

Rowan University

Rowan Digital Works

---

Theses and Dissertations

---

6-25-2013

## Using an Apple iPad for self-monitoring of students with autism

Erin Rigo

Follow this and additional works at: <https://rdw.rowan.edu/etd>



Part of the [Special Education and Teaching Commons](#)

---

### Recommended Citation

Rigo, Erin, "Using an Apple iPad for self-monitoring of students with autism" (2013). *Theses and Dissertations*. 85.

<https://rdw.rowan.edu/etd/85>

This Thesis is brought to you for free and open access by Rowan Digital Works. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of Rowan Digital Works. For more information, please contact [graduateresearch@rowan.edu](mailto:graduateresearch@rowan.edu).

**USING AN APPLE IPAD FOR SELF-MONITORING  
OF STUDENTS WITH AUTISM**

by  
Erin E. Rigo

A Thesis

Submitted to the  
Department of Language, Literacy & Special Education  
College of Education  
In partial fulfillment of the requirement  
For the degree of  
Masters of Arts  
at  
Rowan University  
May 16, 2013

Thesis Chair: Joy Xin, Ed.D.

© 2013 Erin E. Rigo

## **Dedication**

*I would like to dedicate this manuscript to my parents, Michael and Pamela Rigo, for teaching me at a young age the importance of an education, always encouraging me to achieve my best, and for all the sacrifices they made so I could be where I am today.*

## **Acknowledgements**

I would like to express my appreciation to Dr. Joy Xin for her guidance, help, and patience during this research.

## **Abstract**

Erin E. Rigo  
USING AN APPLE IPAD FOR SELF MONITORING WITH STUDENTS OF  
STUDENTS WITH AUTISM

2012/13

Dr. Joy Xin  
Master of Arts in Education

The purpose of the study was to examine the effects on using an iPad to self-monitor the behaviors of middle school students with Autism Spectrum Disorder (ASD). Four students (12-13 years old, 4 male) participated in the study. A single subject design with ABAB phases was used. During the baseline, all students were observed to record their on and off task behaviors in the language arts class. During the intervention, the students were guided by the teacher to create a video of self-modeled on task behavior and saved their self- images into customized “app” called Choiceworks by adding their voice to state the behavior. Subsequently, the iPad was taken away for 10 days, then continued to use in class to further examine the effect. The results showed that the participant’s off task behavior decreased and assignment scores increased during the intervention. It is found that the iPad serving as a portable hardware device could be used to provide students with ASD as an affordable and customizable tool for self- monitoring their behaviors.

## **Table of Contents**

Abstract	v
List of Figures	viii
List of Tables	ix
Chapter 1: Introduction	1
1.1 Statement of Problems	1
1.2 Significance of the Study	5
1.3 Statement of Purposes	6
Chapter 2: Review of the Literature	8
Chapter 3: Methods	19
3.1 Context of the Study	19
3.2 Research Design	22
Chapter 4: Results	30
Chapter 5: Discussions	37
5.1 Limitations	38
5.2 Implications	39

## **Table of Contents (Continued)**

List of References	40
Appendix A Choiceworks “app”	42
Appendix B Student Video Segment	43
Appendix C Student Quiz Sample	44



## List of Figures

Figure	Page
Figure 1 On Task Behavior	32
Figure 2 Off Task Behavior	33

## **List of Tables**

<b>Table</b>	<b>Page</b>
Table 1 Student Information	20
Table 2 Observation Checklist	24
Table 3 Student Survey	25
Table 4 Instructional Routine	27
Table 5 Means and Standard Deviations of On and Off Task Behavior	30
Table 6 Student Quiz Scores in Percentages	34
Table 7 Student Response to the Survey	35

## **Chapter 1**

### **Introduction**

#### **Statement of Problems**

Autism spectrum disorder (ASD) is a developmental disability that affects 1 in 88 children, and has a higher prevalence in boys (1 in 54), than girls (1 in 252) (The Center for Disease Control and Prevention as cited in Shelton, Hertz, & Pessah, 2012). The characteristics of the disability can be identified in a child's early age, often when a delay or absence of speech development is apparent. In addition, a lack of interest in others is noted in these children and sometimes speech and social skills regress overtime. Individuals with ASD usually exhibit deficits in social reciprocity, language and communication, as well as repetitive and stereotypical behaviors. Some individuals with ASD display significant cognitive difficulties, whereas others function at a relatively high level, despite social deficits (Gelbar, Anderson, & McCarthy 2012). Some of these individuals can exhibit aggression, self- injurious behaviors, property destruction, and tantrums which are most frequently referred for a treatment. These traits usually continue into adulthood, and can impact daily living skills, school performance and living independently throughout his or her adult lives (Rapin, 1997).

Because of the inclusion in our schools, more and more children with ASD are being integrated into classrooms in public schools (Crossland & Dunlap, 2012). In addition to social deficits, these children are exhibiting inadequate attending skills, such as a lack of ability to focus and pay attention, thus, they are having difficulties in success

in general education classrooms (Holifield, Goodman, Hazelkorn, & Heflin 2010). Teachers are facing challenges instructing these students. Individually designed interventions are needed for these children to reduce their inappropriate behaviors (Soares, Vannest, & Harrison 2009).

Self- monitoring is described as a procedure that requires students to systematically monitor their own behavior in order to assess whether a targeted behavior has occurred, and record the result in some manner (Holifield et al. 2010). According to Blood, Johnson, Ridenour, and Simmons (2011), self- monitoring has two steps. These steps include teaching the student to recognize if the target behavior has occurred or not, and following the process of self- recording the behavior. As indicated by Robinson (1999), self- monitoring has shown an effect to increase on task behaviors. Self- monitoring also has a strong history of helping students control challenging behaviors and has been recommended as a means of actively involving students in their own learning process. Teaching students self- monitoring has also been shown to improve motivation in some students with disabilities (Holifield et al., 2010). Self- monitoring is one intervention that has been reported as relatively easy to adopt and apply in class for students with disabilities, especially managing their attention problems (Soares et al., 2009). Soares' study found that this strategy is effective in increasing attention, academic productivity and accuracy, reading comprehension, and on task behaviors in students with learning disabilities, behavioral disorders, and moderate to severe intellectual disabilities, and varied mild disabilities to decrease inappropriate disruptive behaviors (Soares et al., 2009). Self monitoring is also used to enhance socialization and

improve behaviors of students with ASD (Holifield et al., 2010). Teachers have found self monitoring to be effective across academic subjects and settings, easy to design, and practical for teachers to use in classrooms (Holifield et al., 2010).

Recently, Cihak, Wright, & Ayres (2010) found that incorporating visual picture prompts into self- monitoring has increased academic and task engagement. A visual picture is a type of prompt that uses a picture or a visual cue to encourage a response. Visual picture prompts are used with students with autism because of their strengths in visual perception in learning. Visual picture prompts have been used extensively for students with moderate and severe intellectual disabilities to learn on-task behaviors (Cihak et al., 2010). Teachers used picture prompts to teach these students functional, vocational, communication, and domestic skills. However, most of the research on picture prompts for students with ASD has focused on schedules, transitioning, and helping them learn to transition independently between tasks (Cihak et al., 2010). There are few studies to examine the use of picture prompts or visual materials to improve the on-task behavior in classrooms for students with ASD.

Video self- modeling is another technique to teach self- monitoring skills to students with ASD (Gelbar, Anderson, McCarthy & Buggey 2012). This self- modeling is a specific application that allows the student to observe him or herself performing a behavior successfully. Video modeled skills benefit for students with ASD because of their visual strengths, selective attention, and repetitive nature of behaviors. It is found that video technology can provide repetition of a visual model and practice for the learner

and offer a clear and detailed display of positive behavior that is available for the student to view and imitate (Corbett, 2003).

