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**THE EFFECTS OF SELF-MONITORING USING AN IPAD TO INCREASE ON-TASK BEHAVIORS OF HIGH SCHOOL STUDENTS WITH ATTENTION DEFICIT/HYPERACTIVITY DISORDER (ADHD)**

By

Christina Bamford

A Thesis

Submitted to  
Department of Interdisciplinary and Inclusive Education  
College of Education  
In partial fulfillment of the requirement  
For the degree of  
Master of Arts in Learning Disabilities  
at  
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Thesis Chair: Joy Xin, Ed. D.

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## **Dedications**

I would like to dedicate this document to my husband, Robert, and our daughters, Madelyn, Corrine, and Erin, for all the words of encouragement, the sacrifices you all made, and for always believing in me. Without all of you, this moment would not have been possible.

This thesis is dedicated in loving memory of my mother, Stella Walton. While she was unable to finish this journey with me, her endless sacrifice, support, and encouragement throughout my life made it possible to pursue this dream.

## **Acknowledgment**

I would like to express my appreciation to Ms. Kimberly Schmidt for welcoming a complete stranger into her classroom. Her willingness to try anything to benefit her students makes her a very special teacher and a very special person.

## Abstract

Christina Bamford

THE EFFECTS OF SELF-MONITORING USING AN IPAD TO INCREASE ON-TASK BEHAVIORS OF HIGH SCHOOL STUDENTS WITH ATTENTION DEFICIT/HYPERACTIVITY DISORDER (ADHD)

2015-2016

Joy Xin, Ed. D.

Master of Arts in Learning Disabilities

This study examined the effect of using an iPad to increase on-task behaviors of high school students with Attention Deficit/Hyperactivity Disorder (ADHD). Four students attending a Resource Center during the class of United States' History II participated in the study. A single subject design with ABAB phases was used. During the baseline, students were observed for 20 minutes in class, and their behaviors were recorded with a checklist. During the intervention, each student was taught to identify one to two on-task behaviors as a goal and to use an iPad with Choiceworks App for self-monitoring for 8 days. The iPad was removed, then resumed for a period of 8 days respectively. Results showed that all students using the iPad for self-monitoring increased their on-task behaviors. Future research involving longer time of using an iPad should be considered in order to validate the findings.

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## **Chapter 1**

### **Introduction**

#### **Statement of Problem**

Attention Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder which presents difficulties in sustaining attention, excessive hyperactivity, and poor impulse control (Sibley, Altszuler, Merrill, Morrow, 2014). It is found that certain areas of the brain of a child with ADHD function differently from that of a typically developing peer (Barry & Kelly, 2006). For example, a child's Frontal Lobe is underdeveloped, as well as the Reticular Activating System. The anterior portion of the Corpus Callosum is smaller than the non-ADHD brain, and there is abnormal blood flow in the Frontal Cortex, Cerebellum, and Basal Ganglia. Their behaviors of inattention, impulsivity, and (or) hyperactivity are found in these children's lives, affecting their schooling academically, socially, and emotionally. Poor working memory, apparent in students with ADHD, is a factor in poor organization (Martinussen and Major, 2011), and other behaviors, such as aggression and noncompliance are often observed in classrooms (Gureasko-Moore et al., 2006).

Approximately 5-10% of children and adolescents are diagnosed with ADHD (Gureasko-Moore et al., 2006, Sibley et al., 2014). Adolescents with ADHD are more likely to struggle in school and become academic underachievers, or recipients of special education services (Birchwood & Daley, 2012). For example, they are less likely to complete their schoolwork, therefore attain poor grades, and high rates of absence. These

students present more disciplinary problems and are suspended and expelled more times than their typical peers. As a result, these adolescents are more likely to drop out of high school (Sibley et al., 2014). In academic learning, they possess limited ability to plan, organize, and appropriately manage themselves in the classroom.

Planning is one of the biggest problems parents and teachers reported about adolescents with ADHD (Sibley et al., 2014). They were found to be unable to begin planning and to create a coherent story independently without supports. However, when given four pictures to assist these students with writing, their stories were organized and meaningful. It was also found that the use of the pictures helped students to develop a goal for their writing which assisted them in developing a logical story, which is helpful for these students in planning (Martinussen & Major, 2011). Working memory plays a critical role in attention and learning. It integrates new information with the already known, and assists in comprehension, reasoning, and learning; therefore, it is linked to students' ability to perform academic tasks (Gathercole, Durling, Evans, Jeffcock, & Stone, 2008). Language comprehension and written expression, as well as many other academic areas, are affected by working memory impairment (Alloway, Gathercole, Kirkwood, & Elliott, 2009; Montgomery, Polunenko, & Marinellie, 2009; Swanson, Howard, & Saez, 2007; Swanson & Berninger, 1996). Breaking instruction and assignments into smaller segments can help these students to make their plan (Martinussen & Major, 2011).

Another concern is organizational problems in adolescents with ADHD. For example, they often have difficulty finding the materials needed for class, lose their

assignments or misplace them in the wrong folders or notebooks, miss parts of a class lecture and, forget to record vital notes. Their assignments are often lacking organization and appear as if they were not able to organize. Sometimes they do not write their assignments down, so that they are not able to complete their homework. With regards to completing their homework, they often do not follow the directions properly. All of these problems negatively impact these students' academic performance (Abikoff et al., 2013). As a result, these students struggle to grasp and maintain information they learned, and are impaired in their ability to organize information in a meaningful manner (Morin, 2015). Following directions with multiple steps is difficult for these adolescents. If multiple steps are required, they will have difficulty to recall the necessary steps or vital information needed (Morin, 2015).

In addition to planning and organizational problems, another issue teachers and parents are concerned about adolescents with ADHD is behavior problems (Sibley et al., 2014). Most students with ADHD lack of inhibitory control of their behavior when compared to their peers (Barkley 1997, 1999). According to Barkley (1997) a lack of self-regulation in adolescents with ADHD is due to their impairment in executive functioning. Typically developing adolescents are able to evaluate external stimuli and relate it to the present, past, and future contexts. They understand that if their behavior is deemed inappropriate, they should not behave in that manner again. Whereas, adolescents with ADHD lack impulse control, but seek immediate reinforcement (Barkley, 2000). Academic success at the middle and high school levels require a student be able to manage himself and be independent. Because of problems with sustained

attention, executive functioning, and deficits with self-management of one's own behavior, an adolescent with ADHD is more prone to failure than his/her non-ADHD peers (Sibley et al., 2014). These students struggle in their academic learning in elementary school, when they transition into middle school and high school, this struggle becomes even more serious (Sibley et. al, 2014). Because of the environmental change, they are required to move from one classroom setting with one or two teachers in elementary school to multiple classrooms with multiple teachers. This process requires organizational skills to multi-tasks. In addition, the schedule of high school is blocked into 45 minutes, which seems difficult for individuals with ADHD to stay in their seats for such a long period of time

Given the concerns in planning, organization, and self-regulation of students with ADHD, additional supports in the academic setting are needed for these students, especially to self-identify their strengths and limitations, and ways to manage themselves.

Self-management known as self-monitoring is described as a procedure for students to systematically monitor their own behavior (Bedesem, 2012). Self-monitoring is observing and recording of behavior occurrences, including two steps: (1) teaching students to recognize their behavior and (2) follow the process to self-record his or her own behavior (Gureaski-Moore et al., 2006). Self-monitoring has demonstrated positive effects for increasing students' time spent on task, as well as motivation because students are taking their own responsibility to manage themselves. It has been indicated as an effective classroom intervention for students to increase appropriate behaviors, as well as benefit teachers because the responsibility lies mainly with the individual students. This

strategy also makes adolescents accountable for their behavior because they are assessing and regulating their own behavior (Gureasko-Moore, et al., 2006).

