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# Using iPads to increase on-task behavior of students with autism

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### Recommended Citation

Gould, Michelle, "Using iPads to increase on-task behavior of students with autism" (2015). *Theses and Dissertations*. 511.
https://rdw.rowan.edu/etd/511

**USING IPADS TO INCREASE ON-TASK BEHAVIOR
OF STUDENTS WITH AUTISM**

by
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A Thesis

Submitted to the
Department of Language, Literacy, & Special Education
College of Education
In partial fulfillment of the requirement
For the degree of
Master of Arts in Special Education
at
Rowan University
June 2015

Thesis Chair: Joy Xin, Ed.D.

## Dedication

*I would like to dedicate this manuscript to my father, Michael Gould, for teaching me the importance of education and always encouraging me to be the best student I could be.*

**Acknowledgements**

I would like to express my appreciation to my students for their cooperation and participation in this thesis project, my brother, Michael Gould Jr., for his encouragement and Dr. Joy Xin for her patience, guidance and assistance during this process.

# Abstract

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USING IPADS TO INCREASE ON-TASK
BEHAVIOR OF STUDENTS WITH AUTISM
2014/15
Dr. Joy Xin
Master of Arts in Special Education

Students with ASD often exhibit behavior problems, of these; off-task behaviors are a concern. The purpose of this study was to examine the effect of using an iPad for students with ASD to self-monitor their own behaviors. A boy and three girls with ASD participated. A single subject design with ABAB phases was used. During the baseline, each student's behavior occurrences in a language arts class were observed using interval recording of three on-task behaviors including facing forward, engaging in assignment, and looking at the teacher. During the intervention, an iPad was provided with an app called Choiceworks downloaded together with each student's self-modeling image of each on-task behavior. Each student was taught to learn the on-task behaviors by watching the self-modeled image, and recording his/her own behavior for 15 days. Then, the iPad was taken away for 5 days, and resumed for 15 days to evaluate student's performance. The results showed that their on-task behaviors were increased when an iPad was used in self-monitoring.

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# Chapter 1

## Introduction

**Statement of Problems**

Autism Spectrum Disorder (ASD) is a developmental disorder that affects a person's thinking, feeling, language and behavior (American Psychiatric Association, 2013). As reported by the Center for Disease Control (2010), 1 in 68 children are diagnosed with ASD, while boys are 3-4 times more likely than girls to be identified as having ASD. Children with ASD have difficulties in social interactions and unusual patterns of interest and behaviors, for example, a resistance to change in the environment and daily routines (Council for Exceptional Children, 2014). They also show difficulty with attending skills, such as struggling on focusing and paying attention (Holifield, Goodman, Hazelkorn, & Helfin, 2010).

The fifth edition of the Diagnostic and Statistics Manual of Mental Disorders (DSM-V, 2013) points out three areas that those with ASD struggle with, of those three; behavior problems are a main concern. These problems include noncompliance, rituals and aggression, as well as stereotypy (Zane, 2014). In addition, these students often show poor self-management skills including not being able to control or maintain behaviors in the classroom and in public (Wilkinson, 2008). These problems can hinder a student with ASD in both settings.

A portion of the noncompliance behavior can be considered as off -task (Bryan & Gast, 2000). Off task behaviors can be defined as not following directions, looking around, and getting out of seat. These are behaviors that negatively impact how a student with ASD functions socially, vocationally and in the community, and their

academic learning (Taber, Seltzer, Heflin & Alberto, 1999).

Self-monitoring is a tool to possibly reduce the off-task behaviors that students exhibit in the classroom (Menzies, Lane & Lee, 2009). It is designed for a student to keep track of his or her own behaviors (Wilkinson, 2008). There are two steps in the self- monitoring process: observing specific behaviors and recording their occurrence or nonoccurrence (Wilkinson, 2008).

There are different ways for a student to self-monitor, such as using paper and pencil, video and video feedback. With the paper and pencil technique, it is important to make sure the form is age-appropriate (Menzies, Lane & Lee, 2009). A self-monitoring sheet is often created by the teacher, who then gives the directions to the students of how to self-monitor (Holifield, Goodman, Hazelkorn & Helfin, 2010). Video feedback is another form of self-monitoring where the student views his/her own actions with different people in different settings (Deitchman, Reeves, Reeves & Progar, 2010). Video modeling is the other form of self-monitoring where a student is asked to perform an action he/she has viewed in a video (Odluyurt, 2013). Different from video modeling, video feedback gives the student feedback of his/her own behaviors and evaluating what he/she can improve (Deitchman, Reeves, Reeves, & Progar, 2010).

