5-2019

Effects of an Electronic Visual Activity Schedule on Independence for a Student with Severe Disability

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A thesis

presented to

the faculty of the Department of Special Education

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Master of Education in Special Education

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by

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May 2019

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Keywords: Severe Disabilities, Transition, Electronic Visual Activity Schedules, Life Skills, iPad, Visual Support, Self-Determined Learning, Systematic Instruction, The System of Least Prompts

ABSTRACT

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This study investigated the effects of an electronic visual activity schedule (eVAS; i.e., *FIRST THEN Visual Schedule* application) paired with the system of least prompts on the latency period and level of independence that a fifth-grade student with Intellectual Disability needed to transition throughout the day. Also investigated were the value that the teacher and student placed on the use of an eVAS to teach daily life and school routines instead of typical instruction (e.g., traditional visual schedule) and the student's ability to generalize the use of the eVAS across instructors and materials (display). An ABAB single case design was used to investigate the effects of the eVAS app. Study research results indicated a functional relation between the use of the eVAS paired with the system of least prompts and the students correct responding and decreased latency. Limitations of the study and the suggestions for future research are discussed.

DEDICATION

This work was written with the intention of being a source that will enrich the lives of anyone who is interested. First, I would like to dedicate this work to my loving parents, who believe in my dream and encouraged me to pursue my passions. Without their belief, prayers, and unconditional love, I would have never become the person that I am today. Second, I owe an enormous debt of gratitude to my husband, Khalid, who is the best friend, supporter, leader, and the most optimistic man I have met. He promised to be by my side throughout my life, and he always does. To my miracle baby, Sara, who I waited a long time for and who shares my body now and will crown my success during the graduation ceremony by being a part of one of the most important moments in my life. She taught me that patience is coming with a happy ending. I am grateful to have you here to enjoy the final stage of this journey. You bring so much light to my world before you come. I would also like to thank my siblings, cousins, and friends; Ahlam, Tuqa, Amal, Stephanie, Maram, Nouf, Amani, Mashael, Ola, Hiba, Narmeen, Ayman, Tahani, Dareen, Eman, Reem, Arwa, and others. I appreciated all they have done for me.

ACKNOWLEDGEMENTS

I would like to gratefully acknowledge various people who have been helping me since I began learning English as a second language, started a master's degree, and up until I completed this thesis. First, I would like to thank all the members and teachers of the English Language institutions in INTO and ELS who gave me the golden key that opened the door to another world of knowledge I did not know before. Second, I am grateful to ETSU for accepting me as a student. To all the professors who taught and advised me in the Special Education Department. Next, I would like to send special thanks to my committee members who guided me through writing my thesis: Dr. Mims, my thesis chair who encouraged me to complete this work with her enthusiasm, confidence in my ability, and patience and flexibility; Dr. Fox, one of the spiritual Father of SPED, who I am lucky to have met and learned from; and Dr. Marks, my adviser who sparked my academic journey toward achieving my goals for this stage of my life. I would also like to thank the second observer, Katie, who was an undergraduate student in ETSU and assisted me in collecting research data. Also, the teacher and the student who participated: without them, I would not have completed my thesis. Finally, I would like to thank all the students and teachers in public schools that I have encountered during my time in the United States. You have nurtured my mind and spirit.

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CHAPTER 1

INTRODUCTION

According to Stephenson (2015), students with disabilities often face difficulty throughout their lives. For example, completing certain activities independently or without any prompt has been noted as an area of struggle for many students with disabilities (Spriggs, Gast & Ayres, 2007). Teachers of students with disabilities spend a significant portion of their day helping students with a range of skills, including transition skills (Kamille & DiCarlo, 2016). Additionally, special educators often spend extra time providing instructions to students with disabilities, since, it is not uncommon that this population requires breaking down and doing tasks step by step (Spriggs et al., 2007).

The common challenge for students with severe disabilities is they struggle with routine skills (Spooner, Browder, & Mims, 2011). Routines happen daily in a sequential manner (Spooner et al., 2011). Knowing the daily routines can promote student confidence, which, in turn, can reduce overall anxiety and assist the student's acceptable behavior (Kamille & DiCarlo, 2016). It is important for students with severe disabilities to have a foundation in routine activities. One such support shown to increase independence in routine activities is the use of picture activity schedules. Research by Kamille and DiCarlo (2016) showed that the student's performance to complete required daily school routines increased when the researcher applied picture activity schedules. Picture activity schedules (PAS) are a type of visual step by step guide for an activity or sequence of activities in which a student must engage.

Not only have PASs been shown to increase overall independence, research has also emphasized the positive impact of using a hardcopy of a PAS book for on-schedule and on-task behaviors with students with moderate intellectual disabilities (Spriggs et al., 2007). For example, Spriggs et al. (2007) applied a single case withdrawal design to evaluate the impact of using a hard copy of the PAS book for students with moderate intellectual disabilities. The researchers measured the participants' ability to engage in task appropriate behavior. Initially, they collected data without using PAS to assist the participants' performance, and all participants showed low frequencies of correct response levels. After receiving instruction in PAS book, the participants showed increased correct responses. Overall, the result indicated that the PAS book increased the students' performance during on-schedule and on-task behaviors.

Some studies have emphasized the efficacy of using visual aids, such as PASs, with children with autism. Individuals with autism often experience an inability to effectively communicate (Flippin, Reszka, & Watson, 2010). However, research shows that with early intervention, children with autism can increase their ability to effectively communicate (Jones, 2014). Jones noted the importance of employing visual aids in assisting children with autism in schools and the impact on the progress of communication skills. Jones (2014), sought to find out the role visual aids play in preschool children with autism. Specifically, the researcher investigated how children with autism react in self-contained and regular class. Also, to investigate the positive long-term effects of visual aids on a child with autism. The findings indicated that teachers from preschools for students with autism had a command of knowledge on visual aids that could help them communicate effectively with the students with autism.

Experts have examined many examples of tools that are designed for the purpose of communication. The Grace Applications and The Picture Exchange Communication System, also known as PECS (Flippin et al., 2010; Jones, 2014; Lerna, Esposito, Conson, Russo, & Massagli, 2012), have been lauded as effective communication tools for children with autism.

With the development of technology, many studies have emerged that support the use of technology based visual supports to teach daily school routines (Ayres, Mechling, & Sansosti, 2013; Douglas & Uphold, 2014; Hodgdon, 2011). Teachers increasingly have started to adopt an electronic visual activity schedules (eVAS) as a means to provide clear and consistent supports for students with disabilities (Spriggs, Dijk & Mims, 2015). For example, Douglas and Uphold (2014) taught students to self-manage tasks during a school day using the *First Then Visual Schedule (FTVS)* application. The students were high school students with intellectual disabilities (ID). They were given a chance to choose between either the iPod touch or iPad. The researchers used the same application (*FTVS*) in both iPod touch and iPad. The results showed an increase in the participants' completion of tasks, regardless of the device used. Also, their targeted academic achievement and functional skills performance were impacted positively.

As indicated above, the *FTVS* app was successful in increasing task completion for students in high school with ID. The *FTVS* app was also used in a study by Stephenson (2015) to determine the effect of the application via an iPad with elementary age students with developmental disabilities. The researcher utilized single case design, multiple baseline across students, and used a *FTVS* application to teach the participants how to use an electronic schedule to complete tasks independently. The results of this study showed positive effects of the electronic schedule on task completion. The researcher recommended teaching students with developmental disabilities to use the iPad to complete tasks individually in order to save the teachers' time during the class. Also, use of an iPad gave the students the chance to access a device like their peers without disabilities and it enable them to work independently.

In summary, the above studies engage teachers to use visual activity schedules to transfer instructions to students with severe disabilities. In addition, by using assistive technology, the students with severe disabilities have an opportunity to increase their skills in independent living. Learning life skills is not limited to a certain age. These studies have shown applicability of VAS across different ages and abilities and provided evidence that teaching visual schedules is important and effective in regard to positive student outcomes.