The use of handheld computers, such as the Apple iPad, is another technique to prompt individuals with disabilities, while promoting independence. Handheld devices have the capacity to display visual models in a portable instrument to provide a unique means for displaying picture prompts (Blood, Johnson, Ridenour, Simmons & Crouch 2011). These handheld devices appear to be effective at reducing prompting and teacher assistance and allow the teacher to spend more time on engaging students in lessons and less time on controlling behaviors (Cihak et al., 2010). In a study conducted by Cihak et al. (2010), when this kind of device was implemented, all students demonstrated an increase in task engagement and a decrease in teacher directed prompts. Handheld computer devices were used as a solution for providing self- monitoring strategies to students with disabilities. The Apple iPad is a tablet computer that is primarily used for reading books and storing libraries, reviewing periodicals, listening and streaming music and videos, gaming, and internet surfing. The iPad is popular because of its small size and lightweight design. The display on the iPad is multi touch operated by applying pressure to the screen with a fingertip. The game like look and feel of the iPad is interesting and intriguing to students. According to Boser (2012), “The iPad’s sensory component is crucial. It is the direct touch of the finger to the device--rather than a mouse or a stylus--that children with autism appreciate” (p. 28).

There is limited research available about the impact of the current widespread availability and general purpose of portable hardware devices such as the Apple iPad and

how running “apps” on this device could be used as a tool for students with ASD, especially in self- monitoring techniques. These apps are easily obtainable, affordable, customizable, and user friendly. To date, there is a variety of research available on the use of visual picture prompts and video modeling, but little on the use of the iPad to improve self- management for students with ASD. This study attempts to use the Apple iPad to provide visual aides to teach self- monitoring skills to students with ASD.

### **Significance of the Study**

There are many different methods for teaching self- monitoring techniques to students with ASD. Some of these are effective, but are dated methods without the use of technology that is available today for students in the classroom. With so many approaches available, it is difficult for teachers to choose the most effective and least time consuming method for students in the classroom. Teachers need access technology and understand its use in the classroom to be able to implement these strategies for students. In today’s world of technology use and the advancements in devices that are accessible for students in school, further research is needed on how to incorporate these means of technology into the classroom for students. The goal of the present study is to examine the impact of the Apple iPad on teaching self- monitoring techniques to students with ASD. It attempts to create a system for students to self- monitor their own behaviors using the Apple iPad to engage them in whole group activities during the class instruction.

## **Statement of Purposes**

The purposes of this study are to: (a) evaluate the effectiveness of using the Apple iPad as a tool to teach the self- monitoring strategy to students with ASD, (b) develop or combine “apps” to assist these students in the self- monitoring process, and (c) increase their on task behaviors in class.

## **Research Questions**

The research questions of this study are as follows:

1. Will the self- monitoring strategy taught using an Apple iPad increase the on task behaviors of students with ASD?

2. Will the self- monitoring strategy taught using an Apple iPad reduce the off task behavior such as: calling out, looking around, playing with objects, and drifting off and increase the on task behavior of attending the assignment, raising hands to respond, facing forward in chairs, and keeping hands on the desk?

3. Will students with ASD be satisfied with the use of the Apple iPad in learning self- management strategies?

## **Definition of the Terms**

On task: defined as a student attending to the assignment, raising hands to respond to a request, facing forward and seated in chairs, and keeping hands on the desk without touching peers or playing with objects.



Off task: defined as calling out, talking out of turn, looking around, leaving a seat, playing with objects, and drifting off.

## **Chapter 2**

### **Review of the Literature**

Self- monitoring is an essential skill in classrooms for students with ASD. It requires that students be able to control their own behavior and stay engaged in the lesson without teacher's prompting. It also requires teachers to have access to materials and techniques to involve students in class activities and become responsible for their own behaviors or learning, in order to increase appropriate behaviors or academic productivity during instructional time. The basis of self- monitoring is to teach children skills they can apply independently to monitor their behaviors.

According to Bandura (1997), children acquire an array of skills from observing others' performance, rather than just through their own personal experiences. Then, observers will imitate behaviors without reinforcement, and perform the behavior outside of the original setting in which it is taught. Teachers need to develop modeling that is as similar to the student as possible, and to guide students in learning the appropriate behaviors. This chapter presents a review of the literature on self-monitoring, including the use of video and static picture prompts and the effectiveness of incorporating self- monitoring on handheld devices, such as the Apple iPad.

#### **Self- Monitoring for Students with Disabilities**

Self- monitoring has been applied in schools for students with ASD as a means of reducing inappropriate behavior and supporting academic productivity. In Holifield et al.'s study (2012), two students with ASD were taught to use self- monitoring sheets in

both language arts and math classes. The first student was a 5th grader with a measured IQ of 70. He was performing around the 3rd grade level in both mathematics and language arts. The second participant was a 3rd grader with a measured IQ of 39 and performing around the 1st grade level in both subjects. Both students were exhibiting long term deficits in attending skills that was negatively impacting their educational performance and social functioning in the classroom. In the intervention, the teacher verbally explained the definition of “attending to a task” and showed two pictures of images of modeling the behavior of attending to a task from Boardmaker software. The self- monitoring sheet had three instructional directions, “write,” “count,” and “work.” With the numbers 1-4 and the phrase, “attending to task,” each with a, “yes,” or “no” next to it. Students were verbally and physically prompted to start the independent seatwork assigned. If a “yes” was circled, the student would be verbally praised, If a “no” was circled, no praise would be given, but the participant would be verbally redirected to the independent seatwork. After three consecutive days of self- monitoring implementation, another student was following the same process. After six days of the intervention, both participants were able to self monitor their behaviors independently, and their attending behaviors were increased. Both students also exhibited increased academic scores in both subject areas (Holifield et al., 2010).

This study showed that self- monitoring was an effective strategy for prompting attending behaviors and increasing academic performance of students with Autism. The classroom teacher stated that self monitoring seems easy to administer and fit in well with the classroom procedures. In addition, the participants also demonstrated their

independence in completing class assignments without any verbal prompts and were able to gather their own data on self monitoring sheets.

Self- monitoring was also used for secondary school students in Crabtree, Alber-Morgan, & Konrad's study (2010). The subjects were three high school students diagnosed with learning disabilities. Two of the students were also diagnosed with ADHD. All of the subjects were receiving special education services in a resource room for reading instruction, because their reading scores were below grade level. The intervention took place in a one on one setting in the classroom between the student and teacher. A self- monitoring response sheet was incorporated into the reading comprehension passages. The reading passage was three pages long, divided into three sections, and separated by prompts as, "Stop One (Fill in responses in Stop One Boxes)" and "Stop Two (Fill in responses in Stop Two Boxes)." At the end of the self- monitoring sheet were questions: "Who are the main characters?" "What is the setting of the story?" "What is the story about?" "What are the problems and conflicts?" "How did the story end?" At the first and second stops in the reading, the participants wrote answers to the simple questions. At the end, the students gave their final answers to the questions in the end column. After the self- monitoring response sheet was completed, the participants took a quiz with 10 short questions. The results showed that the student's scores drastically increased. Their comprehension scores ranged from 8-17 correct out of 20, comparing to 1-5 correct during the baseline before the intervention of self- monitoring. The students were also required to complete a brief questionnaire regarding the self- monitoring strategy implemented to help improve their reading comprehension skills.

The participants reported that the intervention was easy to use and helpful in improving their comprehension.