In the past, all self-monitoring techniques were using paper and pencil format such as a worksheet for a student to mark their behavior. Today's students are more interested in technology. An alternative method that could be used in the classroom for self-monitoring is a mobile device, such as an iPod (Blood, Johnson, Ridenour, Simmons, & Crouch, 2011).  Using a self-monitoring technique on an iPod Touch showed a positive impact on a student's on-task behavior and to reduce disruptive behaviors (Blood et al,

2011).

The Apple iPad is another mobile device that is used mostly for reading books, listening to music and playing games through "apps" which can be downloaded onto this handheld computer. Using such a device is found to reduce the amount of assistance or prompts given by the teacher during instructional time in the classroom (Blood, et, al, 2011). Because an iPad's visual cues display a sequence of visual- aides, it is ideal for self-monitoring (Cihak, Wright & Ayres, 2010). Further, iPads are portable, easy to carry for students with ASD in all settings such as home, school and the community (Cihak, Wright & Ayres, 2010). Using an iPad as a visual-aide for these students is a key to gaining their attention, because they rarely respond to auditory requests (Bryan & Gast, 2000). If such a visual aide is involved in the self-monitoring process, these students may be actively engaged in their own behavior management.

In addition, self-monitoring gives these students an opportunity to be independent by recording their own behaviors, and to take part in managing their own behavior (Wilkinson, 2008). Mobile devices, as indicated in Blood et al's study (2011), provide another alternative for self-monitoring for these students to manage their behaviors.  An iPad as a mobile device may have potential to serve these students in learning self- monitoring process and engaging their attention to learn appropriate behaviors in school.

**Significance of the Study**

Self-monitoring has demonstrated a way to teach students managing their own behaviors (Wilkinson, 2008). To date, many studies presented positive results of student behavior changes when using self-monitoring, however using technology, such as

portable devices, iPads for those with ASD is very much limited. This study is designed to use such mobile devices for those with ASD who are have a low cognitive ability and are significantly below grade level in learning self-monitoring procedures to improve academic and social skills. The main focus of technology is to teach these students to function with as much independence as possible at a young age.

**Statement of Purposes**

The purpose of this study is to evaluate whether self-monitoring using iPads is effective for those with ASD. Students will be taught to use an iPad to monitor their on-task behavior in class, for example, sitting in a seat, facing forward, looking at the teacher and engaging in the assignment. The data collected included observations of their behaviors as well as their academic performance evaluated in weekly quizzes.

**Research Questions**

The research questions are as follows:

1. Will students with ASD increase on-task behaviors when an iPad is provided for self-monitoring?

2. Will students with ASD increase their recall of the week's sight words when an iPad is provided for self-monitoring?

**Chapter 2**

**Literature Review**

Students with ASD often exhibit behavior problems, of these, off-task behaviors are a concern, because such behavior problems can hinder their social skills and academic performance as well as interrupt teachers' instruction and others' learning in class. Self- monitoring is a tool for students with ASD to record and manage their own behaviors (Wilkinson, 2008). This self-controlled process guides learners to keep checking their own behavior and reminds teachers to encourage their students' involvement in behavior management. It has been found that this particular strategy is beneficial to students with ASD (Holifield, 2011 & Legge, 2010). In the past, self-monitoring was one of the intervention strategies provided for this group of students and demonstrated effectiveness. This chapter reviews research on self-monitoring for students with ASD and the use of technology in self-monitoring to provide a new avenue for these students.

**Self- Monitoring for Students with ASD**

Self-monitoring is used for students with ASD to reduce their inappropriate behaviors. For example, in Holifield et al's study (2011), two males with ASD, in a self- contained classroom, in grades 3 and 5 participated. The purpose of the study was to evaluate the strategy used to change their behaviors. A self-monitoring sheet was provided directly before independent work in both Language Arts and Math classes to manage their off- task behavior. There were three words, "write", "count", and "work" listed in this sheet. Four, numbered "attending to task" phrases, with a "yes" and "no" next to each phrase, were also listed under each word. The students were given the

definition of "attending to task" verbally as well as being shown two pictures made with the software called Boardmaker. During the first 20 minutes, the students were cued every 5 minutes. The verbal prompt "Attending to task – one" was given to both students while they were working and the students had to circle a "yes" or "no". A verbal praise was given if "yes" was marked. A prompt was given to remind them of their assigned work. Both students were able to self-monitor independently when prompted after six days. Results showed that both students showed an increase in their on- task behavior, and eventually helped gain their academic achievement with increased scores (Holifield et al, 2011).