Traditionally, self-monitoring has been used with paper tallies and response sheets (Bedesem, 2012). For example, a student would monitor the number of assignment items he/she completed compared to the number of items which were assigned using a checklist. The results could then be graphed or plotted to provide a visual presentation.

Although self-monitoring has been reported in research as an effective intervention in reducing inappropriate behavior of students with learning disabilities (Bedesem, 2012), behavior disorders (Blood, Johnson, Ridenour, Simmons, & Crouch, 2011), and severe disabilities (Mechling, 2007), few studies have been found for students with ADHD. Today the majority of adolescents have instant access to technology via smart phones or portable tablets, such as iPods and iPads. These handheld computer devices allow users to upload pictures and videos and to download Apps to assist them in educational settings and in daily life responsibilities. It seems that such handheld equipment may play a role of in-class self-monitoring to replace paper-pencil checklists (Mechling, 2007; Bedesem, 2012; Wills & Mason, 2014).

Video presentation was found to be effective on the social behavior of adolescents with ADHD to increase self-awareness of their own behavior and improvement through video modeling. In such video segments, the student viewed his behavior, rated the appropriateness of his social behavior, and then discussed with a program counselor



(Sibley, et al., 2011). Another video modeling combined with self-monitoring was found to increase on-task behavior and decrease disruptive behavior (Blood, et al., 2011), but the equipment used often was a TV screen that may impact others in class if one student was allowed to watch. A handheld computer, such as an iPad, may be private to place on an individual's desk without disrupting the rest of the class.

### **Significance of Study**

Because of the inclusion movement, students with ADHD are placed in the general education classroom with their typical peers, and 80 % of their day is spent in the general education setting (Gureasko-Moore, et al., 2006). In the inclusive environment, managing student behaviors would be a challenge for teachers, especially managing those with behavior problems, such as ADHD.

Reviewing research articles, it is found that the most common interventions for these students are stimulant medications and teacher-delivered behavioral interventions (e.g., behavior modification plans). Self-monitoring provides another opportunity for these students to take responsibility to manage themselves. Traditionally, self-monitoring was provided with paper and pencil format to fill out a checklist. This method may not be appropriate for inclusion classrooms because these students may be considered as different from others when they are using equipment (e.g. headphones, cassette player, and paper checklist) that other students are not using. However, with the increase of technology use in the classroom, students who may be using technology to self-monitor

would have the same equipment that all other students have. This way no one appears different.

A handheld computer, such as an iPad, provides personal usage without interrupting others in class. Given the fact that adolescents are more likely to be engaged by and responsive to technology, while limited research was found to examine students' gains utilizing technology, this study is designed to use iPads to implement self-monitoring with high school students with ADHD.

### **Statement of Purpose**

The purposes of this study are to: a) to evaluate self-monitoring using iPads for students with ADHD; b) to examine the effect on using iPads for self-monitoring to change behaviors of students with ADHD; c) to evaluate these students' satisfaction with the use of iPads.

### **Research Questions**

1. Will the use of iPads increase appropriate behavior of students with ADHD?
2. Will the use of iPads increase test scores of students with ADHD?
3. Will students be satisfied with the use of iPads for self-monitoring their behaviors.

## Chapter 2

### Review of the Literature

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder that impacts multiple aspects of a person's life (Young, Morris, Toone, & Tyson, 2007). The inattentive and/or hyperactive-impulsive behaviors often affect a student's academic, social, emotional, and behavioral functioning (DePaul, Reid, Anastopoulos, & Power, 2014). There are three subtypes of ADHD including inattention, hyperactivity-impulsivity, and a combination of both (Hallahan, Lloyed, Kauffman, Weiss, & Martinez, 2005).

There are five models of cognitive dysfunction associated with ADHD (Young, et al., 2007). One is delay aversion which states that people with ADHD cannot delay the need for gratification. The 2<sup>nd</sup> is inhibition which states that deficits are caused by failure in inhibitory control. The 3<sup>rd</sup> is behavioral inhibition/activation that children with ADHD have underresponsive behavioral inhibition system to respond to punishment or reward. The 4<sup>th</sup> is executive functioning that states that ADHD symptoms are caused by executive dysfunction. The final is cognitive-energetic model that states that information processing transpires among different cognitive levels, and there is a breakdown in cognitive communication (Young, et al., 2007).

According to DuPaul, et al. (2014), the academic achievement of students with ADHD is .60 to .75 standard deviations below their normal achieving peers. Often, these students have difficulties in interaction with peers and adults, establishing and

maintaining friendships, and presenting appropriate emotional moods (DuPaul, et al., 2014). These symptoms can continue into adolescence and adulthood (Frazier, Youngstrom, Glutting, & Watkins, 2007). The most significant concerns are behavior problems including inattention, off-task behavior, impaired self-regulation, and poor task completion (Martin, 2014).

In a classroom environment, paying attention, sitting quietly, and following directions are required, but challenging for students with ADHD. It is important to provide appropriate strategies to support these students to succeed in school socially and academically. This chapter reviews research articles about intervention strategies for managing behaviors of students with ADHD.

### **Medical Treatment**

Often, ADHD is diagnosed by physicians with medical prescription of drugs, such as Ritalin, Methylin, Adderall, Dexedrine, Cylert, and Concerta. This treatment of stimulant medications can be beneficial, because they are fast acting and easy to take in order to improve behaviors (Kirkpatrick, 2005).

In Forness and Kavale's study (2001), 579 children who were diagnosed with ADHD were treated with psychopharmacologic stimulants. First, teachers and parents completed a four point scale rating the child's behavior, 0 representing no ADHD symptoms, 1 for "some" symptoms, 2 for "pretty much", and 3 for "very much". The behaviors observed included inattention, impulsiveness, hyperactivity, aggression, as well as social interaction and communication, and academic achievement. All participants

scored above 2 on the rating scales indicating that their ADHD symptoms were significant. Then, they were divided into four groups for interventions: placebo, behavioral intervention, medication treatment, and combined medical and behavioral intervention. After 14 months, parents and teachers were given the same rating scale to record. Twenty five percent of children in the placebo group scored 1, 34% of the behavioral group scored 1, and 56% of the medical group score 1 while the combined group with medical and behavioral intervention had a rate of 68% score 1. It seems that merging medical treatment and behavioral intervention had a stronger effect than only one treatment.

Arnold and associates' study (2003) evaluated the effects of stimulant medication and behavioral intervention on children with ADHD. Parents and teachers were given behavior rating scales on a 0-3 measurement to rate 18 symptoms listed in the *Diagnostic and Statistical Manual of Mental Disorders, 4<sup>th</sup> edition* (DSM-IV, 1994). A total of 566 children with ADHD were then randomly assigned to one of four groups: a medical intervention, behavior intervention, medical and behavioral intervention combined intervention, and community care. A placebo was initially given to children in medical intervention and the combined medical and behavioral groups, then a methylphenidate titration was given to determine the best dose for individuals. Once the correct doses of stimulants were determined, the medication was monitored for 13 months.

Results showed that 76% of African American and 78% of Caucasian children responded favorably to medication. Parent and teacher rating scales demonstrated higher rates of normalization after 13 months of stimulant treatment. It is found that African

American children were most successful with the combined medical and behavioral intervention than the Caucasian. Middle class Caucasian children who did not have a comorbid behavioral disorder or parent-child conflict, may only need stimulant treatment for ADHD symptoms while minority children from low socioeconomic backgrounds who have comorbid behavioral disorders and/or parent-child conflicts may need the combined medical and behavioral intervention.

However, there are concerns regarding the treatment of stimulant medicine. For example, this medicine may cause insomnia, anorexia, nausea, abdominal pain, headaches, lability of mood, anxiety, nightmares, weepiness, tachycardia, and blood pressure changes as short term side effects, and the long term treatment of stimulant medication can cause weight loss or stunted growth. Also, stimulant medicines could affect the heart and be a cause of drug dependence (Brown & Rosa, 2002). It has been found that the severity of these side effects is dependent on the dosage level, the higher the dosage level the more severe the side effects (Brown & Rosa, 2002).