This study showed that self-monitoring can be an effective strategy for high school students with learning disabilities and can also be used to improve reading skills. Based upon these two studies, it seems that self-monitoring was not only easy to give students a structured intervention for their behaviors, but also helpful to guide their academic learning by following the steps or answering questions. Crabtree et al., (2010) and Hollfield et al., (2012) indicated that self-monitoring was a successful strategy to implement in the classroom for elementary students as well as high school students. Also, self-monitoring was shown to benefit students with greater social needs, such as students with ASD, as well as instructional needs for students with various disabilities. The two studies found that self-monitoring is relatively inexpensive and is an easy technique that teachers can use to assist their students in guiding themselves without teacher's verbal prompting both academically and behaviorally. In addition, the student satisfaction survey used in Crabtree et al.'s study (2012) showed that the participants enjoyed self-monitoring and found it to be helpful in understanding the reading passages. Thus, further research is needed to self-monitoring in different academic and social settings. According to Joseph and Eveleigh (2011), self-monitoring is a worthwhile strategy to incorporate in the classroom for increasing on task behavior and academic productivity, but little research is available on how students with special needs apply self-monitoring skills in the classroom or how those skills are generalized to other settings such as general education environments.

## **Self- Monitoring with Visual Picture Prompts**

Visual picture prompts refer to using photographs, pictures, and symbols to guide students (Cihak et al., 2010). This means that a student is taught to use a picture to guide his or her own behavior instead of depending on others' directions (Argan 1997, as cited in Copeland & Hughes 2000.) These visual cues are used to aid students with disabilities in the task of self- monitoring (Cihak et al., 2010). It was found in Cihak et al.'s study (2012) that incorporating picture prompts into self- monitoring might increase on task behavior and complete the class assignment.

In Copeland and Hughes' study (2000), two male and two female high school students were chosen to participate due to their observed requirements for verbal, gestural, and physical prompts from the teachers to initiate task steps for jobs. The intervention used two components. They were: looking at a picture prompt book to prompt task steps and self- monitoring by touching each picture before beginning the task. The picture prompt book was composed of photographs representing each step or materials for the task of the student's task analysis. The results showed that the levels of independent task step initiations increased for the first student from 57% during the baseline to 80% during the intervention when picture prompting was provided. The second student showed an increase from 58% during the baseline to 75% after the intervention. This study showed that picture prompting incorporating into self- monitoring can be an effective technique to guide students in successfully monitoring their own progress in task analysis (Copeland & Hughes, 2010). However, the study lacked input from the teachers about the effectiveness of the strategy and it was unclear if

the skills were able to be generalized into the job field successfully. Further, the study was lacking student input on the ease and helpfulness of using the strategy as a guide and prompting system to complete their task analysis for their job performance.

A recent study by Cihak et al., (2010) included two 11 year old, 6th grade males and one 13 year old 7th grade male who were diagnosed with high functioning autism. The study was conducted in a general education setting with a class of 27 students. The intervention was implemented during three subject areas. Photographs were used to show the student writing, reading, and watching and listening to the teacher. The photos were put into a PowerPoint presentation and were displayed digitally every 30 seconds on a hand held computer device that was stationary on the student's desk. In addition, each student was also provided with an index card which had 10 numbered "yes" and "no" responses for students to circle. When the self- modeled picture was displayed, the student recorded "yes" or "no" on the index card if they were demonstrating the targeted behaviors. The intervention continued over three weeks until each student achieved a 90%. The results of the study showed that student's task engagement increased from 29% during the baseline to an average of 94% when the picture prompt self- monitoring technique was used. The number of teacher directed verbal prompts during the base line was 26.7 and decreased to 3.3 during the picture prompting phase. At the end of the study, the students reported that it was easy to use the photographs, and the self- monitoring cards reminded them the steps to follow, which helped to increase their grades. The teacher indicated that self-monitoring strategies should be recommended to other teachers (Cihak et al., 2010).

Cihak et al., (2010) indicated that self- monitoring strategies with visual prompts improve task engagement in general education classrooms. Educating students in the general education classroom can expand their ability to self- monitor and manage their own behaviors. However, little research was conducted on the use of visual materials, such as picture prompts for students with autism. To date, most studies conducted with students with ASD using picture prompts were focused on schedules and transitioning. Few studies have showed the learning outcomes to improve behavior regulation in academic environments. It is found that these students are highly motivated to use the handheld computer device to display picture prompts (Cihak et al., 2010). Video modeling is another highly motivating technique to be incorporated into self- monitoring (Cihak et al., 2010). Further research is needed on video modeling for these students using the highly motivated handheld devices.

### **Self- Monitoring with Video Modeling**

Video self- monitoring refers to using a videotape of a child demonstrating a positive target behavior with footage of prompts, errors, or off task behavior. This strategy has been found as an effective intervention for changing behaviors of students with ASD. The videos can range from just the child alone, to the child interacting with a peer, or with an adult who is acting as a model (Gelbar et al., 2011). Two methods for video self- monitoring are found. One is having the child role play the desired behavior, and another is videotaping the child in the natural setting and editing the footage to show the child's positive behavior presented.



In the study by Coyle and Cole (2004), video self- monitoring was used as a behavior intervention for two verbal students and one non- verbal student with intellectual disabilities and ASD. Off task behavior was defined as any behavior that was unnecessary to complete a task independently, such as “looking around at other children, fiddling with a pencil, rolling items on the desk, inspecting objects and other students, touching other students, staring blankly, and leaving their seats.” Each of the off task behaviors targeted in the video was used for the self- monitoring. The students were video- taped and then the tape was edited to show only the students participating in on task behaviors with prompting, the prompting was later edited out as well. The students would watch a 3 minute video of themselves attending to their work. The student’s self- monitored for ten 30 second intervals. Then, they would be given time to check off on their self- monitoring sheets, “working’ or “not working.” Results showed that their off- task behaviors were decreased when the video self- monitoring was implemented and their on- task behaviors were maintained after the intervention.

In another study (Gelbar et al., 2011), two elementary school students with ASD were chosen to participate. They were involved in a role playing activity and were video- taped. The tape was later turned into a 3 minute video to show the students demonstrating positive social interactions. The video also used creative presentation techniques by adding things like, “A movie starring ...” Each student then watched the 3 minute video in the beginning of class for 10 days. Over this period, each student increased their social interactions from 0-1 to 4-5 per day with the intervention. The study also tried the same intervention technique with two elementary students with ASD to reduce tantrums in the

class. The students were also video- taped their role playing. Watching their own appropriate behaviors shown in the video, their tantrums decreased significantly.

Further, Coyle and Cole (2004) used a 3 minute video segment of the students in their natural environments and interactions, Gelbar et al. (2011), used a role playing scenario where the students had scripts. Both of these studies demonstrate the two different models of video self- monitoring and successful outcomes. Coyle and Cole (2004) used a very simple sheet with a check box. It allows the students to take responsibility for their behaviors by checking off the box.

### **Self -Monitoring using Digital Handheld Devices**

Handheld devices are effective prompting systems that have been used with individuals with disabilities. Students with ASD can use electronic prompting devices to decrease their reliance on prompts given by the teacher, other adults, or peers. These students have a strong visual perception in using electronic devices (Blood et al., 2011). Today, these devices are widespread and available to run various applications “apps.” They are small sized, low cost, easy to obtain and transport, readily available, and socially acceptable. They are also providing students with simple functions, such as choice making (Shane, Laubscher, Schlosser, Flynn & Abramson 2011).

In Blood’s et al. (2011) study, a 10 years old boy in 5<sup>th</sup> grade with emotional and behavioral disorders participated. He had a full scale IQ score of 82 and was receiving special education services in language arts, writing, and math. The student’s teachers reported that he had difficulties with impulse control, getting along with peers, and

displayed disruptive behaviors. The student used an Apple iPod touch for video modeling and self-monitoring. The iPod displayed the modeled video and served as a timer to remind the student of completing his self-monitoring sheet. The results of the study showed that the self-monitoring and video modeling reduced the student's disruptive behavior and increased his on-task to 99% during the intervention.

It is found that video modeling and self-monitoring are effective interventions. Combining with the use of a handheld device, such as an iPod touch, allows the intervention to be delivered less intrusively (Blood et al., 2011). Students could view the video at their desk privately without others in class. The iPod touch provides a portable option, easy to carry to different classes, which may help students to increase their generalization of skills to other environments. Even though the intervention was successful, the use of hand held devices needs to be used with caution. The device could cause a distraction to other students in the classroom and also the student targeted for intervention. Further studies should consider changing the self-monitoring video to prevent student boredom (Blood et al., 2011).