In another study conducted by Legge, et. al. (2010), three male students with ASD, two, 11 and one, 13 participated in a self-monitoring intervention program. Two of the students were in a self-contained classroom most of the school day and one was in a self-contained classroom for Language Arts and Math instruction, the data was collected during the Math instruction. The students were taught to use a self-monitoring sheet and MotivAider, a pager like device that vibrated on an interval of determined amount of minutes. They were directed to complete their assignments in 20 minutes. Every two minutes the MotivAider would vibrate to prompt students to mark a "+" or a "-" for the following categories: "eyes on work", "in my seat", and "doing work". The students had to mark 3 "+" to receive a "yes", and once a "yes" was received, a reinforcer, such as free time on the computer, was provided. Results showed that all students showed an immediate increase of on-task behavior when the self-monitoring process was applied (Legge et al, 2010).

It seems that using self-monitoring benefits students with ASD to increase on-task behaviors. However, both studies indicated the self-monitoring sheet with paper and pencil was relatively inexpensive.

**Using Technology in Self-Monitoring of Students with ASD**

Technology is a tool that is used in most classrooms today. Technology applications, such as video modeling, computerized presentation, are popularly used with students with ASD to meet their sensory needs. The feature of technology including animation, pictorial images and sound effects may attract these students (Blood et. al., 2011). Using technology such as video, computer and mobile devices has been found in combination with the self-monitoring process in behavior management in class, especially the video images as models were the most popularly applied in self-monitoring (Coyle & Cole, 2004, Gelbar et. al. 2011).

**Video Modeling**

Video modeling refers to a video demonstration of an appropriate behavior such as attending and on-task. Video images serve as models were found in the previous research. In Coyle and Cole's study (2004), three male students with ASD participated. The first student was 11 years old; the other two were 9. All three students attended special education classes. They watched a video entitled "Working Very Well". This video showed the participating students working on classroom tasks and presenting desired behaviors. Picture cards were placed at the top of their desk to keep their attention. During the self-monitoring process, the students were given the self-monitoring materials and prompted to work for 10-15 minutes. When the timer reached 30 seconds, students were required to hit the stop button on the timer and self-record

"working" or "not-working". Their positive behaviors were reinforced with popcorn and stickers. The results showed that all students increased their on-task behavior, but after the intervention was complete without the video and picture cards, their on-task behavior decreased (Coyle & Cole, 2004). It seems that self-monitoring is effective for students to learn especially for those with ASD, because video modeling can provide an appropriate behavior for their imitation. Unfortunately, the intervention was not successful in having the student retain on-task behaviors when the videos were withdrawn.

Further, video modeling was used with two male elementary students to learn social skills in Gelbar, et. al.'s study (2011). The participating students were video taped their role-playing of positive social interactions with peers. Their performance was recorded to a video segment with 3-minute demonstration. Subsequently, the participants watched the video for 10 minutes before each class. All students learned the skills of social interactions shown in the video. Their social interactions increased from 0-1 to 4-5. It appears that video modeling is a positive strategy for elementary students to learn social skills. At the same time, these students reduced tantrums in the classroom by watching the videos presenting the appropriate behavior (Gelbar et. al., 2011).

Both studies by Gelbar et. al. (2011) and Coyle and Cole (2004) demonstrated that video-modeling is a positive intervention for students with ASD. Coyle and Cole used a simple checklist for the students to record their self-monitoring after watching the video of appropriate behavior, while Gelbar et. al. used the video to present the positive interactions as a model for students to watch and learn.

**Mobile Devices**

Mobile device refers to handheld electronic equipment, such as an iPod, iPad, or iPhone. To date, it is popular to use a mobile device in school and at home. Using such a device is found to reduce the amount of assistance or prompts given by the teacher (Blood et. al., 2001). Further, handheld devices are easy for students to carry in all settings such as home, school, and the community (Cihak, Wright & Ayres, 2010).