While the above studies provide a solid foundation of research on the *FTVS* app, there are still some gaps. There is need for replication in order to move toward a stronger body of evidence on the use of mobile Visual Activity Schedules to suggest it as an evidence-based practice. Also, the recommendations for future research that were noted in the previous studies by Douglas and Uphold (2014) and Stephenson (2015) needed to be addressed. For example, Douglas and Uphold (2014) involved high school students ages 15- 16 years. The researchers suggested to replicate the study with young students. Therefore, the present study chose the participant to be pulled from a younger demographic (i.e., 7-12 years old). Also, Stephenson (2015) recommended using more features while applying the eVAS. The present study used the same application to investigate the participant's engagement and generalization while using with the VAS. According to Douglas and Uphold (2014) and Stephenson (2015), using technology as an alternative support for students with moderate and severe disabilities encouraged the students to learn and complete their daily tasks independently without any adult support, and independent completion of daily tasks was involved to the purpose of the present study.

Research Questions

The following research questions were investigated:

1. What is the effect of VAS via an iPad *FTVS* app, on the percentage of steps completed for routine tasks for students with severe disabilities?

2. What is the level of perceived student engagement when using the app vs. typical instruction?
3. What value do the teacher and student place on the use of an electronic VAS to teach daily life and school routines?
4. Was the student able to generalize the use of the electronic VAS across instructors and materials (i.e., using another display of the schedule that the application offers)?

CHAPTER 2

LITERATURE REVIEW

This chapter will provide the reader with an overview of studies that are already published in the field of special education, from at least two decades ago until the time when this study was conducted. In this chapter, three topical themes reflect the conceptual underpinnings of this study and include, visual supports, life skills, and systematic instruction.

Visual Supports

Visual supports are defined by Hodgdon (1995) as an effective approach used for individuals with disabilities to help maintain attention, enhances communication, and encourages interact with the environment. The visual support involves pictorial symbols, printed words, and physical materials that aid to obtain information from the scene. Visual support introduced in schedules or choice boards. Lancioni and O'Reilly (2001) define the visual support as directions for activity steps. The visual support can be considered as a method of communicating with students who have autism and non-vocal verbal since they can memorize symbolic material better than verbal material (Hodgdon, 2011; Jones, 2014).

There are several benefits of using visual supports with students who have mild and severe disabilities. First, it helps students with disabilities to initiate conversation with others. Second, it increases their understanding of social and behavior messages. Third, it aids their memorization and recall of information (Johnston, Nelson, Evans, & Palazolo, 2003). Visual supports have been reported to help students organize their lives and strengthen their interactions and independence (Hodgdon, 2011).

The visual materials have several effects on students with disabilities. Lengthy audio lectures may be a barrier for students with intellectual disability. Therefore, teaching these students often requires a stepwise application of real-life materials to help them acquire the necessary skills (Browder, Wood, Thompson, & Ribuffo, 2014). Browder and colleagues suggest that the teacher can be guided to determine evidence-based material to students with disabilities. The application of visual support can help the student retain more information because a seen act is more retained in the memory than heard information (Browder et al., 2014; Jones, 2014). For example, if a teacher is teaching about gravity, he can demonstrate it by telling the student to throw a pen up and it falls, or he can tell the student to jump (Browder et al., 2014). Visual support materials that can help children with intellectual disability to learn are pictures, graphs, and charts that demonstrate concrete things.

Visual activity schedules are one type of visual tool. According to Spriggs and colleagues (2015, p.21), "visual activity schedules are visual supports used to show a list or sequence of events." These events could be transitions between activities (e.g., doing a reading task then moving to the gym) or transitions within activities (e.g., following the steps of a lunchtime routine in the checklist sheet). Also, visual activity schedules are considered as an accommodation for the standards of the academic performance (Beech, 2010).

Integration of technology within the education system facilitates teaching individuals with disabilities the different aspects of being successful in life. Modern technology has expanded the opportunity obtain information, which enables us to offer visual tools much easier than the past (Hodgdon, 2011). An electronic visual schedule was used in a study by Spriggs et al. (2015) to present symbolic information via an electronic device (iPad) to teach novel skills to four high school students with Autism and to increase their independence during transition activities. The iPad application was called *My Pictures Talk*. The participants demonstrated communication difficulties and received therapy services. The study took place in a classroom. The result of this study indicated that all participants increased their abilities to complete novel skills and increased independence during transition.

Lancioni, Singh, O′reilly, Sigafoos, Alberti, Boccasini, and Lang (2014) also examined the effectiveness of using assistive technology. Their study provided a computer screen, which presented instructions via (pictures and video clips) during daily activities to guide the participants in completing the task given independently. The six participants were between 14 and 54 years old with moderate to severe intellectual disabilities. The study which took place in a school for some participants and in activity centers for others, used a multiple probe design across activities. The result showed that the use of visual instructions was helpful for all participants.

In the same year, Chan, Lambdin, Graham, Fragale, and Davis (2014) assessed the advantages of a picture-based activity schedule on an iPad to train the participants to play a video game. The participants were three workers between 33- 57 years old with mild intellectual disability; two of them had challenging behaviors, such as repeating questions. The participants could speak and complete the daily living skills independently; however, they could not learn new tasks independently. The researchers trained them to play the video game in their workplace during break times. The result emphasized that the use of the activity schedule was an effective way to transfer the instruction visually. All participants mastered the target skill after starting the intervention phase.

PASs have not only been effective for students with disabilities; students without disabilities have shown success with this intervention. For example, Watson and DiCarlo (2016) conducted a study on the use of a PAS with a typically developing kindergarten boy who had difficulty following the daily routine. The researchers sought to determine if a PAS could be incorporated into the typically occurring routine and increase the independent completion of daily routines for the targeted student. They used a single case, multiple baseline design across three different classroom routines (i.e., mealtime, afternoon, morning activities). The dependent variable was the number of steps in a daily routine completed by the student within 5 minutes without any additional prompting by the teacher. The independent variable was the implementation of the PAS. A functional relation between the implementation of a PAS and the steps completed in all three daily routines for the student was demonstrated.

Visual support strategies are used to improve communication skills (Hodgdon, 2011). In a single-subject study with multiple baseline across participants design, Lund and Troha (2008) explored the effectiveness of modifying the Picture Exchange Communication System (PECS) with tactile symbols to teach requesting to participants who were diagnosed with autism and visual impairment. After the intervention, all participants, who between 12-17 years old, demonstrated improvement in their communication skills. However, one participant completed every intervention phase. The result confirmed the effectiveness of integrating the PECS and tactile symbols for teaching students with multiple disabilities.

Lal and Bali (2007) examined the effectiveness of visual support in improving the communication skills using an experimental group design. The control group was comprised of thirty participants from three different schools in India. Their ages were between 5-10 years old, and they were diagnosed with autism and lower communication skills. The researchers trained them using different visual tools such as pictures, objects, and symbols signs, in fourteen one-on-one sessions to develop their comprehension, communication, and active interaction during classroom instructions. The results showed the positive effect of using the visual supports with the control group in both their receptive and expressive language, which led to improvement in their communication skills.

Life Skills

According to Cronin (1996), life-skills are the activities that contribute to the independent and successful functioning of an individual. Researchers acknowledge that life skills have effects on students with both mild and severe intellectual disabilities (Cronin, 1996) .

Teaching life skills to children with mild and severe intellectual disabilities has positive effects. The study by Karimi, Mahamoudi, Shaghaghi, Sarcheshmeh, and Abkenar (2017) acknowledged the fact that children with mild or severe intellectual disabilities lack adaptive and functional behaviors. They, examined the effect of life skills training to enhance students' with mild or severe intellectual disabilities self-control skills, assertion, and cooperation. They also investigated how the life skills can be imparted to students with disabilities. The result concluded that an academic curriculum with a functional program allows students with intellectual disabilities to apply functional behaviors that will enable them to interact with others effectively.