## **Summary**

After reviewing the research on self-monitoring for students with ASD; it was found that this strategy has been an effective intervention for reducing off task and increasing on task behaviors (Crabtree et al., 2010, Holifield et al., 2010, Robinson, 1999). Recently, self-monitoring has been enhanced by the use of picture prompts and video modeling, and student self-modeling video (Cihak et al., 2010; Coyle & Coyle

2004). Technology, such as handheld devices, has been used to replace the traditional forms of video modeling. Presently, little research is conducted in the area of incorporating self monitoring practices on handheld devices, such as an Apple iPad. Presently, there is a need to investigate the effects of such a portable and easy to use device and its effects on reducing off task behaviors of students with ASD, especially to encourage these students to manage their own behaviors.

## **Chapter 3**

### **Method**

#### **Context of the Study**

##### **Setting.**

The study was conducted at a middle school in southern New Jersey. The state Department of Education listed the District Factor Group (DFG) for the district as, “A” which was based on statistics collected from the 2000 Census. The DFG classifies the districts from “A” to “J” based on their socioeconomic status. A rating of an “A” is deemed as a district with the lowest economic status and a rating of a “J” being a district with the highest economic status. Based on the rating from the DFG of an “A,” this district is located in a poor, rural area. The school has approximately 520 students in 6<sup>th</sup> through 8<sup>th</sup> grades, and 23.4% of students have an Individualized Education Plan. These students receive services in inclusion classrooms, resource rooms, and self contained special education classrooms. The district’s middle school autism programs was offered, as well as programs for life skills, social skills, and the use of a sensory area to accommodate the needs of this particular population. The study was conducted in a resource room for students with ASD. There were 5 students in the classroom receiving language arts instruction in an 80 minute block period. During this time, there was one special education teacher and three paraprofessionals present in the classroom.

## Participants

### Students.

One 6<sup>th</sup> and three 8<sup>th</sup> graders, all males, diagnosed with Autism participated in the study. They were taught in this resource room for language arts, as well as social and behavioral skills that would make a successful transition to an inclusion setting in the future. Individual student information was described in Table 1.

Table 1

#### *Student Information*

<u>Student</u>	<u>Age/Grade</u>	<u>Intelligence Test Scores</u>	<u>Language Test Score</u>
A	13/ 8 <sup>th</sup>	81	At Grade Level
B	13/8 <sup>th</sup>	71	Below Grade Level
C	13/8 <sup>th</sup>	102	Below Grade Level
D	12/6 <sup>th</sup>	N/A	Below Grade Level

( Note: WISC: Wechsler Intelligence Scale for Children -4<sup>th</sup> ed. 2003; Language Test: Scholastic Reading Inventory)

Student A was diagnosed with autism in the 3<sup>rd</sup> grade. He is shy and quiet and excels in mathematics. Student A struggles with raising a hand to speak and often calls

out answers while in class. Reading comprehension is a struggle for this student and decoding and word recognition were noted as strengths.

Student B was diagnosed with autism in the 1<sup>st</sup> grade. He is highly distractible and impulsive. This student currently takes medication for ADHD. He struggles with peer interaction and maintaining eye contact. Often he drifts off during instruction, playing with pencils and papers on the desk, and calling out answers. Reading comprehension is a struggle for this student and decoding and word recognition are noted as strengths.

Student C was diagnosed with autism when he was 10, along with depression and ADHD. He does not take medication. He desires to interact with grade level peers, but struggles due to his social deficits. He drifts off constantly during instruction and has to be verbally prompted to stay focused throughout the day. Reading comprehension is a struggle for this student and decoding and word recognition were noted as strengths.

Student D was diagnosed with autism when he was 3. He takes medication to help with staying focused and sleeping at night. He likes interacting with peers. Student D calls out, plays with pencils, and drifts off multiple times during instruction. He has difficulties in reading comprehension and learning vocabulary words, while decoding and word recognition are noted as strengths.

## **Teacher.**

One teacher was involved in the study. She had been teaching students with disabilities for 7 years. This was the first year she has taught students with autism. She delivered instruction for these students in language arts, social studies, science, and math.

## **Research Design**

A single subject design with ABAB phases was used in the study to examine the effects on self monitoring using the iPad to increase the student's on task behavior. During Phase A, data was collected for 10 days based on the observations of the occurrence of on and off task behaviors. During Phase B, the first intervention, the students were introduced to the iPad, and their personal images were incorporated into the "app" of the iPad program. The students were instructed to use the iPad to self monitor their own behavior for 10 days. The students' on and off task behaviors were recorded as the baseline (Phase A). During second Phase A, the iPads were taken away and student's behaviors were continued to be observed and recorded for 10 days. During the second Phase B, the self monitoring intervention using the iPad resumed, and the students were observed for 10 days. During each phase of the intervention at the end of the week a short comprehension quiz was given to the students to see if the intervention increased their academics, as well as on task behaviors. After the study was complete, a student satisfaction survey was given to each student to gain insight into their feelings about the use of the iPad in the classroom.



## **Materials**

### **Instructional Materials.**

*Apple app of “choiceworks”.* Each student was given an Apple iPad with the “Choiceworks” app presented on the screen. This program was developed to help learners complete daily routines and understand and control their feelings associated with their routines. It allows an image or photo to be incorporated (See an example in Appendix A). The program was customized into a self-monitoring tool for students in class.

*Self - modeling.* Students had access to the camera feature of the iPad that allowed them to record and watch their own video of on task behaviors. In class, each student was provided an index card with a list of 4 on task behaviors including attending to the assignment, raising hands to respond to a request, facing forward and seated in chairs, and keeping hands on the desk without touching peers. The teacher modeled each on task behavior. Each student was required to imitate and their on-task was videotaped using the camera feature in a 2 minute segment, and saved (See an example in Appendix B).

### **Measurement Materials.**

*Observation checklist.* A checklist was developed to collect the occurrences of on task and off task behaviors displayed during the 20 minute session. An interval recording was used with 2 minute intervals during which students’ behaviors were observed and recorded. Table 2 presents the checklist.

Table 2

*Observation Checklist*

Student	Behavior
2 min	On
	Off
2min	On
	Off
2 min	On
	Off
2 min	On
	Off
2 min	On
	Off

**Tests.** A weekly test was given to the students in the language arts class at the end of each week. Each test included 10 questions with fill- in the blank, true or false, and multiple choices questions based on the week’s instruction. The students had a total of 20 minutes to complete the test and their scores were calculated and converted into percentages (See a sample test in Appendix C).

**Survey.** Survey was developed to obtain student feedback about the use of the iPad and self management in class. This survey included 8 questions with 4 levels of ratings for responses: “Strongly Agree,” “Agree,” Disagree,” and “Strongly Disagree”, with 4 possible points as the highest and 1 possible point as the lowest. Table 3 presents the student survey.

Table 3

*Student Survey*

	Strong Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)
I enjoyed using the iPad in the class.				
I understood the lesson better when the iPad was present.				
The iPad helped me stay focused on my behavior				
Having the iPad on my desk made it hard to concentrate.				
I liked hearing my voice on the app.				
I would have liked to hear my teacher's voice.				
I enjoyed watching my video of good behavior.				
I think using the iPad helped me do better on quizzes.				

## **Procedure**

### **Instructional Procedures.**

Students were not instructed in self monitoring during baseline A1 or A2. The teacher collected data on the student's on and off- task behaviors during a 20 minute session of language arts class. During intervention B1 and intervention B2, students watched their short video of correctly modeled on task behaviors, participated in the language arts lesson, self recorded their own on task behaviors using the iPad, and watched the on task modeling video again if necessary. While students were self-monitoring, the teacher continued to record their behaviors.