### **Behavior Modification**

Behavior modification was developed based on B. F. Skinner's science of behavior (1953) which advocated for the use of reinforcement to increase the number of times an appropriate behavior occurs. In the past, behavior modification has been applied for students with Autism (e.g. Carnett, Raulston, Lang, Tostanoski, Lee, Sigafos, & Machalicek, 2014) and Cognitive Impairment (e.g. Hetzroni & Roth, 2003). A recent study by Pfiffner, Villodas, Kaiser, Rooney, and McBurnett (2013) examined a home-

school intervention for 57 children diagnosed with ADHD in 2<sup>nd</sup> through 5<sup>th</sup> grades. All students displayed six or more ADHD symptoms in both the school and home environment, with IQ >79, participated in the study. Teachers and parents filled out a 4-point scale (never, sometimes, often, very often) identifying the students' behaviors listed in DSM-IV (1978). Next, parents completed the Homework Problems Checklist with 21 items, and teachers completed the Academic Competence Evaluation Scale which compared the student's performance against grade level expectations (far below, below, grade level, above, far above) for reading/language arts, math, and critical thinking. Parents and teachers also completed the Children's Organizational Skills Scale which measured organizational skills, management of materials/supplies, and task planning. School grades were obtained using a Standards Based Report Card system where students were rated on their skill development in the subject areas. Their academic achievement was assessed through four subtests, Paragraph Comprehension, Reading Fluency, Math Fluency, and Math Calculation of the *Woodcock Johnson Tests of Achievement* (3<sup>rd</sup> edition, 2001). Further, students were observed three different times in class for two weeks using the Behavioral Observation of Students in Schools (BOSS) which measured Active Engaged Time, Passive Engaged Time, Off-Task Motor, Off-Task Verbal, and Off-Task Passive. A daily school-home report card was developed to identify two to three behavior problems. Subsequently, students were given social skills training for 10 sessions, and their parents were involved in training, too. A token system was provided to students to earn stars at both school and home when they met their goals, and received daily and weekly rewards for stars earned.

Results showed that 51% of students demonstrated less than six ADHD symptoms after the intervention, and their academic achievement and time spent on-task in the classroom were increased. It is found that reduced ADHD symptoms had a close relationship to their improved organizational skills. Their academic improvement was significantly related to their reduced ADHD symptoms. Using the token economy system, students were able to earn points and cash-in their points for prizes, which showed significant benefits to reduce inappropriate behaviors.

In Luman, van Meel, Oosterlaan, and Geurts' study (2011), 34 students aged 6-13 were involved in validating the Sensitivity to Punishment and Sensitivity to Reward Questionnaire for children (SPSRQ-C). Children diagnosed with ADHD through the parent association's outpatient clinics were recruited. Their diagnoses were confirmed using the Diagnostic Interview Schedule for Children of DSM-IV. Then parent versions of the Disruptive Behavior Disorder (DBD) rating scale were completed, showing scores which were above 90<sup>th</sup> percentile for ADHD symptoms. Next, the teacher rating scale was completed showing scores above the 80<sup>th</sup> percentile for ADHD symptoms. These measures confirmed ADHD symptoms of these participating children. A typically developing peer group (TD) consisting of 75 children participated to serve as a comparison group.

Further, parents were issued the SPSRQ-C to measure their child's sensitivity to punishment and reward. This questionnaire included a Punishment Sensitivity scale with 15 items, and it included three Reward Sensitivity scales (Reward Responsivity, Impulsivity/Fun-Seeking, and Drive). Results regarding Punishment Sensitivity for



children with ADHD were not significant when compared to the TD group. However, children with ADHD scored higher on the Reward Sensitivity and the Reward Responsivity scales than those in the comparison group. This indicates that reward reinforcement is desirable to children with ADHD to obtain appropriate behaviors and individual rewards should be considered to meet their needs.

Even though behavior modification using a token economy has been shown to be successful, there are concerns about such a system. One concern is the amount of time required to plan a token system to individualize a student's behavior needs, because of different types of disruptive behaviors, a behavior modification plan should be developed individually based on individual student's needs (Filcheck & McNeil, 2004). In order for the plan to be successful the reward must be meaningful. Another concern is maintenance and follow-through with the plan. For example, the tokens must be given immediately as a reward for children to internalize the action with the positive reinforcement.

### **Self-Monitoring**

Self-monitoring is to teach students to record their own behavior and to be aware of their own problems. Self-monitoring has been used for students with disabilities, including those with autism (e.g., Finn, Ramasamy, Dukes, & Scott, 2015), learning disabilities (e.g., Sebag, 2010), and severe disabilities (e.g., Agran, Sinclair, & Alper, 2005).

Graham-Day et al.'s study (2010) involved three students who were 16, referred by their teacher because of their off task behaviors. All three were diagnosed with

ADHD and received special education services. Baseline data were collected through observations to record their on-task behaviors. During the intervention, a checklist was given to each student to indicate if they were on task when they heard the determined chime. Reinforcement was given to the student if the checklist matched the observer's to evaluate accuracy of the student's recording.

Results show, on average, approximately 47% of on-task behavior increased when self-monitoring was applied. The students reported that the checklist was easy to use and the chimes reminded them of on-task, but they became frustrated with the interruption of the random chimes, and the teacher liked the checklist and reported that the self-monitoring was effective. However, these students' academic performance was not improved. The possibility may be that students increased their on-task behaviors, but may not learn the skills needed to complete assignments in a manner to improve their academic performance. This could imply that the structure and skills to complete an assignment should be taught prior to self-monitoring to support these students socially and academically.

Harris, Friedlander, Saddler, Frizzelle, and Graham (2005) examined self-monitoring of attention versus self-monitoring of academic performance with six elementary students with ADHD in a general education classroom. Before the self-monitoring intervention began, students had been taught and were proficient with a strategy for studying their spelling words. They had been taught to look at the word, close their eyes and spell the word aloud, study the word again, cover the word, write the word three times, and check to see if the word is spelled correctly. Baseline data was

then collected measuring on-task behavior and academic performance. Students were instructed to begin work during their spelling period by utilizing the spelling strategy they had been taught.

Once the intervention began for self-monitoring of attention, the special education teacher met with the students and discussed what it meant to pay attention and why it was important. The teacher then explained the self-monitoring of attention intervention as a way to help the student pay attention better. The student was instructed to ask “Was I paying attention?” when he or she heard a tone. The tone occurred at random times during the intervention, and students noted if they had been paying attention or not. Students were successful with self-monitoring their attention.

In addition, the special education teacher and the student discussed the meaning and importance of practicing spelling words for the self-monitoring. Again, the teacher explained the self-monitoring as a means of helping the student practice his or her spelling words more. The students were instructed to count the number of times weekly spelling words were practiced correctly. Students then graphed the number of words correctly spelled.

Results show that the group’s on-task behaviors increased approximately 37% from the baseline to the intervention. In addition, the group’s academic performance increased when using self-monitoring. During the baseline, the group averaged 38 correct practices of spelling words. With implementation of self-monitoring, the group averaged 83 correct practices of spelling words. At the same time, students reported that

they liked to self-monitor themselves because it gave them more practice with their spelling words and helped them learn to spell more words. In addition, half of the students liked the tone reminders to monitor their attention, while the other half found it distracting.

Overall, results showed that self-monitoring does lead to more on-task behavior. However, the increase in academic performance is only found when students are directly taught a strategy for the assignment and when they are monitoring their own performance in addition to their on-task behavior.

### **Using Technology for Self-Monitoring**

In today's society, technology is an integral part of our lives. Ownership of computers, tablets, cell phones, and iPods are common among students. According to the Pew Research Center (2013), 78% of children aged 12-17 have a cell phone and 23% of teenagers own a tablet. Given these statistics, the use of technology to self-monitor should be considered when developing interventions for children with ADHD.