Several strategies are often applied by teachers to enable students to learn life skills more effectively. For instance, teachers often incorporate various assistive technologies and accommodations to support their instruction to students with intellectual disabilities. Zacharkow (2015), investigated the impact that video modeling as a strategy of teaching life skills affects students with intellectual disabilities. He suggested that video modeling has positive results to students with an intellectual disability, as they can develop self-help skills, such as getting dressed, play skills, and other relevant skills that are essential to their interaction with other individuals.

Life skills of individuals with mild and severe disabilities are promoted using visual schedules. In the study by Duttlinger, Ayres, Bevill-Davis, and Douglas (2012), picture activity schedules were implemented for students with intellectual disability to complete routine tasks during the school day. The participants were four students from 11 to 15 years old. The study was conducted in middle school. The researchers created the picture activity schedule to collect the data on particular routine tasks such as washing hands, getting a tissue, returning the book to the shelf. By the end of the study, all participants succeed in completing three to five tasks compared to using the traditional way of providing the instruction (no picture activity schedule was applied).

Life skills training for individuals with intellectual disabilities is essential since it enhances independence. Techniques such as task analysis and chaining are used to train individuals with intellectual disabilities life skills, such as meal preparation, dressing, bathing, eating, transportation of vehicles, and shopping. Life skills are taught through the *First Then* app and the participant can complete the tasks given independently. However, in some cases, the teacher may use real-life situations to teach a specific skill. For example, cooking or asking the participant to go to a mall and shop. Using real-life situation is considered to be one of the most effective methods of learning life skills (Cakmak,2016).

Another study by Morse and Schuster (2000) applied the task analysis technique to test a grocery shopping curriculum. The study was implemented with a group of female and male elementary students with disabilities (Down Syndrome, functional mental disabilities, and Autism); their age ranged from 6 to 12 years old. The grossery shopping curriculum was implemented in two different place: in the self-contained classroom and the grocery store. A task analyses were used to apply the intervention. The task analysis data sheet listed 28 steps of the grocery store skills. The instructions were given for each participant using a systematic method. Also, prompt and praise were provided as needed. The participants mastered the objective when they completed all the task analysis steps in 2 sessions with 100% accuracy. The study also involved maintenance and generalization phases using the same steps of the task analysis to ensure that the participants benefited from the intervention. The result affected the participant positively; their performance increased and their parents reported they generalized the grocery store skills in real-life situations.

Systematic Instruction

Systematic instruction is an evidence-based strategy that has been used for many decades. The foundation of this strategy is related to the principle of behavioral approaches (Spooner et al., 2011; Gersten, 1985). In early studies, systematic instruction was defined as a fundamental procedure that is applied during teaching individuals with developmental disabilities living skills such as routine skills in the home or the community (Spooner et al., 2011). Recently, the systematic instruction approach has been applied as an effective procedure for teaching academic skills such as literacy skills (Almalki, 2016) and math facts (Stevens & Schuster, 1988).

Systematic instruction is a teaching technique which includes two main systems to provide the instruction for students. These systems are: 1) response prompting systems which are known as a guide of the student's performance toward an errorless response and usually occur after instructions are presented, and 2) antecedent or stimulus prompting systems which are signal assigned before the instructions are given (Collins, 2012; Spooner et al., 2011).

There are several strategies related to response prompting systems, such as the system of least prompts, time delay, simultaneous prompting, graduated guidance, and most to least prompting. These strategies are identified as effective instructional strategies that address the student's reaction toward the instruction delivered (Ault, Wolery, Doyle, & Gast, 1989; Collins, 2012; Spooner et al., 2011).

The system of least prompts (SLP) is one of the most often used approaches (Doyle, Wolery, Ault, & Gast, 1988). In the book "*Systematic Instruction for Students with Moderate and Severe Disabilities*" Collins, (2012) described the procedure of SLP. The instructor applies a hierarchy of prompts starting from the least to most intrusive level. The student is given a chance to independently respond before providing an assistance prompt from a hierarchy. If no response or an incorrect response is demonstrated, prompts are provided from the least to most intrusive level, with an adjusted time interval, until the correct response is presented. The hierarchy of prompts is faded over time as the student exhibits the target response.

The system of least prompts has been applied across a variety of age stages. Qiu, Barton, and Choi (2019) applied the SLP strategy with young children. Other studies applied SLP to participants who are in the school ages such as elementary students (Cihak, Fahrenkrog, Ayres, & Smith, 2009; Manley, Collins, Stenhoff, & Kleinert, 2008), middle school students (Shepley, Spriggs, Samudre, & Elliot, 2018), and High school students (Probst & Walker, 2017). On the other hand, few studies use the system of least prompts with adults. A study by Mechling, Gast, and Fields (2008) used SLP with young adults. The SLP has been shown effective with students with varying disabilities such as autism spectrum disorders (Cihak et al., 2009), cognitive disabilities (Manley et al., 2008), comorbid visual impairment (Probst & Walker, 2017), and intellectual disability (Manley et al., 2008; Shepley et al., 2018).

Assistive technology is employed in the education system. By the evidence from many studies, assistive technology affects teachers' instruction and the students' performance in academic and functional skills (Ayres et al., 2013). Cihak and his colleagues (2009) examined the impact of implementing video-modeling in an iPod device with four elementary students with autism during independent transitions in the general education classroom. The participants' performance during the baseline was 7%. However, the percentage was progressed to 77% during the intervention phase. The result indicated that video modeling demonstrated to be an adequate strategy to use with students with disabilities.

A diversity of studies implemented the system of least prompts to teach individuals with disabilities life skills via electronic devices. Shepley et al. (2018) applied the system of least prompts via the *My Pictures Talk* application downloaded in iPod touch devices. The participants were four students with intellectual disability in middle school. The purpose of the study was to teach the participants how to make a snack following self-instruct instruction presented in a video activity schedule. The study took place in the kitchen area of the participants' self-contained classroom. The task analysis for making a snack was recorded in the video activity schedule to be used during the study. Each participant was trained to use the application and follow the steps presented in training sessions before applying the intervention. During the intervention, correct responses were recorded, and a hierarchy prompt was provided as needed. By the end of the study, three out of four participants mastered the task given and increased their ability to use video activity schedule via iPod as a guide to make their snack independently.

CHAPTER 3
METHOD

Participant

Student Participant. This study was conducted with a student who met the inclusion criteria to investigate the effects of the technology-based schedule system on the student's ability to independently complete each step of a particular routine skill and communication attempts during specific process. The participant was teacher-nominated based on the following inclusion criteria: (a) adequate hearing and vision, (b) an IQ of 55 or below, (c) between 7-12 years old and between 2nd and 7th grades (d) either verbal with limited language skills (e.g., (speaks in short sentences, uses the simple expressive language), or non-vocal (cannot speak but could follow one step instructions, uses receptive language), (e) has no experience with using technology-based activity schedules or completing tasks using an electronic schedule, (f) has a communication related goal in his/her IEP, and (g) has a regular attendance record.

The student, David, was a 10 years-old male in the fifth grade at the time of the study. He attended a self-contained /comprehensive development class for students with significant disabilities. He was diagnosed with an Intellectual Disability (ID) and was mostly non-vocal, however, the classroom teacher mentioned, in the informal interview that David had started some initial speech at the beginning of the age of ten, but his speech was limited, not functional, and he was unable to speak fluently. David's IQ matched the study's criteria, but the researcher did not get the permission from the teacher and the school's department office for more specific information regarding his IQ score or the test given to determine the participant's ID level.