Table 4

*Instructional Routine*

Day	Lesson	Minutes
Introduction	Students were introduced to the iPad and learned the location of the basic functions such as: the on and off switch, how to lock and unlock, and open and close “apps.”	20
Creating the “App”	Students worked with teachers to insert images of modeled on task behavior. After, they read from a script describing the modeled on task behavior and recorded their own voices into the “app.”	60
10 Day Intervention	Students started every intervention day by watching their own video first. After they started their language arts lesson. After the timer went off, the students checked off the behaviors they felt they completed. If the students were missing one check, they had to watch their video again.	25

## **Measurement Procedures**

**Observation.** The teacher and aide in the classroom timed on a stop clock a 20 minute period into 2 minute intervals and recorded information on the checklist using a “+” for an on task and a “-” for an off task behavior.

**Testing.** A weekly test was given for students to complete in 20 minutes independently. The teacher read test directions and students could raise their hands to ask questions for clarification or request for a question read to them. The test scores were calculated and converted into percentages

**Survey.** The survey was given to all participating students at the end of the study. The teacher read each question aloud and explained to the students to ensure their understanding, and then asked them to mark “+” on one rating element, “Strongly Agree,” Agree,” “Disagree,” or “Strongly Disagree.”

## **Data Analysis**

**On Task Behavior.** A graph was created with the data collected during the ABAB phases. Each line on the graph represents the occurrences of the student’s on task behavior during each baseline and intervention phase.

**Off Task Behavior.** A graph was created with the data collected during the ABAB phases. Each line on the graph represents the occurrences of the student’s off task behavior during each baseline and intervention phase.

**Student Performance.** A table was presented to include each student's test scores in percentages with means and standard deviations.

**Student Satisfaction.** A table was constructed to present each student's responses to the survey questions, as well as means and standard deviations.

### **Inter-Observer Reliability**

The teacher's aide in the classroom also collected data during the baseline and intervention to obtain inter-observer reliability with the teacher

## Chapter 4

### Results

Students' on and off task behaviors were recorded during each phase. Table 4 presents the mean and standard deviations of their behaviors during each phase.

Table 5

*Means and Standard Deviations of on and off-task behaviors*

Student	Baseline A1				Intervention B1				Baseline A2				Intervention B2			
	<u>On Task</u>		<u>Off Task</u>		<u>On Task</u>		<u>Off Task</u>		<u>On Task</u>		<u>Off Task</u>		<u>On Task</u>		<u>Off Task</u>	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
A	27.3	8.5	1.5	2.59	31.4	5.03	0.1	0.32	30	2.11	0.1	0.32	26.8	3.85	0.1	0.32
B	24.7	2.31	10	4.48	28.8	4.68	2.8	2.02	29.2	1.62	0.9	1.20	26.4	2.95	0.6	0.84
C	18.7	2.87	11.4	4.88	25.9	7.2	6.3	4.67	26.6	2.63	3.5	1.58	23.3	3.9	2.33	1.66
D	21.6	2.87	10.3	4.08	26.8	4.64	2.3	2.31	28.8	2.15	1.3	1.13	24.7	3.85	2.3	1.16
Class	23.1	2.9	8.3	0.99	28.7	1.24	2.89	1.79	28.7	3.02	1.45	0.53	25.59	0.43	1.33	0.56

Student A had a relatively high level on of on task behavior and low level of off task behavior throughout the study. The intervention (B1) was the most beneficial for this student. Student A's main off task behavior was calling out during instruction. Once the video was shown and the photos were present in the "app", Student A almost stopped his calling out completely.



Student B had a slight increase of his on task behavior and a substantial decrease of 7.2 in off- task behavior between baseline A1 and intervention B1. Student B also maintained the low occurrences of off task behavior throughout the remaining periods of the study and continued to increase his on task behaviors.

Student C decreased off task behavior by 7.9 occurrences in phases A1 to A2 and by 3.97 from phases B1 to B2. Student D decreased off task behavior by 9.7 in phases A1 to A2. Student B increased on task behavior by 4.5 occurrences in phases A1 to A2 and Student D increased on task behavior by 7.2 occurrences in phases A1 to A2.

Figure 1 presents on task behavior occurrences for each student during the baseline and intervention.

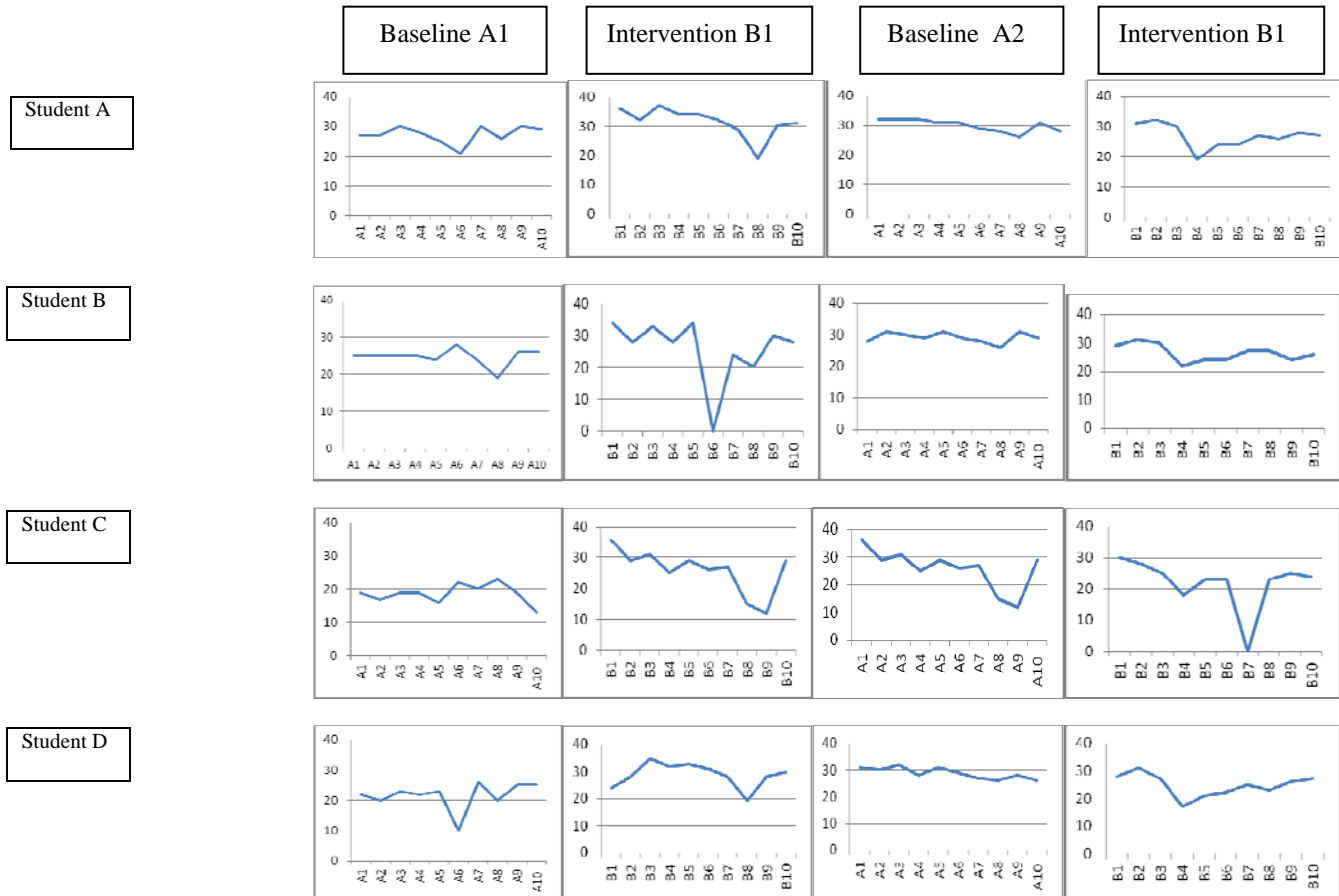


Figure 1. On Task Behavior.