In Davies, Stock, & Wehmeyer's study (2002), 12 students with cognitive impairment used a Palmtop computer as a self-monitoring means to increase independence. First, participants were secured by seeking volunteers from a community based group offering vocational supports. Next, the Palmtop computer was chosen as the technology device because it offers a program called Schedule Assistant. Schedule Assistant is designed for helping people with special needs maintain a personal schedule by offering visual and audio prompts for assistance. Messages can be sent through visual

or auditory means and replayed automatically as a reminder to complete the task, or be programmed to require confirmation that the task was completed. Next, participants were directly instructed and shown how to complete an 8 item list (e.g., begin labeling floppy disks, stop and take a break, begin labeling disks again, stop and place completed disks in a box, turn off the coffee pot, close the drawer of the filing cabinet, water the plant, and report when tasks are completed). The task completion was taught and modeled. Next, the group was taught how to complete these tasks by following directions posted on a large sign, and ask for assistance when they needed help. The group alternated either following the traditional list or using the Palmtop for four weeks. Their task completion was observed and recorded.

Results showed that participants required significantly less assistance and made fewer mistakes when they used the Schedule Assistant program on the Palmtop computer compared to following the traditional list. Eleven out of 12 participants were able to complete the 8 tasks using the computer program, whereas one participant was able to complete all tasks following the traditional list compared to the computer program. It is found that an automated prompting system following a set schedule could help individuals with cognitive impairments complete tasks independently.

Using an iPod touch as self-monitoring was found in Blood, Johnson, Ridenour, Simons, and Crouch's study (2011). In this study, a 10 year old boy with emotional and behavioral disorders (EBD) participated. His off-task and disruptive behavior frequently occurred during the small group math lesson. A combination of video modeling and self-monitoring was provided for the student to learn appropriate behaviors.

A video segment of two peers at the same age as the participant was loaded onto an iPod touch to demonstrate appropriate behaviors. The student was guided to watch a short video presentation in which two peers at his age demonstrated appropriate behavior each day. His behavior was recorded during his math lesson to compare the difference between his behavior and the appropriate behavior presented in the video. He was also taught to record rates of his own behavior (on-task or off-task) using a self-monitoring sheet. During the self-monitoring, the student would push a start button on his iPod which began a timer going off every two minutes. When the timer sounded, the participant would mark on paper whether he was on or off-task. The results showed that the student increased on-task time and decreased 99% times of his disruptive behavior when the video modeling and self-monitoring interventions were provided.

A cell phone was used for self-monitoring with two middle school students with learning disabilities in Bedesem's study (2012). The participants' on-task behavior was observed in one minute intervals for four days as baseline data. During the intervention of 13 days, the participants were taught to identify modeled instances of on-task behavior. Next, they were guided through the use of the cell phones for self-monitoring. Text messages were used as a means of cuing students. Two social networking sites, Twitter and HootSuite, were used to draft, schedule, send, and receive text messages. A total of four text messages was sent to each student each day. The first text message asking "Are you one task?" was automatically sent from HootSuite one to two minutes before the observation began. The second and third text messages were sent to cue the students at 7 and 14 minutes during the 20 minute observation. Students were required to

reply with a 1 for “yes” as they were on task or a 0 for “no” for off task. The last text message was automatically sent from HootSuite one to two minutes after observation to ask the students if they were on task.

Results showed an increase of on-task behavior of each participant when the cell phone was used in self-monitoring. The average percentage of on-task behavior increased to 71% compared to the baseline of 45%. All parties involved in the intervention, general and special education teachers, as well as both students reported that it was successful at helping them stay on-task without distracting others.

Further, Wills and Mason (2014) evaluated on-task behaviors using a self-monitoring App called I-Connect on a handheld tablet, a Samsung Galaxy Player 5.0. Two students, one with ADHD and another with SLD, were selected for learning self-monitoring to improve their on-task behavior in a 9<sup>th</sup> grade general education classroom.

The I-Connect App sent cues in a text message format asking participants “Are you on task?” for the student to touch “yes” or “no”. The response was recorded in a secure database on a remote server. Both students’ behaviors were observed during baseline and intervention to compare the changes.

Results showed that the use of the I-Connect App increased both students’ on-task behavior and decreased the rates of disruption. When the I-Connect App was used, on-task behavior increased for both students to an average of 93% compared to 34.5% in the baseline. When the intervention was removed, on-task behavior decreased to 35.5%. When the I-Connect App was used again, on-task behavior increased to an average of

92.5%. The same trend was observed when measuring disruptive behaviors. The average of disruptive behaviors for both students was 3.25. When the I-Connect App for self-monitoring was provided, their average rates of disruption dropped to 1.25. When the students stopped using the I-Connect App, their disruptive behavior rose to an average of 3.15, when the students again used the App, their average disruptive behavior dropped to .5. It seems that using the I-Connect App for self-monitoring improved on-task behaviors and decreased their disruptive behavior.

### **Summary**

Medical treatment, providing the consistent use of prescribed stimulant medicine for ADHD symptoms, has been successful in managing behaviors (e.g., Forness & Kavale, 2001) . Often times, however, the normalized behavior only lasts until the medication wears off. Combined stimulant medicine and behavior modification plans are effective to reduce behavior problems of students with ADHD (e.g., Arnold et al., 2003). A token economy serving as one approach of behavior modification demonstrated effects to reduce behavior problems by identifying and practicing appropriate behaviors followed by a reward (e.g., Pfiffner et al., 2013).

Self-monitoring is a successful tool to teach children to recognize behavior problems and record their own behaviors. Traditionally, self-monitoring was conducted in class to involve students in recording behaviors with a paper and pencil to mark a checklist. This format may make the student embarrassed in a particular situation, especially in general education classroom with other peers who are not required to use the paper checklist.



Using technology, such as a portable tablet, would be an alternative. Research showed that using an iPod in self-monitoring was effective for a student with autism (e.g., Blood et al.,2011), while students with ADHD have not been included. This present study attempts to include these students to use iPads for their self-monitoring to learn and increase appropriate behaviors in the classroom.

## Chapter 3

### Methods

#### Setting

This study took place at a regional high school located in southern New Jersey. Approximately 2,700 students from five different townships attended this school in grades 9-12<sup>th</sup>. The study was conducted in a Resource Center during the class of United States' History II. The class consists of 8 students, 6 juniors and 2 seniors , classified as having Other Health Impaired (OHI), Specific Learning Disability (SLD), and Autism, as well as one special education teacher, and one teacher assistant.

#### Participants

**Students.** All 8 students had Individualized Education Plans (IEPs) with goals and objectives in social skills, reading, and writing. Out of the 8, 4 were diagnosed as having ADHD according to their medical diagnosis. Their behaviors were observed and recorded for this study. Table 1 presents their general information.

Table 1

*General Information of Participating Students*

Student	Age	Grade	Classification	History Unit Test %*
1	16	11	OHI**	70
2	16	11	OHI	70
3	17	12	SLD***	86
4	17	11	Autism	78

\*History test %: calculated by averaging unit tests completed during the intervention of 8 weeks

\*\*OHI – Other Health Impaired

\*\*\*SLD- Specific Learning Disability

Student 1 had difficulty paying attention, struggling in maintaining attention during instruction, and was easily distracted. She frequently talked to peers or called out when the class was assigned for silent reading. She needed to be cued often by the teacher to refocus her attention. This student was often out of her seat, and could be disrespectful by using inappropriate language when directed for keeping quiet. She would raise her voice and demand to go to the bathroom, and required extended time when taking tests because of her organizational problems.