David’s main challenge was a difficulty in following his schedule and transition between activities or sessions independently despite the fact that a VAS was applied in his classroom. Also, David consistently picked the preferred task instead of completing the VAS as it was arranged. He also did not initiate checking on his schedule unless he received a natural cue from his teacher or peers. If the transition was for an outside activity (e.g., gym, cafeteria, Art class), instead David waited for prompting from the teacher or peers. The other concern was that David spent an inappropriate amount of time during the transition from one activity to another. The range time he took to move to his VAS before each session was 32 seconds to 5:53 minutes during the first baseline. That means the time of each activity to begin was delayed and the completion of each session was impacted. At the time of the study, David had regular attendance at school, and he was skilled in operating the iPad.

Teacher Participant. The classroom teacher served as the interventionists in the study. She had a BS English studies degree and 12 years of teaching experience in elementary and intermediate schools. She also became a special education teacher by passing the Praxis test in low incidence disabilities and was able to obtain licensure. The classroom teacher had 7 years of experience teaching students with disabilities and had limited formal training in the field.

Setting

The study was conducted in David’s assigned Comprehensive Development Class (CDC) and the school environment. The intermediate school was located in an urban district in the southeastern of the United States. The CDC served nine students (male and female), in the fifth grade, labeled with moderate to severe disabilities, such as Intellectual Disability and Autism. In addition to the classroom teacher there were two teacher assistants. The first teacher assistant had around 9 years of experience working with students with disabilities. The second teacher assistant had about 5 years of experience.

The school contained 1,265 students in the fifth and sixth grade. The ethnic classification of the students was 71.5% white, 11.5% African, and 9.4% Hispanic. There were five self-contained classrooms for students with disabilities. The eligible students who received a free or reduced-price lunch were 39.5%. The school had 68.6 teachers (the student/ teacher ratio 18:1).

The class routine incorporated a VAS for each student. Some students had their schedule in the file (i.e., the laminated symbols which presented the class sessions during the day were placed inside the student's file by the Velcro, and there was an envelope to collect each symbol after completing the session). The file was placed on the students' desk. When the timer went off or the teacher said: "*Time to Switch*," they took one symbol to an assigned session to complete the activity. Other students had their schedules hung on the wall or the door inside the classroom environment. Both ways of displaying the VAS inside the class was chosen depending on the students' abilities. The VAS includes two major activities, those inside and those outside the classroom. From 8:00 am. to 10:15 am., the students spent their time inside the classroom completing a variety of activities. They had 9 tasks and activities in the first part of the day (e.g., Morning group, Language, Math, Writing). Each session of these activities was 15 minutes long and included 2 or 3 students. All teachers taught in a different session at the same time. Each teacher was placed in a particular zone and worked or monitored their students and assisted them as needed during that scheduled time. The students switched from session to another one when the *STOP WATCH* sounded, or when the classroom teacher said: "*Time to Switch*." The students were then to independently follow the VAS in order to complete their tasks or activities. From 10:40 am to 2:40 pm., the students attended inclusive classes or activities (e.g., Art class and gym), or had a related service, such as Physical Therapy or Occupational Therapy. The researcher determined to implement the intervention with David during the first part of his VAS when he had to transition to five different scheduled sessions of tasks within his classroom (15 minutes for each task).

Materials

Baseline Phase. In the baseline phases, the researcher collected data on the VAS that David used to complete the class routine activities (i.e., the traditional hard copy visual schedules which included icons of the sequence of activities arranged from top to bottom). These activities constituted his schedule during the school day. The icons were created by the classroom teacher using the *Bordemakeronline.com*. Each icon 2” x 2”, laminated, and Velcro was pasted on the backside. There was an envelope in the bottom in which to place the icon when David completed each activity. David’s VAS was located on the door side of the restroom inside the class, and he had to take the icon before he moved to the next session and post the icon on a small board which included a place for two or three students to be in the same activity each session. The small board was hung either on the wall or in the locker depending on the location of each session. When the session is over, David had to take the icon to his VAS to put it in the envelope. David supposed to do the same procedure in each successive session.

eVAS and Prompting Intervention. For the intervention, an iPad Air 2 with Wi-Fi and 128GB was used as the medium for the intervention. An electronic visual schedule application, *First Then Visual Schedule HD* (version 2.25*)*, was downloaded from iTunes for the iPad. This particular App was selected based on the faculty consultation among several applications. There were five critical reasons to choose the *FTVS* app (Appendix A). The first was, the ease of dealing with it depending on the application features such as providing the opportunity to add text to speech, images, video, take a picture of the steps to be completed, and print copy of the schedule. Second, there was a timer feature to determine the time that the participant took to complete each activity. If the participant did not finish the activity in a selected time, the timer would beep. Therefore, the user could complete the task independently through the application. Third, the student could choose several ways to interact with the visual schedule, based on his or her preferences, such as dragging the icon choices to the envelope, using the checklist for the icons, or following the arrow in *first-then* display. Fourth, the teacher could make a hardcopy from the application or send electronic copy by email as needed. Fifth, there were evidence-based studies used the same application to apply different type of skills. The *FTVS* app provide the students with disability the opportunity to be with their peers while completing a task given through visual steps presented into an VAS. By applying *FTVS* app, the complicated instructions transferred clearly to these students.

Creating eVAS. The researcher created an Electronic Visual Activity Schedule (eVAS) labeled with the participant's name, based on his daily morning schedule. Each icon in the *FTVS* application was taken from David's traditional hard copy VAS.

Measures

Dependent Variables. The primary dependent variable was the percent of independent correct responses that David demonstrated in using his visual schedule after the natural cue (the timer went off, or the teacher said: "*Time to Switch*"). David's visual schedule included: Morning group, Moby, Language, writing, Math, break, book club, reading, etc. As explained in the setting section, David had difficulty making the transition time before and after each session.

During baseline, the range time David spent moving to his VAS after each session was between 32 seconds and 5:53 minutes. Given this variable delay in making the transitions, David did not benefit from the time of the session. The researcher chose five consecutive sessions to record the participant's response. The researcher also recorded the last level of prompts that were provided to David in order to complete the response to his VAS during the intervention.

The secondary dependent variables were the amount of time David took to respond to the natural cue and check his schedule, and the communication that occurred during the interacting time between the researcher and the participant. Although a formal pre- and post -measure of David's communication was not collected, informal data were collected while gathering the social validity data after the study was completed (the process of collecting social validity data will be explained in the social validity section). Data were collected on the dependent variable for five sessions. At this point, the student entered the intervention phase for at least five sessions. The student again returned to baseline conditions for five more sessions before returning back to intervention for a final five sessions.

Interobserver Agreement (IOA). A second observer collected IOA at least 25 percent of all data collection sessions in baseline and intervention. The second observer was an undergraduate student in human services who was trained mastery on the data collection procedures before coming out to collect IOA. IOA was calculated using an item by item agreement and was obtained by dividing the number of agreements by the total numbers multiplied by 100.

Social Validity. Two measures of social validity (SV) were collected after the end of the study. The first one was addressed to the participating teacher (Appendix E). It was designed to indicate the extent to which the teacher was satisfied with the effect of using iPad and implementing *FTVS* App to complete a daily routine visual schedule independently. The survey included 11 questions. Each question contained five options that varied from strongly agree (scored by 5 points) to strongly disagree (scored by 1). The teacher had to read and circle the appropriate statement. The second survey was addressed to the participant to determine if he liked the intervention or preferred the traditional way of presenting the routine daily schedule (Appendix F). The participant's survey included three questions and visual symbols in the responses box (i.e., happy face was chosen if David liked the eVAS with a score of 1, and sad face was chosen if he disliked eVAS with score of 0). The researcher read and explained the survey to the participant. He responded by pointing to one of the two response options (i.e., sad face or happy face).