Figure 2 presents off task behavior occurrences for each student during the baseline and intervention.

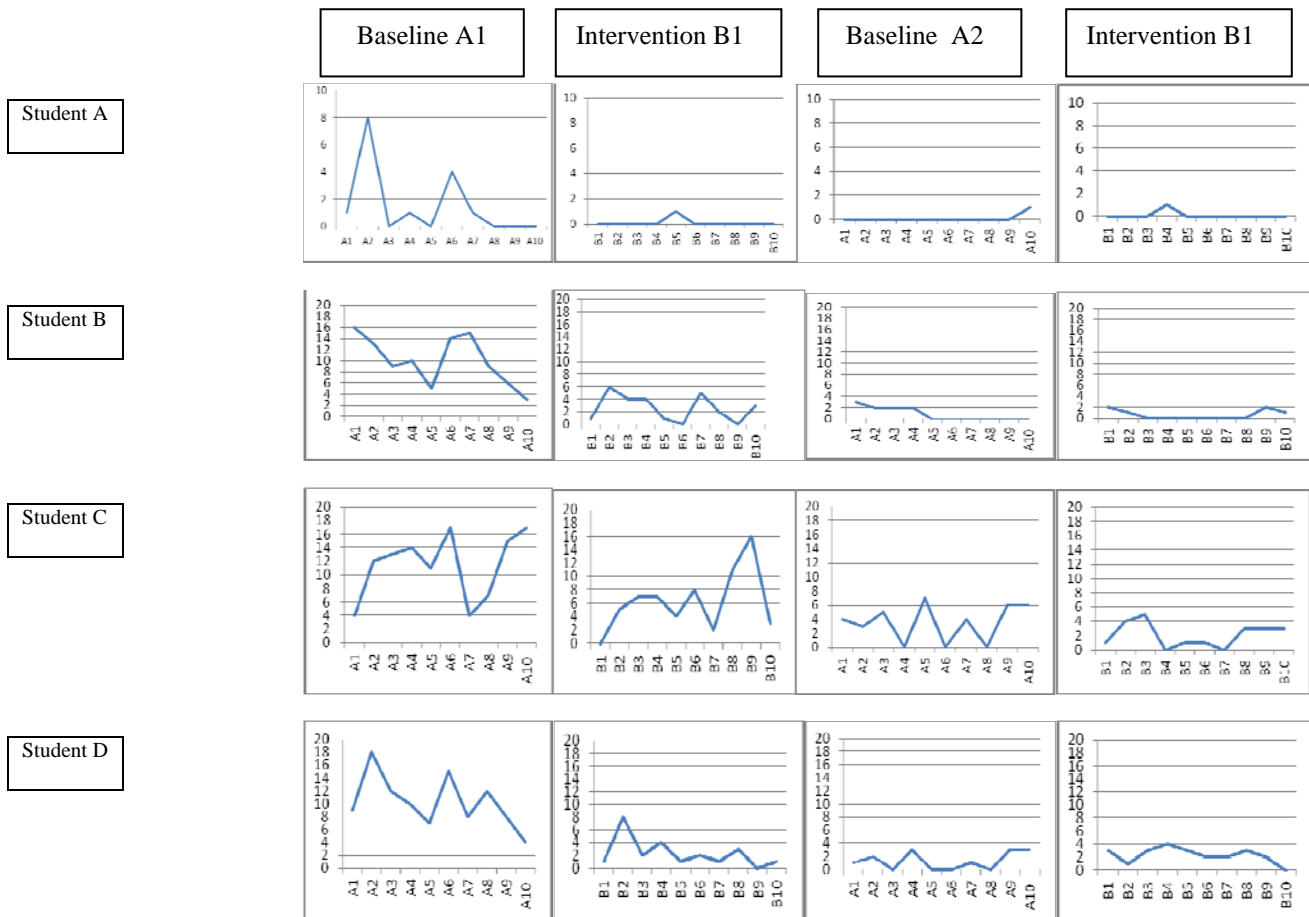


Figure 2. Off Task Behavior.

Student's academic performance in reading was evaluated by a weekly quiz. Their scores are presented as percentages in Table 6.

Table 6

*Student Quiz Scores in Percentages*

<b>Student</b>	<b><u>Phase A1</u></b>	<b><u>Phase B2</u></b>	<b><u>Phase A2</u></b>	<b><u>Phase B2</u></b>
<b>A</b>	90	100	95	100
<b>B</b>	65	100	75	92.5
<b>C</b>	95	95	90	92.5
<b>D</b>	85	100	85	92.5

Student B and D showed large improvement during the intervention phases. For example, Student B gained 35 points during the first intervention and again 17.5 points during the second intervention. Student D increased 15 points in the first intervention and 7 points in the second intervention. Student A has good classroom performance prior to the intervention, and maintained the good grades in the interventions with an increase of 5 points during the second intervention. Student C maintained the same grades. At the end of the study, each student was given a survey. The results were analyzed and displayed in percentages. Table 7 presents their responses to the survey.

Table 7

*Means and Percentages of Student Responses to the Survey*


---

<b><u>Questions</u></b>	<b>Mean</b>	<b>Strongly Agree %</b>	<b>Agree %</b>	<b>Disagree%</b>	<b>Strongly Disagree%</b>
I enjoyed using the iPad in the class.	4	100	0	0	0
I understood the lesson better with the iPad.	4	100	0	0	0
The iPad helped me stay focused on my behavior.	4	100	0	0	0
Having the iPad on my desk made it hard to concentrate.	3.25	75	0	0	25
I liked hearing my voice on the app.	4	100	0	0	0
I would have liked to hear my teacher's voice.	2	0	25	25	50
I enjoyed watching my video of good behavior.	4	100	0	0	0
I think using the iPad helped me do better on quizzes.	3.75	75	25	0	0

---

All of the participants indicated that they enjoyed using the iPad in class. In addition, all (100%) stated that they understood the lesson and liked to manage their own behavior with the iPad. Consequently, 3 out of 4 of the students (75%) strongly agreed and one (25%) agreed that the use of the iPad helped them do better on their quizzes. All students enjoyed hearing their own voices and seeing their own images in the video to learn on task behaviors on the iPad's screen. Only one student suggested including the teacher's voice incorporated into the "app.", while the rest 3 students did not like to include their teacher's, but their own voice.

## **Chapter 5**

### **Discussions**

The purpose of the study was to evaluate the effectiveness of the Apple iPad as a tool for teaching students with ASD self monitoring strategies. The tool for assisting the students was created by having the participants model on task behaviors while be recorded using the camera feature of the iPad. Then, student's individual images and voices were recorded and incorporated into the app, called "Choiceworks." The study attempted to find out if the self monitoring strategy using the iPad could increase their on task behaviors as well as reduce off task behaviors.

### **Findings**

The first research question was addressed that if the student behavior would change when the iPad- based self monitoring was provided in class. Results showed that the intervention was effective in reducing their off task behavior and increasing on task behavior of all of the four participants. The findings are consistent with that of Holifield et al.'s study (2012). In their study, two students with specific learning disabilities were taught self- monitoring strategies. Both students had difficulties attending to tasks. After the intervention, the participants were able to self monitor their behaviors independently, and their attending behaviors were increased. In the meantime, both students increased their academic scores in language arts and math. Further, in another study by Crabtree, Alber-Morgan, & Konrad (2010), three high school students diagnosed with learning disabilities were included, of which two were diagnosed with Attention Deficit Hyperactive Disorder. Their results showed that the students' academic scores drastically

increased. Both studies indicated that a combination of self monitoring and video modeling was helpful to reduce student's disruptive behaviors and to increase on task behaviors. This current study expands the previous research by using the iPad with application of self images to model the appropriate on task behaviors of students with ASD. The findings may add information to the previous research and create another avenue for teachers to practice, in order to support students with behavior problems.