Student 2 socialized with peers, but was not attentive to instruction. Once she lost focus, she was unable to comprehend the lesson or her reading. Her assignments were not often completed due to poor organizational skills that made her grades low. She also became confused when there were multiple steps to solve a problem because of her lack of ability to organize these steps to complete the task. She was unprepared to begin class and was distracted by external stimuli (e.g., talking with peers, finding a writing utensil). Thus, she often needed one-on-one assistance.

Student 3 struggled with maintaining attention and was easily distracted. He often appeared to “zone out”, and when he was distracted, he fell behind in his assignment. He then struggled in understanding and completing his work. He required cueing to focus his attention and engage in the lesson, slow pace, and redirections. Once he completed the required task, he would engage in unrelated activities, such as talking and using his cell phone.

Student 4 had difficulty with staying on-task. He often needed to be redirected and reminded to follow rules, such as raising hands without calling out. He struggled with completing individual assignments, even with taking notes as a guide. He had a hard time to maintain focus on immediate requirement and often times, he needed to get out of his seat and move around.

**School staff.** A Special Education teacher with one and a half years teaching experience in this high school taught US History I and II. She was the only teacher to deliver instruction during this study. A teacher assistant (TA) assisted in managing small group activities and individual support whenever needed.

## **Materials**

**Instructional materials.** A handheld computer device, an iPad, was used to allow users to record and view videos, take and share pictures, connect to the internet, read e-books, and utilize Apps to download games and other programs. In this study, an iPad was assigned to every student in class.

An iPad App, Choiceworks, was used as a self-monitoring tool. This app consists of three boards for a user to complete daily routines. The schedule board of the program focusing on task completion was used for self-monitoring.

**Measurement materials.** An observation checklist was used for observations and recording behaviors. It included 20 minutes divided with 1 minute intervals, with a “+” representing “occurrences” and “-“ for non-occurrences. This checklist was developed by the researcher to record each student behaviors during the 20 minutes of the assignment time in each History class (see Appendix A).

A chart was used weekly to track each student’s appropriate behavior (see Appendix B). This chart was developed by the researcher to record the student behaviors, the percentage of time to the goal, and test scores.

Three tests were given throughout the unit to determine if the intervention had a positive effect on test scores. The first test was a guided reading packet for students to read, hi-light important information, and then answer questions. The second and third tests were in a format of multiple choice, fill in the blank, and short answer response.

A questionnaire survey with five items in a format of a likert scale was given to all participating students to measure their satisfaction with the self-monitoring process. It ranged from “strongly agree to strongly disagree”, with 4 representing “strongly agree”, 3 representing “agree”, 2 representing “disagree”, and 1 representing “strongly disagree” (see Appendix C).

## Procedures

**Measurement procedures.** Baseline data, (Phase A<sub>1</sub>), was collected for a period of 8 days. The special education teacher identified one to two on-task behaviors for each student as a goal. These identified behaviors were observed and recorded using the checklist by the researcher for 8 days as baseline data.

Following baseline data collection, Intervention (Phase B<sub>1</sub>) data was collected. The teacher modeled the behavior and provided role play as a means to practice. Then, the participants were taught how to use the Choiceworks App on the iPad. The teacher modeled how to create a board and input on-task behaviors. Students were guided to create their own boards for History class. They took pictures or record video segments themselves when demonstrating the desired on-task behavior and uploaded the pictures and videos to their History board. During the intervention, data was collected through email. Each participant would monitor themselves in each History class 4 days a week for 2 weeks. If they presented the desired behavior, they would touch the screen and slide the goal into the “All done” column. They would then share their board with the researcher by an email to compare accuracy. Using their individual school issued email account to the researcher’s account data was collected at the end of each week to determine the percentage of time the participant presented the desired behavior. Each participant would follow the same process themselves in each History class 4 days a week for 2 weeks.

The iPad was taken away, baseline (Phase A<sub>2</sub>), and students were told that they would not use the iPad this week, but same observations were continued.

Intervention (Phase B<sub>2</sub>) data was collected after 2 weeks. The iPads were resumed, and the Choiceworks App for self-monitoring was reintroduced and students once again began to self-monitor their behaviors, and same observations were continued and their behaviors were recorded.

**Instructional procedures.** During days 1-10, the teacher identified two to three appropriate behaviors each student needed to demonstrate during class. Student behaviors were observed and recorded by the researcher.

On day 11 the teacher modeled examples of appropriate behavior and guided students role play appropriate behaviors.

Day 12 followed with students being instructed on how to use an iPad and how to use the Choiceworks App. Each student was taught to create a board for History class. After they created their boards, they input the appropriate target behaviors by taking a picture or video of themselves engaging in the appropriate behavior, then uploading to each block under the “First I need to” column. Subsequently, they typed in the target behavior to correspond with the picture, then identified two incentives at the bottom of the page to be used as rewards for their desired behaviors.

On days 13-20, the self-monitoring intervention was implemented. When a student demonstrated an appropriate behavior, he or she moved the icon demonstrating the behavior over to the right column. Visual and an audio confirmation were presented to

show that the behavior was successful. Students then emailed their results to the researcher.

### **Research Design**

A single subject design with ABAB phases was used in this study. During Phase A<sub>1</sub>, student behaviors were observed and recorded the checklist for 8 days. During Phase B<sub>1</sub>, the Choiceworks App was provided as a self-monitoring tool, and same observations were provided. During Phase A<sub>2</sub>, the iPad was taken away for 8 days, and then returned to students to continue the self-monitoring procedures, the same observations were continued as that in the previous intervention (Phase B<sub>1</sub>).

### **Data Analysis**

Means and standard deviations were calculated and presented in a table. A visual graph was demonstrated to compare student behaviors across phases. The student survey responses were recorded and generated into means to evaluate their satisfaction with iPad usage and self-monitoring.



## Chapter 4

### Results

Student performance was evaluated over a period of 8 weeks. Their performance was examined through behavior observations, and test scores for their academic learning outcomes.

#### On-Task Behavior

Table 2 shows means and standard deviations across four phases of data collection representing total percentage of on-task behaviors. All students' behavior occurrences were generated into percentages.

Table 2

#### *Means and Standard Deviations of On-Task Behaviors*

Student	<u>Baseline(A<sub>1</sub>)</u>		<u>Intervention(B<sub>1</sub>)</u>		<u>Removal of Intervention(A<sub>2</sub>)</u>		<u>Reintroduction of Intervention(B<sub>2</sub>)</u>	
	M	SD	M	SD	M	SD	M	SD
1	23.9	(27.5)	58.3	(71.4)	12.3	(12.1)	28.5	(20.1)
2	20.3	(20.3)	83.3	(0)	4.8	(3)	82.7	(3.1)
3	43.5	(0.5)	100	(0)	35.5	(0.5)	100	(0)
4	21.3	(17.9)	49.9	(23.5)	25	(7.4)	85.7	(0)

Overall, the data shows an increase in percentages of on-task behavior occurrences when the Choiceworks App was used for self-monitoring during the first and second intervention.

Gains of on-task behavior was found from the baseline (A<sub>1</sub>) to the intervention (B<sub>1</sub>). Student 1's on-task behavior increased 28.38 when using the Choiceworks App to monitor her own behavior. Student 2's on-task behavior increased 62.97, student 3's increased 56.5, and student 4's increased 28.65. When examining the unit test scores in the history class, overall, students gained scores when using the Choiceworks App to self-monitor their behavior. For example, during the first intervention, student 1's scores increased 6.5 from 70 to 76.5; student 2's increased 7.5 from 70 to 77.5; student 3's increased 1% from 86 to 87, but student 4's decreased 1.5 from 78 to 76.5.

When the iPad and Choiceworks App were removed, the percentage of on-task behavior reduced significantly, some even below the baseline, except student 4. For example, during the second baseline, student 1's on-task behavior dropped 46 from 58.33 to 12.33; student 2's decreased 78.47, from 83.3 to 4.83; student 3's decreased 64.5, and student 4's decreased 24.98 from 49.98 to 25 when the self-monitoring App was removed.