Independent Variable. The intervention consisted of the system of least prompts (SLP) along with the *FTVS* application on iPad. This application provided the opportunities for the participant to move between his daily routine schedule and complete the activities independently after responding to the natural cue (i.e., the timer went off, or the teacher said: "Time to Switch"). Also, the first prompts hierarchy was applied after 5 seconds. The system of least prompts in this study was chosen depending on the participant's ability. A gesture prompt was provided to gain David's attention as a first level of the system of least prompts (the details of implementing the system of least prompt will be explained in Procedures section). All data was collected in the data collection sheet (Appendix B). It showed the percent of sessions completed independently during the transition time after the natural cue, and the latency period collected by the seconds to present the time David took to check his schedule.

Procedural Fidelity. In addition to collecting IOA, the second observer also collected a sequence of steps completed on procedural fidelity during the intervention phases by using a checklist sheet which was designed to identify if the intervention was implemented correctly, including the procedure of applying the SLP in systematic steps (Appendix C). The second observer was also trained to fidelity on the intervention procedures. The second observer came out at least 25 percent of all data collection sessions in the intervention to collect the procedural fidelity on the collecting sheet (Appendix D). The procedural fidelity score was obtained by dividing the number of steps completed, and the total of the number of steps in a checklist then multiplied by 100.

Procedures

Baseline Phase. The researcher collected data on David's performance before introducing the eVAS and prompting intervention. The data sessions illustrated David's daily routine throughout the school day. During baseline, David used his traditional hard copy visual schedule as implemented by his teacher had devised and used prior to baseline. The researcher collected five sessions of baseline data. Specifically, when it was the transition period between sessions and the timer went off or the teacher said: "*Time to Switch*," the researcher recorded David's response directly after the cue to respond, without any prompt or praise in all baseline data sessions. The observing response included:1) choosing the correct icon from the visual schedule, 2) moving between sessions in a particular time, and 3) completing these steps independently. In addition, the latency period after the natural cue "*Time to Switch*" and the time David completed the response (checking his schedule) was recorded.

Training. After the last day of the baseline, the researcher provided a training session by sitting with the participant and taught him how to use the *FTVS* app. The researcher applied a modeling strategy and offered explicit instruction throughout the session. During the training session, the researcher performed the steps of dealing with eVAS; then the participant imitated the same actions. The researcher gave David immediate feedback after each step. The procedure involved a task analysis of steps: 1) first, turn on the iPad; 2) press the main button; 3) choose the *FTVS* app; 4) the eVAS appeared and labeled with the David's named he then, choose an appropriate design that presented David's hard copy schedule; and, 5), drag-and-drop an icon into the envelope. The researcher used clear language during each step to communicate with David and give him the opportunity to repeat words. During the training session, the participant seemed to be interested and ready to use the iPad. The researcher spent 30 minutes to complete the training session.

eVAS and Prompting Intervention. The intervention started by providing an iPad device for David to complete his daily routine schedule using *FTVS* app. The data were recorded during the transition period before the beginning of each session. The researcher implemented a system of least prompts as necessary (i.e., if the student did not respond to the natural cue within the set time). The hierarchy of prompts were implemented using the system of least to most prompts to guide the participant to the appropriate response. When the teacher said: "*Time to Switch*" and/or timer went off, the researcher waited five seconds for David to independently respond. If David did not respond, the first level prompt was provided by the researcher gaining the David's attention and then giving a gestural prompt (i.e., the researcher pointed toward the iPad app then waited five seconds for a response). Again, the researcher waited 5 seconds for the participant to respond. If the David did not respond, the researcher delivered the second level prompt by gaining the David's attention then a nonspecific prompt was presented (i.e., the researcher said: "what is next?" and waited five seconds for a response). The researcher introduced the third level of the prompt by gaining the David's attention and implemented a specific verbal prompt if David did not respond within 5 seconds (i.e., the researcher said: "Take your token on the iPad" and waited five seconds for a response). Any time during the intervention phase, if the participant exhibited an incorrect response (e.g., pressed wrong activity or skipped session), an error correction was implemented (i.e., block and redirect, move to the next prompt in the hierarchy).

The procedure of the latency data was the period spent by the participant at each session. The researcher started to record the latency of David's response when the timer went off, or the teacher said: "*Time to Switch*" until he responded to the natural cue (checking his VAS). In each session, the latency data was recorded by the seconds; however, the total of the latency data for each day was calculated by the total of minutes of the latency data and divided by 5 (the number of sessions David had to complete every day during collecting the research data for about an hour and 30 minutes/ 15 minutes for each session). During the baseline 1+2, the researcher recorded the latency data of David's response without given any prompts or praise. In the intervention phase, varying level of praise (i.e., token reward, specific praise statement, etc.) and prompts (i.e., Gesture, Non-Specific Verbal, Specific Verbal) was applied with five seconds interval between each prompting.

Differential levels of reinforcements were presented when the participant responded correctly. The researcher used the same reinforcement system as prescribed by the teacher. When the participant showed an independent and correct response, a high level of the reinforcement was provided (i.e., If the participant responded correctly and independently within 5 seconds, the researcher recorded “I” on the data sheet and provided a token reward). If the correct response resulted after any level prompt, the researcher provided a lower level of reinforcement (i.e., If the participant responded within 5 seconds but needed a gesture prompt, the researcher recorded “G” on a data sheet and provided specific praise statement). The intervention was implemented for each session using the same procedure until the trend line was shown.

Maintenance and Generalization. As the participant mastered the set criteria of using an eVAS via the iPad device, the maintenance and generalization procedures were implemented to evaluate the effectiveness of eVAS in completing assigned daily routine visual schedule independently. The maintenance data were collected two weeks post intervention and we conducted two days of data using the same process, the same display of the eVAS on *FTVS* app, and the same setting that the researcher applied the eVAS during the intervention. However, it differed from the intervention by performing it after 10 days of the intervention phase. On the other hand, the data of generalization were collected across instructors (the classroom teacher presented the eVAS to David instead of the researcher) and the materials (using another display of the schedule that the application offers) to evaluate David's ability to generalize the use of the eVAS.

Research Design

A single-subject (A-B-A-B) reversal design was used to examine the effect of using electronic visual activity schedules independently. The A-B-A-B phases delivered in a sequential order; traditional VAS, eVAS, traditional VAS, eVAS, and maintenance and generalization phases. The data was collected during each phase. The baseline phases continued for 5 consecutive days. Then, the intervention phases were continued for five days and until the participant mastered the criteria of 4 out of 5 independent response for at least 2 data sessions. The intervention (eVAS on iPad) was removed from the baseline setting for five sessions before returned in the intervention setting for the second time. This position continued until the data was collected for all phases. During the generalization session, the same device, application, and activity was implemented, but in another eVAS display. By utilizing the reversal design, the replication of the data collection in the baseline and the intervention demonstrated the varying of David's performance without and with the independent variable.

CHAPTER 4
RESULTS

Interobserver Agreement

Interobserver agreement (IOA) was collected in 25% (1 out of 5 days) of each baseline and intervention session. The Interobserver agreement data were analyzed by comparing the number of sessions and the latency that the primary and secondary observers recorded in agreement. The formula of the number of sessions recorded in agreement and dividing by the number of sessions recorded in agreement + the number of sessions recorded in disagreement and multiplying by 100 was calculated for each baseline and each iPad intervention session. The IOA was 80% in the first baseline phase, but the IOA scoring 100% in the second baseline. during completing sessions independently in the first and second intervention phase, the IOA was recorded 100%. With the same procedure, the maintenance and generalization phases were recorded with 100% of the agreement.

Procedural Fidelity

Procedural fidelity was recorded to emphasize the probity of sequential steps of the procedures applied during intervention sessions. These steps were not recorded during baseline sessions.