### **Limitations**

These are some limitations in the study. First, the class was a resource room with 5 students as the sample size. One student could not participate because the parent permission slip was not signed, thus only 4 students were available. A larger sample group could have provided different results and proved a stronger case for the intervention. In addition, data collection was broken up because of changes in the schedule due to spring break, state testing, and parent and teacher conferences. This might have impacted the consistency of the data collection. In preparation for the state testing, a review unit was taught during the second intervention, which gave the students less opportunity for participation. Further, because of the limited number of participating students, the students may need to continue practicing self-monitoring skills learned through the intervention to generalize to other behaviors or class settings. More data could be collected to maintain and generalize student self monitoring skills in other subject areas and with other teachers.



## **Implications**

This study provided evidence of the effectiveness of handheld devices, such as the Apple iPad being used in the classroom. Teachers could use this technology to develop other strategies to assist students with ASD and other disabilities in their behavior and academic improvements. Based on the findings, school administrators should consider purchasing popular electronics for class instruction because of students' interests. Proper training could be provided to teachers, so that iPads could be incorporated into their daily lessons and behavior management, which would benefit students and teachers. Compared to other electronic devices, iPads are considered relatively inexpensive. These devices are highly portable and easy to use; thus, this feature makes it an obtainable piece of assistive technology for students with disabilities. It also is highly popular; so that students may not feel embarrassed or ashamed to use it in the classroom for assistance in front of their peers. Teaching students to use their iPad to support academic achievement will be a big task for teachers. It is my hope that more teachers use technology in classrooms so more students will benefit.

## **Conclusion**

This study shows the success self- monitoring can bring to students with ASD. The Apple iPad proved to be an important piece of technology that can be incorporated into the classroom practice. Having access to this device, provided the students with a fun and interesting way to learn to manage their own behaviors and lead them to increasing their own academic and behavioral success.

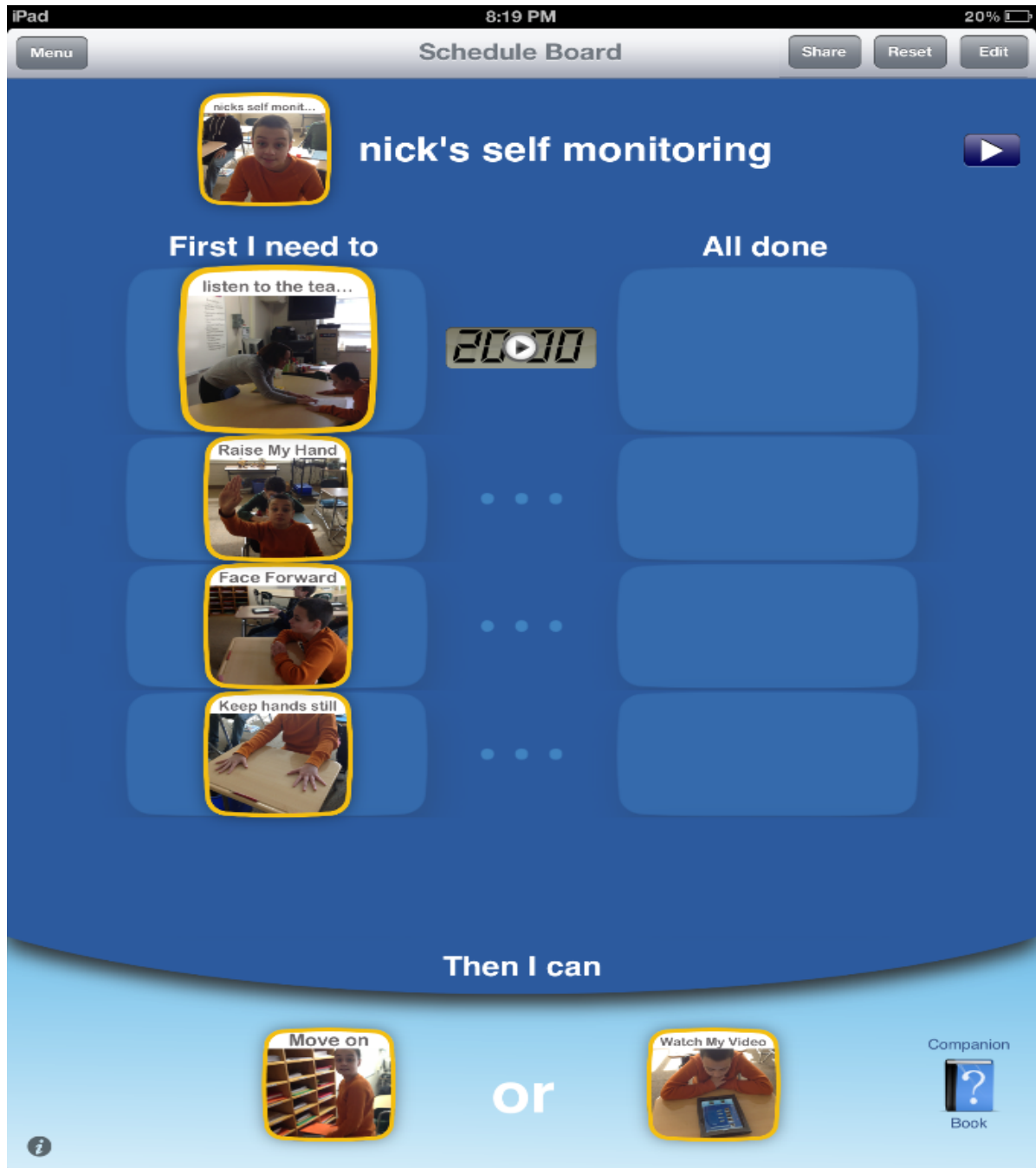
## References

- Bandura A. (1997). The anatomy of stages of change... from: Self efficacy: The exercise of control... from: SELF EFFICACY: THE EXERCISE OF CONTROL by bandura (c) 1997 by W. H. freeman and company. *American Journal of Health Promotion*, 12(1), 8; 8-14; 14.
- Erika Blood, Jesse W. Johnson, Lindsey Ridenour, Karen Simmons, & Starline Crouch. (2011). Using an iPod touch to teach social and self-management skills to an elementary student with Emotional/Behavioral disorders. *Education and Treatment of Children*, 34(3), 299-321.
- Cihak, D. F., Wright, R., & Ayres, K. M. (2010). Use of self-modeling static-picture prompts via a handheld computer to facilitate self-monitoring in the general education classroom. *Education & Training in Autism & Developmental Disabilities*, 45(1), 136-149. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=eft&AN=508147966&site=ehost-live>
- Copeland, S. R., & Hughes, C. (2000). Acquisition of a picture prompt strategy to increase independent performance. *Education & Training in Mental Retardation & Developmental Disabilities*, 35(3), 294-305. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=eft&AN=507716793&site=ehost-live>
- Corbett, B. A. (2003). Video modeling: A window into the world of autism. *Behavior Analyst Today*, 4(3), 88-96. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=12072084&site=ehost-live>
- Coyle, C., & Cole, P. (2004). A videotaped self-modelling and self-monitoring treatment program to decrease off-task behaviour in children with autism. *Journal of Intellectual & Developmental Disability*, 29(1), 3-15. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=c8h&AN=2004158597&site=ehost-live>
- Crabtree, T., Alber-Morgan, S., & Konrad, M. (2010). The effects of self-monitoring of story elements on the reading comprehension of high school seniors with learning disabilities. *Education & Treatment of Children (ETC)*, 33(2), 187-203. doi:10.1353/etc.0.0090
- Crosland, K., & Dunlap, G. (2012). Effective strategies for the inclusion of children with autism in general education classrooms. *Behavior Modification*, 36(3), 251-269. doi:10.1177/0145445512442682