When the iPad for self-monitoring was reintroduced (Phase B<sub>2</sub>), students' on-task behavior increased again. For example, student 1's on-task behaviors increased 16.23; student 2's increased 77.94; student 3's increased 64.5, and student 4's increased 60.71 when the iPad and the Choiceworks App were resumed for self-monitoring. Individual

student's behavior is presented in Figure 1. The y axis is the percentage of time on-task, and the x axis represents the four phases of the study (A<sub>1</sub> -Baseline, B<sub>1</sub> - Intervention, A<sub>2</sub>- Removal of the intervention, and B<sub>2</sub> – Resume the Intervention).

Student 1

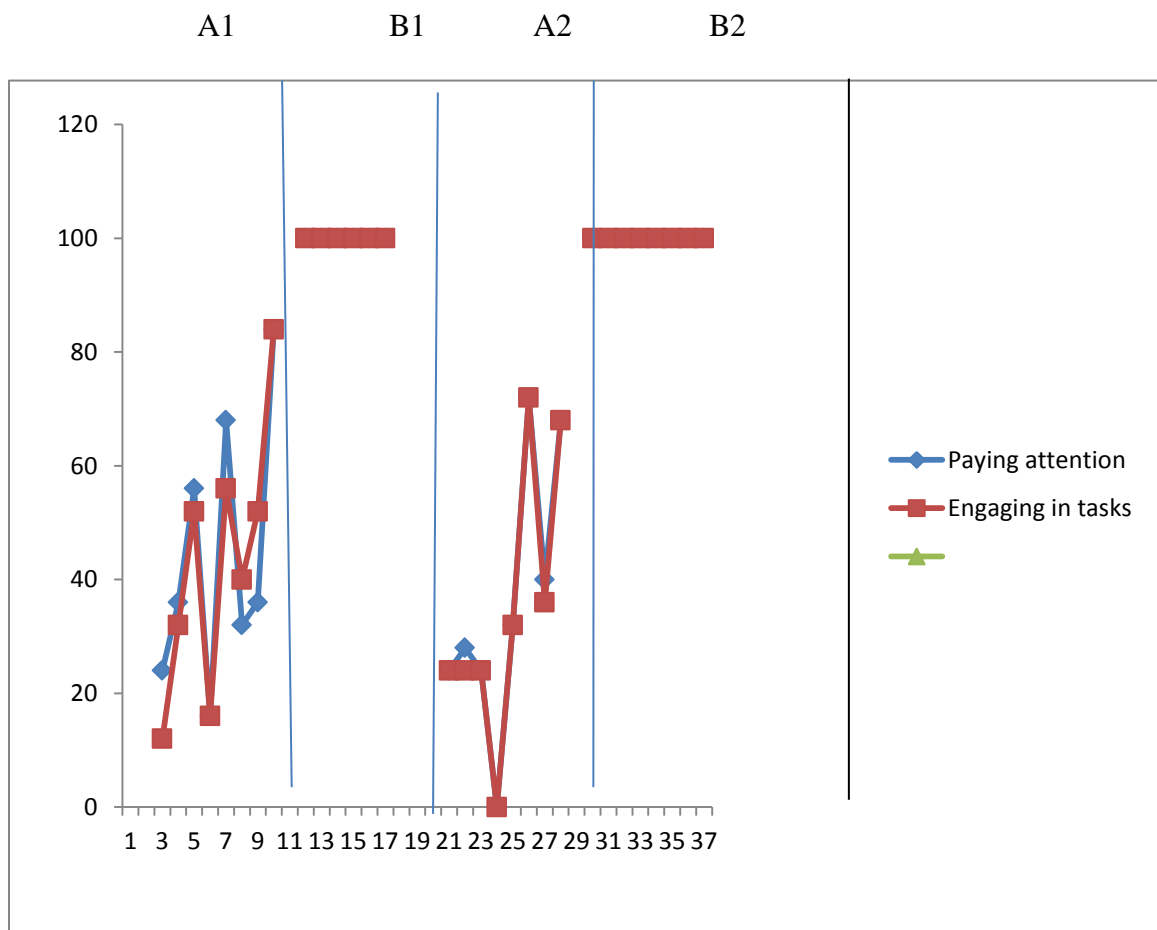


Figure 1 Student 1's on-task behavior across phases

Student 2

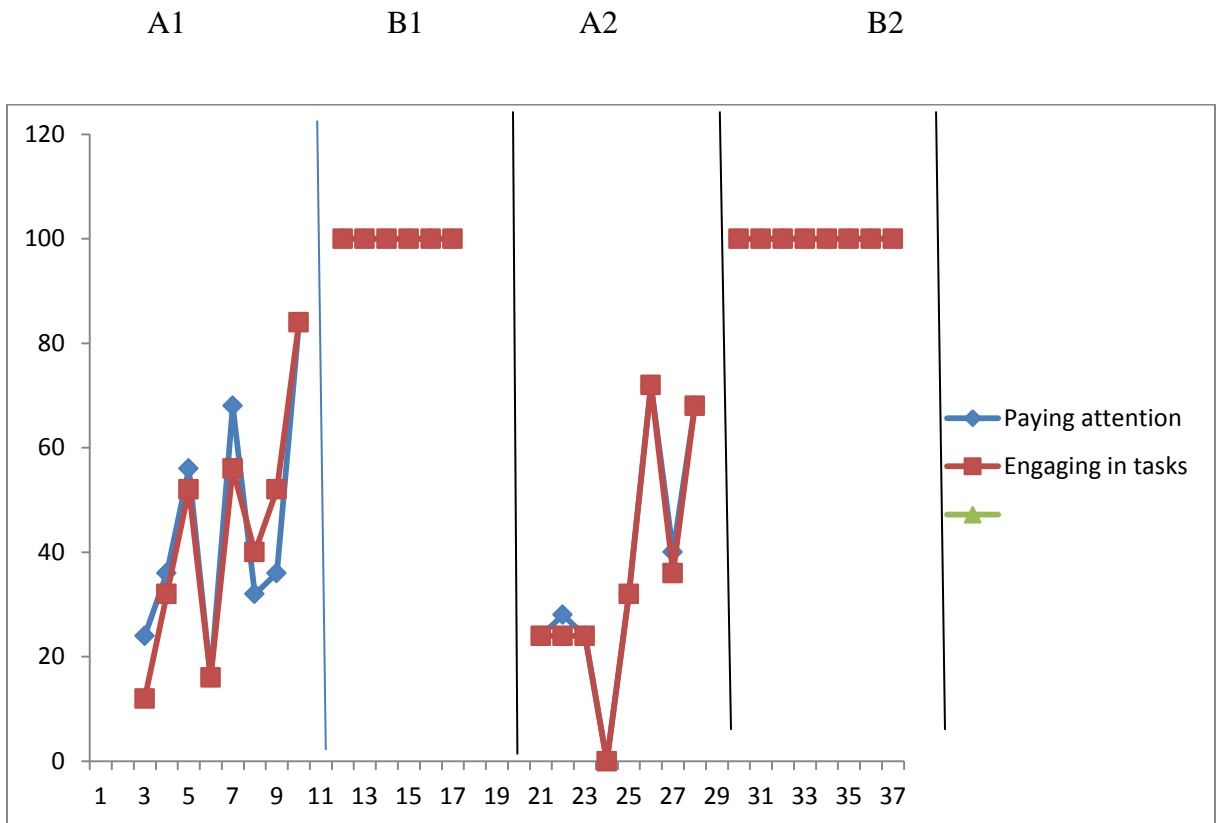


Figure 2 Student 2's on-task behavior across phases

Student 3

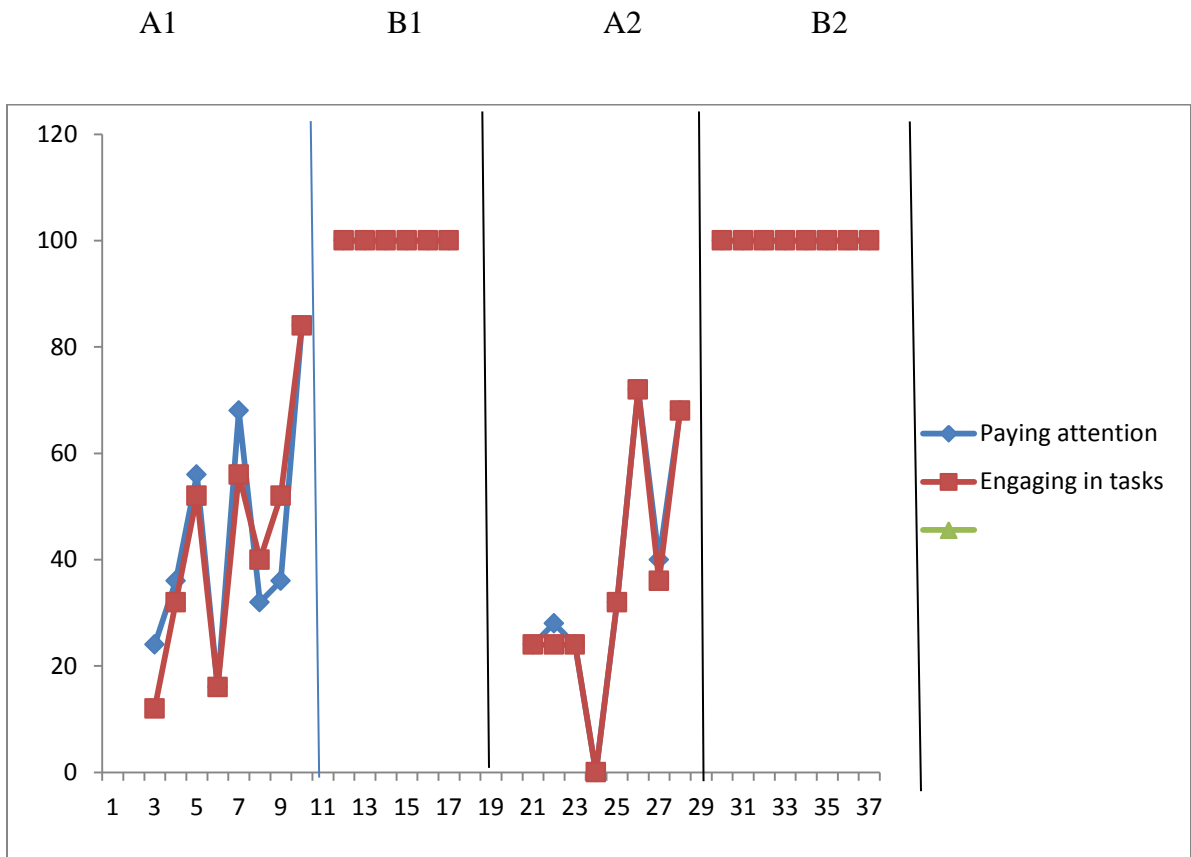


Figure 3 Student 3's on-task behavior across phases

Student 4

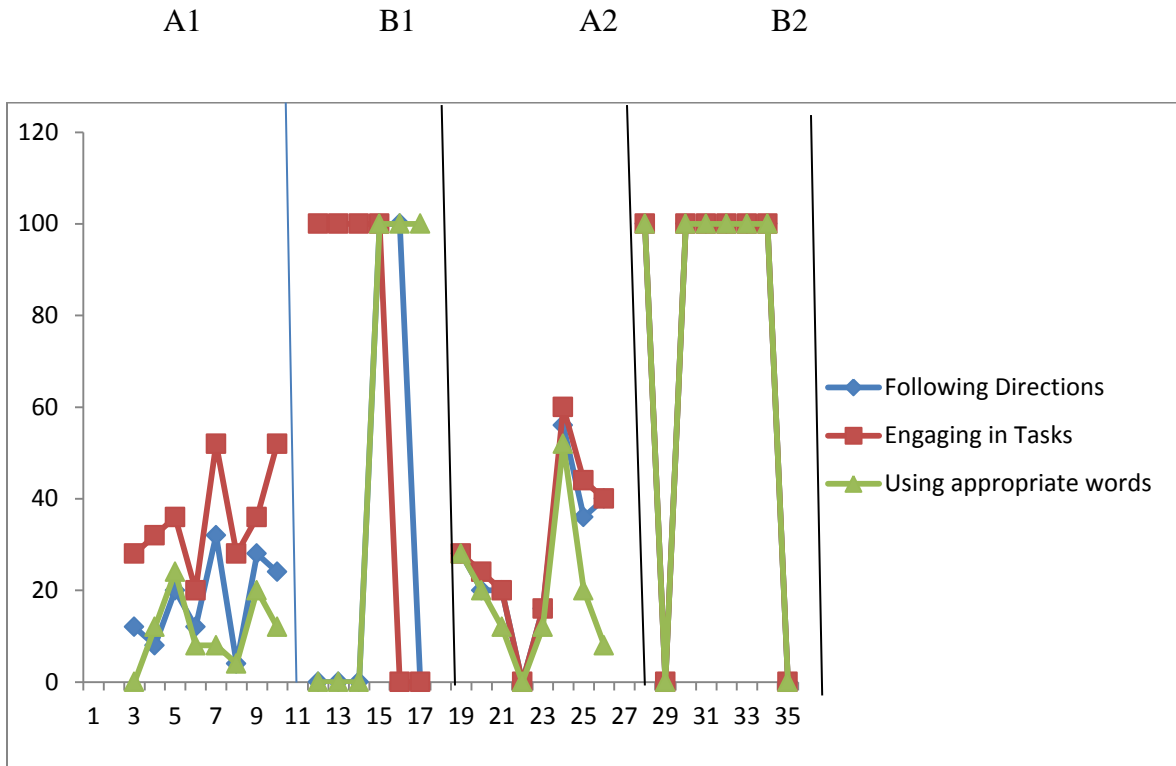


Figure 4 Student 4's on-task behavior across phases

**Unit test.** Students' unit test scores were evaluated in relation to their self-monitoring. During phase A<sub>1</sub>, student 1 obtained a 70 out of 100 on the unit test, an 83 during the intervention when using the iPad for self-monitoring (Phase B<sub>1</sub>), and a 77 when the iPad was removed (Phase A<sub>2</sub>). Unfortunately, there was no test given during the second intervention when the iPad was resumed because of the history teacher's decision based on the state-wide testing season (Phase B<sub>2</sub>). Student 2 obtained test scores of 70 (Phase A<sub>1</sub>), 85 (Phase B<sub>1</sub>), and 64 (Phase A<sub>2</sub>); student 3 attained unit test scores of

86 (A<sub>1</sub>), 88 (B<sub>1</sub>), and 89 (A<sub>2</sub>), and student 4 obtained test scores of 78(A<sub>1</sub>), 75(B<sub>1</sub>), and 81(A<sub>2</sub>).

Table 3

*Unit Test Scores by Percentages*

	<u>Baseline(A<sub>1</sub>)</u>	<u>Intervention(B<sub>1</sub>)</u>	<u>Removal of Intervention(A<sub>2</sub>)</u>
Student	Unit Test	Unit Test 2	Unit Test 3
1	70	83	77
2	70	85	64
3	86	88	89
4	78	75	82

### Survey Responses

**Student responses.** When the study was completed, all students were given a survey with 4 statements in a Likert scale format and asked to rank each statement with varying degrees of opinion: strongly disagree, disagree, agree, and strongly agree. The statements focused on the ease of using the Choiceworks App, the effectiveness of using the App for self-monitoring, and possibility of using the Choiceworks App again. Table 3 presents the survey results. Two out of four students (50%) agreed that they were engaged in using the iPad for monitoring their behavior, and one out of four (25%) strongly agreed. Two students (50%) agreed the App helped to change their behavior. Three out of four students (75%) strongly agreed that the App and iPad were easy to use

during class, and two (50%) agreed that they would use the Choiceworks App in other classes and/or outside school, while only one (25%) strongly agreed on using the App in a different setting.