The second observer evaluated the first and second intervention by checking the procedural fidelity sheet (Appendix C) and recorded the steps completed in each session. The procedural fidelity was calculated to be 100 % in both the first and second intervention phases.

Effects on Percentage Correct and Latency of Response

A visual analysis of data representing the percentages of the participant's correct independent performance. (Figure 1) shows David’s correct percentages plotted in a line graph that showing the baseline, intervention, maintenance, and generalization phases.

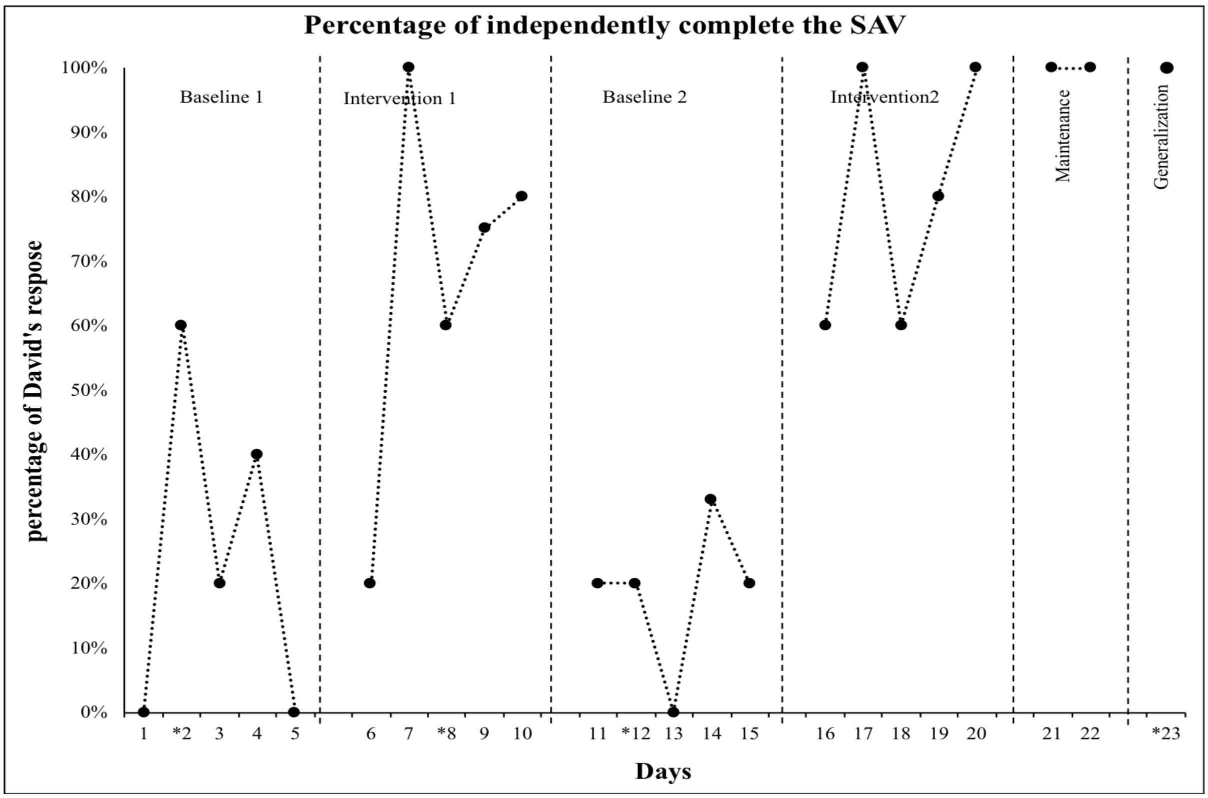

Figure 1. The percentages of the participant's performance

David’s data showed the percentage of completing the VAS independently during all phases. Each phase took five days of data collection, except the maintenance, and generalization phases. During baseline David’s percentage correct ranged from 0% to 60% with a mean of 24%. Once the participant was trained to use the *FTVS* application through the iPad, the first intervention was started. During intervention 1, David’s percentage correct ranged from 20% to 100% with a mean level of 67%. The change in level between phases (baseline 1 and intervention increased to a mean of 28.6%. During the second baseline phase, the data decreased when the intervention was withdrawn. When the iPad was temporarily removed, David's latency increased again, with the range from 0% to 33% and mean level of 18.6%. When the *FTVS* application was re-applied, David's correct use of the eVAS immediately increased, ranging from 60% to 100% with a mean level of 80. The change in level between phases (baseline2 and interveintion2) was 40 percentage points. When the eVAS intervention was applied, David met the criteria for completing the daily routine schedule with the criteria of 4 out of 5 independent response for at least 2 data sessions. During the maintenance and generalization phases, the participant maintained the 100% correct response obtained in the 2nd intervention. This achievement indicated that the use of the *FTVS* app on the iPad changed the participant's performance positively during completing the daily routine assigned in his VAS independently. The total percentage of non-overlapping data (PND) were 69.23%.

The visual analysis of the latency data (Figure 2) illustrated the practical advantage of the intervention (iPad), and the amount of time that the participant spent from the presentation of the natural cue "*Time to Switch*" until he responded to the natural cue (i.e., checked the schedule to move the icon; either from the traditional schedule (during the baseline phases) or electronic schedule (during the intervention phases). The range of the data was from 6.93 minutes and 12.16 minutes during the 1st baseline data collected. The large drop in level from baseline 1 to intervention 1 in the latency was recorded. During 1st intervention phase, a significant change in latency was exhibited (overall M= 2.67; range 0.3 seconds to 1.16 seconds). Once again, when the intervention was removed, the latency period increased to a mean of 6.43 minutes (range 3.92 seconds to 8.16). When the intervention was introduced again for the second time, the time decreased to a mean of 0.35 seconds (range 0.23 seconds to 0.45). During the Maintenance and generalization phases, the latency data remained consistent with intervention levels (mean of 0.24 seconds). PND was 100% for the latency of responding.