- Erika Blood, Jesse W. Johnson, Lindsey Ridenour, Karen Simmons, & Starline Crouch. (2011). Using an iPod touch to teach social and self-management skills to an elementary student with Emotional/Behavioral disorders. *Education and Treatment of Children*, 34(3), 299-321.
- Gelbar, N. W., Anderson, C., McCarthy, S., & Buggey, T. (2012). Video self-modeling as an intervention strategy for individuals with autism spectrum disorders. *Psychology in the Schools*, 49(1), 15-22. doi:10.1002/pits.20628
- Holifield, C., Goodman, J., Hazelkorn, M., & Heflin, L. J. (2010). Using self-monitoring to increase attending to task and academic accuracy in children with autism. *Focus on Autism & Other Developmental Disabilities*, 25(4), 230-238. doi:10.1177/1088357610380137
- Joseph, L. M., & Eveleigh, E. L. (2011). A review of the effects of self-monitoring on reading performance of students with disabilities. *Journal of Special Education*, 45(1), 43-53. doi:10.1177/0022466909349145
- Rapin, I. (1997). Autism. *N Engl J Med*, 337(2), 97-104. doi:10.1056/NEJM199707103370206
- Robinson, T. R., & Smith, S. W. (1999). Cognitive behavior modification of hyperactivity-impulsivity and aggression: A meta-analysis of.. *Journal of Educational Psychology*, 91(2), 195. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=2159595&site=ehost-live>
- Shane, H., [howard.shane@childrens.harvard.edu](mailto:howard.shane@childrens.harvard.edu), Laubscher, E., Schlosser, R., Flynn, S., Sorce, J., & Abramson, J. (2012). Applying technology to visually support language and communication in individuals with autism spectrum disorders. *Journal of Autism & Developmental Disorders*, 42(6), 1228-1235. doi:10.1007/s10803-011-1304-z
- Shelton, J., F., Hertz-Picciotto, I., & Pessah, I., N. (2012). Tipping the balance of autism risk: Potential mechanisms linking pesticides and autism. *Environmental Health Perspectives*, 120(7), 944-951. doi:10.1289/ehp.1104553
- Soares, D. A., Vannest, K. J., & Harrison, J. (2009). Computer aided self-monitoring to increase academic production and reduce self-injurious behavior in a child with autism. *Behavioral Interventions*, 24(3), 171-183. doi:10.1002/bin.283
- W., V. (2012). iPads & autism. *Technology & Learning*, 32(7), 28-28. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=eft&AN=71740473&site=ehost-live>

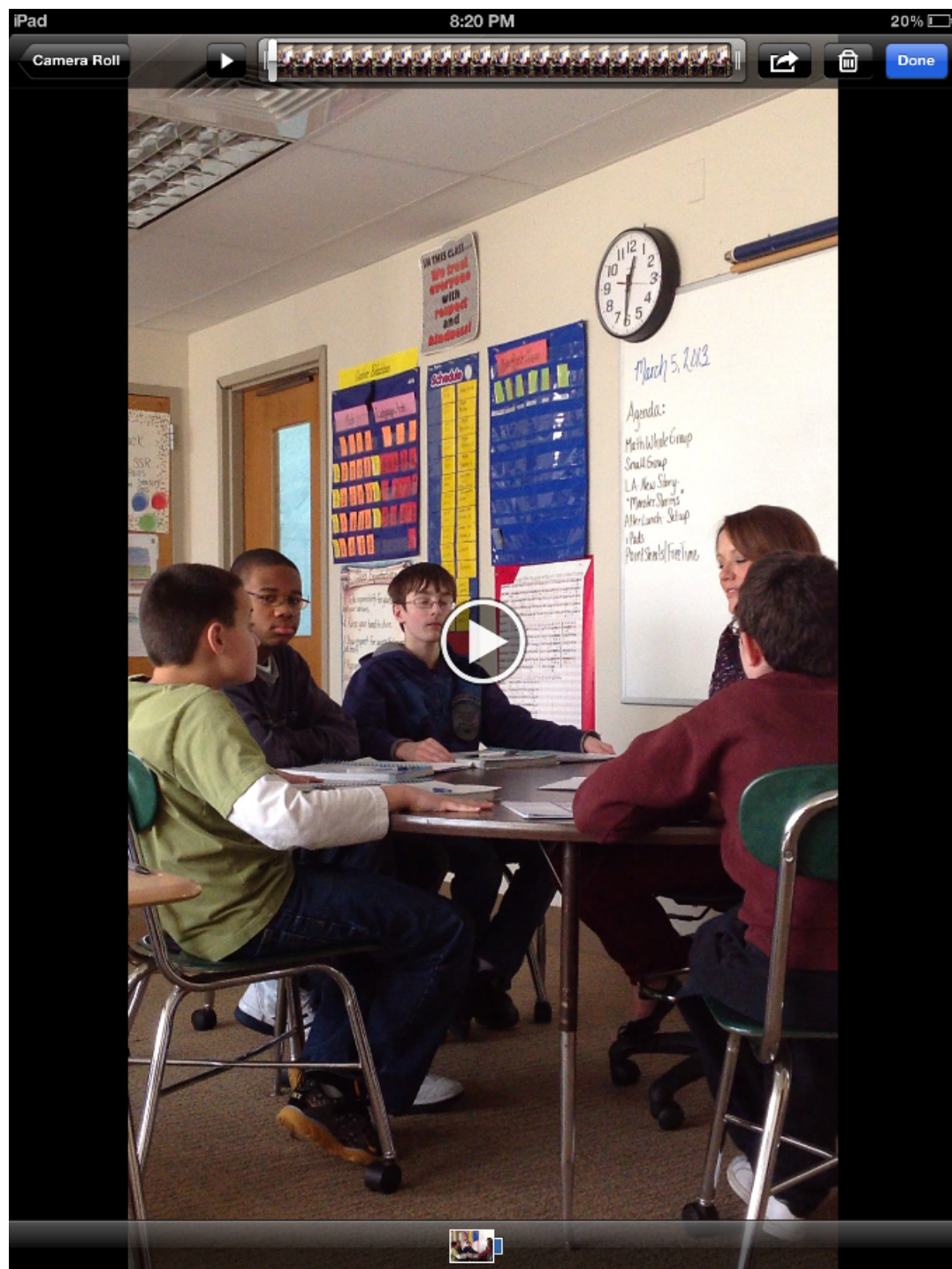
## Appendix A

### Choiceworks “app”



## Appendix B

### Student Video Segment



## Appendix C

### Sample Quiz

#### Read 180 Quiz – “Mountain on Fire”

1. The word **increase** means:
  - a. Terrible damage, b. to make or get larger, c. to pay close attention, d. the process of getting back to normal
2. Write a sentence using the word **focus**.
3. The word **intensity** means:
  - a. greater than, b. great strength or extreme degree, c. to pay attention, d. very serious
4. Write a sentence using the word **degree**.
5. The magazine article “A Mountain on Fire” is \_\_\_\_\_.
  - a. fiction, b. non fiction, c. fantasy, d. biography
6. What is the main idea of the article, “A Mountain on Fire?”
  - a. A boy got struck by lightning and missed work
  - b. A fire on Storm King that destroyed the forest and killed firefighters.
  - c. Fire fighters that died.
  - d. A bad fire that had a blow up.
7. Circle all the words that show sequence
  - a. Second, b. next, c. to, d. times and dates
8. What happened first in, “The Flames Rise?”
  - a. The summer of 1994 was hot and dry., b. On July 2<sup>nd</sup> the flames rose., c. the big blow up, g. firefighters ignored it.
9. True or False – The saying the firefighters were “stretched thin” means that they had too many people there to fight the fire.
10. A fire blow up is

a. A sudden jump in the fire's intensity, b. when the fire goes out, c. when a building blows up because of a fire, d. when the fire fighters open up their shelters.