Blood et. al. (2011) conducted a study to examine the effectiveness of video-modeling using a handheld device, iPod. There was one participant, a 10-year-old 5th grader with ASD who showed difficulties with impulse control and presented disruptive behaviors such as dancing and waving his arms around, talking without permission, or using inappropriate language. A video to teach the student to identify his own on and off task behaviors included images of his performing classroom tasks was shown in a 30 seconds in a semi-random order. The student was taught to identify between on-task, "doing his work" and off-task "not doing his work". He was directed to watch a four-minute video segment, of which two peers were modeling the class rules and expectations together with audio and verbal statements about the desired behaviors being demonstrated. Using an iPod, the student would view the video 5 minutes before each math class. During class, a timer used on the iPod was set for a 30 second loop. Once the timer reached 30 seconds, the student would self-monitor his on-task and off-task behaviors. He was prompted to check the box for "doing my work" or "not doing my work". The results showed a positive effect on the targeted on-task behaviors. The classroom teacher reported that the intervention successfully improved the student's behaviors (Blood et. al, 2001).

In another study conducted by Cihak et. al. (2010), a handheld computer was used to deliver self-modeling picture prompts. Three male middle school students, two aged 11 and one aged 13, participated. All showed difficulty with attending to tasks. Photos of the students' self-modeling of task engagement were taken. These pictures included writing, reading, and watching and listening to their teacher. All pictures were integrated into a PowerPoint presentation that was uploaded onto a handheld computer. Self-monitoring was done on a 3 x 5 index card with 10 numbered "yes" and "no" responses. During the class, the handheld computer was on the students' desk. Every 30 seconds, the pictures were presented and repeated throughout the class period. When the self-modeled picture was shown, the students were required to record a "yes" if task engagement was demonstrated, and "no" if not. This procedure took three weeks for the students to learn until 90% accuracy was reached. Results showed that the students increased their attention and on-task behavior.

Both studies showed that using a handheld device had a positive impact on student's behavior. Blood et. al. (2010) used the mobile device for video presentations of appropriate behaviors, while Cihak et. al. (2010) used a device for picture demonstrations. It seems that such a device has potential for student self-monitoring and learning appropriate behaviors.

**Summary**

Reviewing the research, it is found that self-monitoring process has a positive impact on students with ASD for their behavior. This process has been reinforced in recent studies when technology is involved, such as video modeling, computerized presentations, and mobile devices, to replace the traditional way of using paper and

pencil to mark behavior occurrences on a sheet or checklist. It is also found that

research was focused on students with high-functioning ASD, only one by Coyle and

Cole (2004) was conducted with students with a low cognitive ability and significantly

below grade level. In addition, mobile devices, an iPod was used as an example in the

study, while other handheld equipment may need to be considered, for example, an

iPad. This present study will investigate how students with low-functioning ASD use an

iPad in the self- monitoring process to manage their own behaviors

# Chapter 3

## Method

### Setting

**School.** The study was conducted in a school for children with special needs located in a suburban area of Southern New Jersey. The current school building was renovated in 2006 to accommodate the student population ranging in ages of 3 – 21 with a variety of disabilities including but not limited to Autism, Multiple Disabilities, Medically Fragile, and moderate to severe Cognitive Impairment.

**Classroom.** The study was conducted in a $4^{th}$ – $7^{th}$ grade classroom for students with Autism Spectrum Disorder (ASD). There were 6 students, one teacher and three instructional assistants in the classroom. The teacher has had 3 years teaching experience as she delivered the entire instruction with instructional assistants to support the students in class activities.

### Participants

**Students.** Four students, 1 boy and 3 girls, were classified with ASD following the state code of eligibility standards, participated in the study. Each student has an IEP developed based on their educational needs. Table 1 presents the general information of the participants.

Table 1

*General Information of the Participants*

| Student | Age | Grade | IQ | KTEA II Scores |
|---------|-----|-------|-----|----------------|
| Student A | 11 | 6 | 50 | 27 |
| Student B | 10 | 4 | 57 | 16 |

Table 1 (continued)

| Student | Age | Grade | IQ | KTEA II Scores |
|---------|-----|-------|-----|----------------|
| Student C | 10 | 5 | 59 | 5 |
| Student D | 12 | 6 | N/A | 4 |

Note: KTEA: Kaufman Test of Educational Achievement, 2nd Edition, 2005. The reading subtest was provided and the mean score is 100.