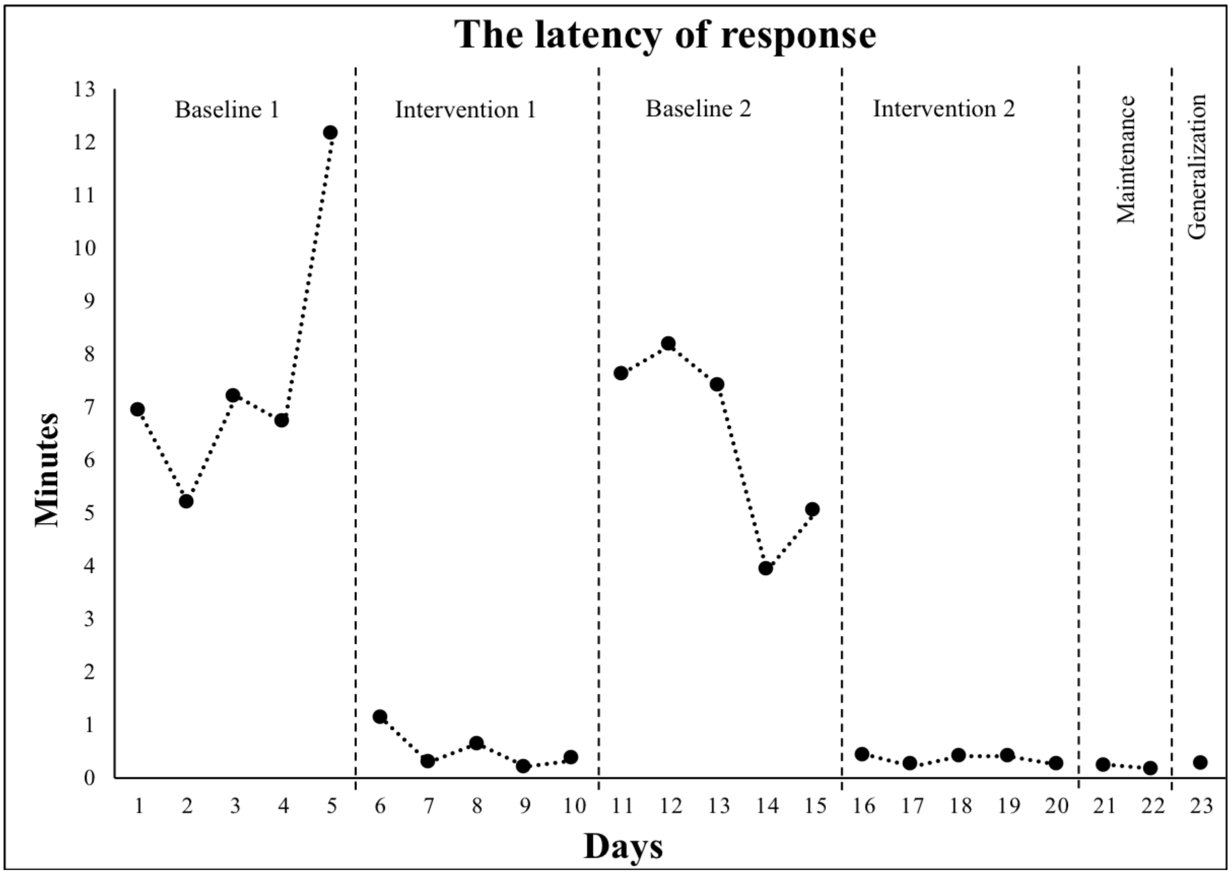

Figure 2. The visual analysis of the latency of David's response toward his VAS

Generally, there was an inverse correlation between the participant performance and the latency he took to move between sessions. During all intervention phases, the high percentage of independent performance was consistent with low latency periods. In addition, during baseline, the low level of independent performance was consistent with the high amount of time. In summary, the intervention led to increased independence in shorter amounts of time.

Tracking Prompts Using SLP

The participant's response was tracked using the system of least prompts to observe any change of the prompts hierarchy over time (table 1). Although the participant teacher applied the SLP randomly during baseline 1+2, the sequential order of prompts hierarchy provided by the researcher during the intervention 1+2 were starting with Gesture prompts "G," Non-specific Verbal prompts "NV," and Specific Verbal prompts "SV," with five seconds interval between each prompting.

The prompts were calculated by the frequency of the time that the hierarchy of prompts were given. The tracking of prompts in the first baseline required a fairly high level of more intrusive prompts (G= 1, NV= 9, SV= 6). Additionally, the first intervention period of intervention indicated the use of less intrusive prompts (G= 3, NV= 3, SV= 1). The second round of baseline required more intrusive prompts again (G= 1, NV= 4, SV= 9). Finally, the second round of intervention required much less prompting in general and those prompts required were not as intrusive (G= 0, NV= 5, SV= 0). During maintenance and generalization probes, there were no prompts needed since the participant responded independently when using the eVAS.

Table 1
A Visual Analysis of The Frequency of Prompts Hierarchy Used

Phases	G	NV	SV	I
Baseline 1	1	9	6	6
Intervention 1	3	3	1	15
Baseline 2	1	4	9	4
Intervention 2	0	5	0	20

Note. G=Gesture prompts. NV=Non-specific Verbal prompts. SV=Specific Verbal prompts. I respond=Independent respond

Social Validity

The teacher and the participant completed the social validity questionnaire forms. The teacher's responses were between agree and strongly agree in all the eleven questions (Appendix E). These responses indicated the degree of satisfaction achieved by the end of this study, whether in the use of the technology, the instruction procedure used during the application of the study, the effect on the participant performance, and the enthusiasm of the teacher to implement the procedures again. The teacher social validity questionnaire indicated results ranging from 4 to 5 with a mean level of 4.36 (Table 2).

In the participant social validity, the three questions designed with symbols and visual statements to match the participant ability since he had limited use of the receptive and expressive language (Appendix F). These statements indicated the attractive of using an iPad to complete sessions assigned in the eVAS. The participant's response was: "Yes, I do" for all three questions with ranging from 1 to 1, and a mean level of 1 (Table 2). A smiley face and written statement were presented to assist him to point independently for an integrity purpose.

Table 2
Mean and Range of Ratings by Teacher and Student on the Intervention Rating Profile

Ratings	Mean	Range
Teacher Social Validity Ratings	4.36	4 to 5
Student Social Validity Ratings	1*	1 to 1

*Note**. Visual symbols (i.e., happy face and sad face) were presented as a measure of whether the student liked or disliked the eVAS.

CHAPTER 5

DISCUSSION

The purpose of this study was to investigate the effects of using eVAS (i.e., *FIRST THEN VISUAL SCHEDUAL HD* app) on a student's ability to independently check his schedule to transition throughout the day. The results extended prior studies by showing the effectiveness of using the eVAS with a ten years old participant diagnosed with Intellectual Disability (ID) to complete the routine skills via applying the *FTVS* app on iPad independently. The research by Stephenson (2015), implemented the eVAS using *FTVS* app with 3 young students, showing that they mastered the goal of completing the activity of academic and communication skills. Also, the study by Douglas, and Uphold (2014) used the same application as well with five high school students to teach them the self-management and self-determination skills through scheduling list of classroom tasks and lunchroom tasks via *FTVS* app to complete the steps of each task independently and they effectively reach the goal of that study.

In addition, to extend prior studies by emphasizing the effectiveness of using the eVAS, this study had successfully applied the system of least prompts to give the student the opportunity to do the task with less prompts and promote independent use of eVAS. The system of least prompts has been used in many studies to teach participants with various age, ability and setting a variety of skills such as life skills (Shepley et al., 2018), reading skills (Mims, Hudson, & Browder, 2012), writing skills (Stephenson, 2015), and self-determination skills (Douglas, & Uphold, 2014).

In this study, by using the iPad to complete the activity in each session independently, other motivating factors may have been involved in impacting the participant's performance such as self-determination, self-control, self- instruction, and self-learning. According to Hughes, Golas, Cosgriff, and Brigham (2011), self-directed learning is a method that the teachers can utilize to promote independence for students with intellectual disabilities. This form of knowledge also involves two strategies that are self-determined learning method and pictorial self-instruction. All these strategies help in teaching life skills. Mims, Browder, Baker, Lee, and Spooner (2009) suggest that self-determined learning teaches the students how to set their personal goals, take action as well as change their plans where appropriate. Hume, Plavnick, and Odom (2012) state that the pictorial self-instruction approach enables the students to complete the assignments using a picture-based organized planner which allow students to plan, organize and complete their work using pictures in different categories. This study furthers the evidence to support the use of eVAS to promote the acquisition of skills that increases the quality of life for students with intellectual and/or developmental disabilities.

Limitations

There are several limitations that need to be discussed. First, although the maintenance probes indicated the student was able to maintain skills, these probes were only conducted 2 weeks post intervention. A better measure of maintenance would be to have collected data 3-4 weeks post intervention, but due to scheduling factors, (i.e., end of the school year) the maintenance period was shortened to two weeks.

The second limitation was the location of the traditional schedule inside the classroom. It was difficult to hide during the intervention phases and often the participant was confused as to which schedule to use (i.e., the eVAS or the traditional schedule). Due to this, it potentially delayed his response to the eVAS.

Third, other students in the class were curious about the iPad, which led to significant attention being directed at the participating student from his peers. This attention could have impacted the participant's response to the eVAS.

Fourth, as indicated in the methods, it was planned to allow for 5 opportunities to "check his schedule" throughout the hour-long observation window. This did not happen on several occasions due to unplanned circumstances. For example, the student was pulled for speech on one occasion and missed the opportunity to "check his schedule" during the hour-long observation window so the percent independent correct calculation was not always calculated out of 5 opportunities, as there were a couple occasions where he was not there or there was no opportunity provided to respond.

