Guardian

_____
Printed Name of Child Participant

_____ _____
Signature of Person Obtaining Consent Date

APPENDIX I

PARTICIPANT ASSENT FORM

ASSENT TO PARTICIPATE IN A RESEARCH STUDY

Evaluating the Effects of Utilizing a Mobile Device by Transitioning High School Students with Intellectual Disability to Locate Items from a Grocery List and Improve their Independence

WHY ARE YOU DOING THIS STUDY?

We would like for you to be in a research study we are doing. A research study is a way to learn information about something. We would like to find out more about locating items using an iPad from a grocery list while at the grocery store.

HOW MANY OTHERS WILL BE IN THIS STUDY?

If you agree to participate in this study, you will be one of four participants in this study.

HOW LONG WILL THE STUDY LAST?

Your participation will require 20 minutes per grocery store trip, 2 times per week for about 12-16 weeks.

WHAT WILL HAPPEN IN THIS STUDY?

If you participate in this study, we will ask you to do the following things:

15. Arrive at the grocery store and obtain an iPad.
16. At first, we will give you a grocery list and ask you to find the items on the list. We will not help you during this time. This is done to see how well you do before the intervention begins.
17. Next, the researcher will prompt you to use and follow the grocery lists. The prompting may include visual prompts, gesture prompts, or physical assistance (the researcher will guide your hand to use the tablet computer and/or get the grocery items on the list). These prompts will be used if your child is incorrect or does not respond in a timely manner. Three different lists will be used: (a) the initial grocery list; (b) a re-sequenced grocery list (four of the six items will be presented in a different order; and (c) the replacement grocery list (four of the six items will be replaced with different items. After the 20 minutes are done, the iPad and shopping cart will be returned to the entrance of the store where the carts are returned.
18. Finally, once the entire intervention is complete, we will ask you to find items on the grocery list and we will not help you. We do this to see if the intervention maintains after we finish working with you.

CAN ANYTHING BAD HAPPEN TO ME?

There will be no more than minimal risk. You will be engaged in activities that are currently practiced in your community based instruction on a weekly basis as part of your program. However, it is possible you might not learn the skill or learn the skill at a slower pace.

CAN ANYTHING GOOD HAPPEN TO ME?
The following benefits may be associated with your participation in this study: You may be able to locate items in the grocery store using an iPad. This can increase your independence while shopping.

DO I HAVE OTHER CHOICES?
There are other teaching strategies available including using visual, gesture, and physical prompts without the use of an iPad. Additionally, videos of people grocery shopping can be used to teach you this skill. These alternatives are not part of this study, however.

WILL ANYONE KNOW I AM IN THE STUDY?
The records of this study will be kept private and will be protected by the researchers. No information will be included that will identify you as a part of the study. In any sort of report we might publish, we will not include any information that will make it possible to identify you as a subject. Research records will be stored securely and only the research team will have access to the records. However, your records may be reviewed for audit purposes by authorized University or other agents who will follow the same rules of confidentiality.

WILL I BE GIVEN ANYTHING FOR PARTICIPATING?
You will receive no payment for your participation. You will not need to pay for anything to participate in this study.

WHAT IF I DO NOT WANT TO DO THIS?
You do not have to be in this study if you don't want to and you can quit the study at any time. If you don't like a question, you don't have to answer it and, if you ask, your answers will not be used in the study. No one will get mad at you if you decide you don't want to participate. Your withdrawal or lack of participation will not affect any benefits to which you are entitled. The investigator can remove you from the study without your consent if they feel it is in the best interest.

WHO CAN I TALK TO ABOUT THE STUDY?
If you have any questions about the purpose, procedures, or any other issues relating to this research study you may contact Vanessa Gil, vgil003@fiu.edu or Dr. Kyle D. Bennett, kyle.bennett@fiu.edu. You may also contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

PARTICIPANT AGREEMENT

This research study has been explained to me and I agree to be in this study.

_____	_____
Signature of Participant	Date
_____	
Printed Name of Participant	
_____	_____
Signature of Person Obtaining Consent	Date

APPENDIX J

FIRST-THEN VISUAL APP SAMPLE LIST


Grocery List-initial
CHIPS
RICE
COOKIES
CEREAL
COFFEE
BREAD
Cancel
Edit
Save

VITA

VANESSA GIL
Born, Miami, Florida

EDUCATION AND EXPERIENCE

	Doctor of Education, Special Education/Cognate: Urban Education Florida International University, Miami, FL
2016-2017	Adjunct Faculty, EEX 3070 Teaching in Inclusive Settings Florida International University
2013	Doctoral Instructor, EEX3070 Teaching in Inclusive Settings Florida International University
2012	Co-Instructor, EEX3070 Teaching in Inclusive Settings Florida International University
2012	21st Century Community Learning Centers Florida Department of Education
2012-present	Special Education Program Specialist Miami Dade County Public Schools
2006-2009	Tutor, Mathematics Rockway Middle School
2003	Master of Science, Special Education Nova Southeastern University, Miami, FL
2003	Honors Graduate Nova Southeastern University
2003	Rookie Teacher of the Year Rockway Middle School
2001-2012	Instructor, Mathematics, Science, U.S, History & Career Planning Rockway Middle School
2001	Magna Cum Laude Florida International University
2001	Bachelor of Science, Special Education

	Florida International University, Miami, FL
1999-2001	Temporary Instructor (homebound and Intellectual Disability) Easter Seals of Miami
1999	Associate in Science Education Miami Dade College, Miami, FL

PROFESSIONAL PRESENTATIONS

Monem, R & Gil, V. (2012). *Using iPad virtual applications to support content area skills.* 66th Annual Florida Council for Exceptional Children Conference. Jupiter, Florida

2013 Presentation Reviewer Proceedings of the Twelfth Annual College of Education & GSN Research Conference, Florida International University, Miami, Florida

2012 Presentation Reviewer Proceedings of the Eleventh Annual College of Education & GSN Research Conference, Florida International University, Miami, Florida

2011 Presentation Reviewer Proceedings of the Tenth Annual College of Education & GSN Research Conference, Florida International University, Miami, Florida