Table 4

*Student Responses to the Survey*

Statement	Strongly Disagree	Disagree	Agree	Strongly Agree
Using the iPad engaged me in monitoring my behavior.	0	25	50	25
Using the Choiceworks App helped me to change my behavior.	0	50	50	0
Using the iPad and Choiceworks App was easy to do during class.	0	25	0	75
I would use this App in other classes and/or outside of school to assist me.	0	25	50	25



## Teacher responses.

Table 5 presents teachers' responses to the survey.

Table 5

### *Teacher Responses to the Survey*

Statement	Strongly Disagree	Disagree	Agree	Strongly Agree
Using the iPad engaged students in monitoring their behavior.	0	0	100	0
Using the Choiceworks App helped students to change their behavior.	0	100	0	0
Using the iPad and Choiceworks App was easy to do during class.	0	0	100	0
I would use this method of self-monitoring with other classes I work with.	0	0	100	0

Overall, the use of the Choiceworks App on the iPad for self-monitoring was viewed positively by the staff members. Both staff members (100%) stated that they agreed with the iPad engaging students in monitoring their behavior; however, both staff members (100%) disagreed that students' behavior change was a result of using the Choiceworks App on the iPad for self-monitoring. All staff members (100%) agreed that using the App and iPad was easy during class, and they would use this self-monitoring with other students in other classes.

## Chapter 5

### Discussion

This study examines the use of an iPad with the Choiceworks App to self-monitor behaviors of high school students with ADHD. All students showed increased on-task behaviors when the iPad was used in self-monitoring, and three out of four students showed improved unit test scores in learning history. It seems that the self-monitoring process in the high school with technology has positive results and benefited those with ADHD at the secondary level.

The first research question asked was if the use of iPads would increase appropriate behavior of students with ADHD. The results show that all students, 4 out of 4, improved their on-task behaviors when they used the iPad to self-monitor their behavior. This could be considered as a novelty for the students to use an iPad in the classroom to motivate interests in managing themselves.

The second question asked was if using of iPads would increase test scores of students with ADHD. Results show that 3 out of 4 (75%) students' unit test scores increased when using the iPad to monitor their behavior except Student 4. It is found that Student 4's inconsistency in behavior, not meeting his behavioral goals as frequently as the other students, when using the iPad during the intervention, while the others demonstrated increased on-task behaviors. This inconsistency in behavior occurrences could affect his unit test scores.

The third question focused on student satisfaction with the use of iPads for self-monitoring. Overall, students were satisfied with using the iPad and Choiceworks App to monitor their own behavior, only 2 out of 4 (50%) of the students agreed the App helped to change their behavior. Three out of 4 (75%) of the students felt that using the iPad and the App were engaging, easy to manage, and would use the App in other classes or outside of school, except Student 1 who felt the iPad was a distraction for her. In addition, staff members viewed the student use of iPads for monitoring behaviors positively. The teacher indicated that the use of the App was a more positive way of promoting appropriate behaviors. For example, the teacher found that at the beginning of the iPad implementation, students needed teacher's prompting to track their behavior, gradually students learned to track their behavior more independently. The results show that student on-task behavior increased more in the first intervention than the second. During the second intervention, students required more prompting to remind them to use the iPad, though they learned previously in the first intervention. Occasionally, some problems existed with the Wifi that might have caused an interruption in their routine to reduce their desire to use the device. The removal of the device during the second baseline (Phase A<sub>2</sub>) may have made students aware that the iPad was not permanent for them to use; this idea might have changed their overall view of using the device. Although there are some limitations, the findings in this study are consistent with Blood, Johnson, Ridenour, Simons, and Crouch's study (2011) in using technology, such as a handheld device for self-monitoring to increase on-task behaviors. In their study, an iPod was used for a 10 year old student with emotional and behavioral disorders, while in this present study, an iPad was used instead. In both studies, participants' behavior improved

when students were using mobile technology to self-monitor their own behavior. In addition, findings in this study support Wills and Mason's (2014) in using technology for self-monitoring. In both studies, students were found to demonstrate increased on-task behaviors when using technology to monitor their behavior.

### **Limitations**

Despite the positive results of this study, there are some limitations. One limitation was the length of the study. There were 4 phases designed in the study, each phase lasted only 8 sessions long. It appeared that just as students were learning to engage in the use of the iPad in self-monitoring, the device was removed. If each phase would have been longer, maybe students would have been even more engaged in using the iPad and it would have become customary. The short period did not allow students enough time to practice with the technology device, which might impact their self-monitoring process. Another limitation is the accuracy of students recording. Many times, the teacher or teacher's aide had to discuss the target behavior with the students and remind them each of the times they did not meet their behavioral goal in class. This adult effect may impact student behavior occurrences, which should be avoided to keep the accuracy of behavior recording in observations.

### **Implications**

The results of this study continue to support the use of technology as a way to increase appropriate behaviors through self-monitoring. At the high school level, the majority of students have Smartphones or some type of tablet they use in their daily lives.

The use of an iPad could be beneficial for students in many ways. In addition to helping students set and meet individual goals using the Choiceworks App, it could become a means of assisting students with managing their time and daily schedules. With this program, students are able to create various boards, and a board can be developed for each class focusing on the behavior they need to manage themselves in each class. The program is also easy for students to create a daily schedule board to remind them of their activities and class schedules each day, such as meeting with a teacher or participating in peer group activities. Schools may consider this opportunity for students to have access to the Choiceworks app to build their self-reliance and responsibility.

### **Conclusion and Recommendations**

This study supported the use of technology for self-monitoring to increase appropriate behaviors. Future research involving longer time to use an iPad should be considered in order to validate the findings. More time should be spent to discuss behavior problems and identification of positive behaviors, so that students are able to accurately manage their behavior. Establishing the behavioral goals and examining one's own behavior at the beginning of the school year may also increase the possibility of behavior changes, because the routine should be set up for students to follow the required rules. In addition, technology is very engaging for adolescents in their daily lives, especially handheld devices, such as an iPad. The use of technology should be considered in secondary school to motivate students to self-monitor their own behaviors.

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Student	Behavior 1	Behavior 2	Behavior 3
2	Demonstrating organization	Engaging in tasks	Completes work
Total number of occurrences			

Student	Behavior 1	Behavior 2	Behavior 3
3	Paying attention	Engaging in tasks	
Total number of occurrences			

Student	Behavior 1	Behavior 2	Behavior 3
4	Following directions	Engaging in tasks	Using appropriate words and tone of voice
Total number of occurrences			

## Appendix B

### Weekly Assessment of Self-Monitoring Using an iPad

Student	Percentage of time goal 1 was met	Percentage of time goal 2 was met	Percentage of time goal 3 was met	Test Average
1				
2				
3				
4				

## Appendix C

### Student Likert Scale

	Strongly Disagree	Disagree	Agree	Strongly Agree
Using the iPad engaged me in monitoring my behavior				
Using the Choiceworks App helped me to change my behavior				
Using the iPad and Choiceworks App was easy to do during class				
I would use this App in other classes and/or outside of school to assist me				

## Appendix D

### Staff Likert Scale

	Strongly Disagree	Disagree	Agree	Strongly Agree
Using the iPad engaged students in monitoring their behavior				
Using the Choiceworks App helped students to change their behavior				
Using the iPad and Choiceworks App was easy to do during class				
I would use this method of self-monitoring with other classes I work with				