Fifth, the application used was including many features. One of the significant advantage that the *FTVS* app had was the time management for each session of the activity. However, this study used the (STOPWATCH) in the researcher's iPhone to calculate the latency of the participant's response. It was a challenge to observe the participant, provide the prompts and stop the timer at the same time. If the timer is programmed to be within each step in the application, the student will remind himself and the teacher will manage the session and observe the student's performance clearly.

A final limitation was that initially this study had planned to target a measure of communication skills as a result of the use of eVAS. This measure did not happen in this study due to several barriers. Future research should consider the formal measure of the use of eVAS on the communication initiations for a student with vocal verbal limitations. One way to the best way to address this would be by conducting a pre-test of vocal initiations at the beginning of the study and post-test on the last day of implementing the intervention.

Future Research

Future research should investigate allowing the participant to choose the preferred device (e.g., iPad or iPod touch) and activity (e.g. prepared snack, morning routine in the school day, etc.) as well as comparing the effectiveness of this preferred device and activity on the participants' performance. Additionally, this current study applied the intervention with one participant. Future research should replicate this study with a concurrent replication across students. Due to limited students who met the inclusion criteria, this study only used one student. Replicating the intervention procedures with more than one participant, and selecting participants diagnosed with a similar and different level of disability will produce more credible results.

Also, future research should examine the relationship between applying the eVAS and the target student's social and communication improvements and academic achievement. As a result of what this study found while applying the eVAS via iPad, the participant who was non-vocal verbal did initiate repeating the recorded voice in the *FTVS* application after the activity's name was called.

Implication for Practice

The more benefit the students can get from the technologies, the more knowledge they can achieve either in academic or personal goals. It is important that teachers consider that they may need to train their students on the use of the iPad and motor skills needed in order to access the app before using the eVAS in general.

There are two main reasons why the participant should be pre-trained with the iPad before implementing the intervention phase. First, to grab the participant's interest by discovering the components of the application to avoid any influence of using eVAS out of its purpose (e.g., playing in the app instead of responding to the eVAS). Second, to know the technique of dealing with eVAS (e.g., click to a particular icon to choose a session determined, and drag-and-drop an icon to move it into the envelope, etc.).

This study guided teachers' use of such supports in the classroom. Also, it encouraged teachers to apply the iPad as a valuable tool instead of using it only to reinforce the students or during their free time. Finally, this study supports teachers' use of technology to promote the independence of students with intellectual and/or developmental disabilities.

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APPENDIXES

Appendix A: The Participant's eVAS on FTVS Application

Note: This is the *FIRST THEN VISUAL SCHEDUAL HD* icon on the App Store. Also, there are some examples of the eVAS was used during the study with the assigned participant, David. These examples pictures showed two different displays (Drag and drop an image from a strip and put it in an envelope and scroll through a checklist) were applied during the intervention and generalization phases. (This appendix was created by the researcher.)

Appendix B: Data Collection Sheet (Researcher Form)

Data Sheet- First/Then App

Student ID____ Observer ____

The effect of the iPod, App, and SLP on student's ability to independently check schedule and the latency period with which he responds.

		Date / /2018		Date / /2018		Date / /2018		Date / /2018		Date / /2018	
Activity	**Time**	**Prompt**	**Latency**	**Prompt**	**Latency**	**Prompt**	**Latency**	**Prompt**	**Latency**	**Prompt**	**Latency**
1st											
2nd											
3rd											
4th											
5th											
Total											
Note											

Key

G= Gesture Prompt
NV= Non-Specific Verbal Prompt
I= Independent
N/A= Not Applicable
SV= Specific Verbal Prompt
NR= No Responding

Note. This data sheet was created by the researcher

Appendix C: Procedural Fidelty Checklist Sheet

✗ = Incorrect/doesn't perform
✓ = Performs step correctly
Ø = N/A

Schedule- Intervention Procedural Fidelity

Date: ________________ Observer: ____________________ Interventionist: ____________________

Length of observation: ______________ Student ID: _______________________

Lesson Components	Teacher Response	Notes:
1st activity	1. ____Teacher Says "Time to Switch" and/or timer goes off. 2. ____Wait 5 seconds for the student to independently respond. 3. ____If student responds within 5 seconds, records "I' on data sheet and provide token reward. 4. ____If no response after 5 seconds, gains student's attention then a gesture prompt is provided (i.e. point toward iPad app) and waits 5 seconds for a response. 5. ____If student responds within 5 seconds, record "G" on data sheet and provide specific praise statement. 6. ____ If no response after 5 seconds, gains student's attention then a nonspecific verbal prompt is provided (i.e., What is next?) and waits 5 seconds for a response. 7. ____If student responds within 5 seconds, record "NV" on data sheet and provide smile. 8. ____If no response after 5 seconds, gains student's attention then a specific verbal prompt is provided (i.e. "Take your token on the iPad") and waits 5 seconds for a response. 9. ____If student responds within 5 seconds, record "SV" on data sheet. 10. ____If student presses wrong next activity or skips an activity, an error correction is provided (i.e., block and redirect, move to the next prompt in the hierarchy). 11. ____Record N/A if no opportunity is given.	
	Total steps implemented correctly ______	

Note: an example of Procedural Fidelity checklist sheet used during Intervention (created by the researcher)

Appendix D: Data Collection Sheet (Second Observer Form)

Data Sheet- First/Then App

Student ID____ Observer ____

The effect of the iPod, App, and SLP on student's ability to independently check schedule and the latency period with which he responds.

		Date / /2018		
Activity	**Time**	**Prompt**	**Latency**	**Note**
1st				
2nd				
3rd				
4th				
5th				
Total				

Key

G= Gesture Prompt
NV= Non-Specific Verbal Prompt
I= Independent
N/A= Not Applicable
SV= Specific Verbal Prompt
NR= No Responding

Note. This data collection sheet for the second observer was created by the researcher

Appendix E: Social Validity Questionnaire (teacher Form)

Social Validity Questionnaire (Teacher Form)

Student: ________________________ Teacher: ______________________ Date: ________

This questionnaire consists of 11 items. For each item, you need to indicate the extent to which you agree or disagree with each statement. Please indicate your response to each item by circling one of the five responses to the right.

	Questions	Responses				
1.	The technology-based life skills instruction was successful in engaging the student during instruction.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
2.	The life skills chosen for the study were appropriate for the student.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
3.	The systematic instruction procedures used along with the app was helpful.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
4.	The text with picture icons were helpful in guiding the student through the steps of the targeted skill.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
5.	Assessing the student's ability to correctly and independently perform each step of a life skills task analysis is a valuable practice.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
6.	The skill selected for interventions for this student are important and adequate.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
7.	There was a change in the student's skill acquisition after the implementation of the intervention.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
8.	I noticed meaningful increases in the student's independence after the implementation of the intervention.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
9.	I noticed meaningful decreases in the student's behavior after the implementation of the intervention.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
10.	The intervention program is important and appropriate for this student.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
11.	I am interested in continuing with the use of the procedures	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

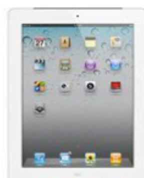
Note. This data sheet was created by the researcher

Appendix F: Social Validity Questionnaire (Student Form)

Social Validity Questionnaire (Student Form)

Student: ________________________ Teacher: ______________________ Date: _______

This questionnaire consists of three questions. The tudent needs to indicate the symbol to which he likes or dislikes with each statement by pointing one of the two responses.

Do you like:			
to use the iPad for your schedule?		 Yes, I do.	 No, I do not.
First Then App?		 Yes, I do.	 No, I do not.
First Then App more than picture schedule?	 	 Yes, I do.	 No, I do not.

Note. This data sheet was created by the researcher

VITA

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