***Student A.*** Student A was diagnosed with ASD when she was in 1$^{st}$ grade. This girl is generally a well-attending to the instruction but at times becomes distracted if she sees other students are not in their seats. She becomes easily distracted especially when other students have behavior problems, such as a tantrum. For example, when something happens in class, she will leave her seat and begin to wander around the room. If she goes to throw out trash, she will become curious and go around to see what others are doing.

***Student B.*** Student B was diagnosed with ASD when she was in kindergarten. This girl is very distractible, looking at the walls or ceiling and turning around while the teacher is at the front of the room. It often takes more than one request to get her to attend to the task at hand, even when she is given a request. Usually, it will take a moment for her to start her assignment.

***Student C.*** Student C was diagnosed with ASD when she was in 1$^{st}$ grade. During class, this girl often looks at the ceiling, the wall and plays with her fingers on the table. She needs more than one redirection command for her to look at the teacher. This girl is not able to attend to the task immediately when the teacher's direction is given.

**Student D.** Student D was diagnosed with ASD when he was 4. This 12-year-old boy is energetic, but restless and impulsive and many times he is out of seat in class. It seems hard for him to control his behavior to stay in his seat, which makes it disruptive to others in class.

**Teacher.** The special education teacher taught all students in the language arts class. She was in her third year of teaching students with disabilities but it was her first year working with students with ASD.

**Instructional assistants.** Three instructional assistants were in the classroom. Each assisted the teacher with observations and student behavior recording.

**Materials**

**Instructional materials.**

***"Choiceworks".*** "Choiceworks" is an app available in the iTunes store on any Apple device. It is developed to help students complete daily routines, understand and control their feelings and improve their waiting skills. It can be used in the classroom, at home and in the community. There are three boards presented in this App including, schedules, waiting and feelings. In this study, "Choiceworks" was used in the classroom and the "Schedule" board was modified to include individual student's image and voice recorded. Three tasks were incorporated and posted on the screen with the student's self-image of the appropriate behavior, e.g. looking at teacher, attending/engaging in assignment, facing forward, and a fourth task for one student, remaining in assigned seat. Each individual 's image was posted using the particular student's picture taken by the iPad's camera feature (See an example in Appendix A). Also a 20-minute interval was posted to remind students of the time for checking their behaviors as self-

monitoring.

**Measurement materials.**

***Observation checklist.*** A checklist was developed by the teacher to record student's behavior. This chart includes 20 minutes divided with 20 1-minute equal intervals. At the sound of the looping timer every 1-minute the instructional assistants would make a ✓ if the behavior occurred and – if the behavior did not occur (See an example in Appendix B).

***Tests.***

***Oral test.*** Flashcards were used as the oral test. Each card contained one sight word.

***Worksheets.*** There were two kinds of worksheets used to evaluate students' reading. One had the six words with 3 lines underneath for the students to write, another had each sight word randomly selected for the students to identify and circle the correct word.

**Procedure**

**Instructional procedure.** Weekly instructional procedures are presented in Table 2.

Table 2

*Instructional Procedure of using the iPad*

| Days | Procedures |
|------|-----------|
| 1 | The on-task behavior was modeled by the teacher using an index card in which one specific behavior was present, such as looking at teacher and listening, facing forward, attending the assignment, staying in seat. Students were required to practice each behavior, and a picture was taken of their appropriate behavior and posted on the their individual iPad screen. |
| 2 | The iPad was introduced and the students were taught on how to touch the screen, move their finger, and record their own behavior. |
| 3 | The students began to use the iPad using the modeled behavior and instruction on how to use to the app. When the timer sounded after 20 minutes  the student would be directed to use the app to self-monitor their behaviors. They would use their finger to drag the icon over to complete the recording. |
| 4 | The students continued to use the iPad to self-monitor their behavior. When the timer sounded after 20 minutes the student would be directed to use the app to record their behaviors. They would use their finger to drag the icon over to complete the recording. |
| 5 | The iPad was still used to self-monitor the students' behaviors. When the timer sounded after 20 minutes the student would be directed to use the app to self-monitor their behaviors. They would use their finger to drag the icon over to complete the recording. |

**Measurement procedure.**

*Observation.* The teacher set a looping timer for 20 minutes with the timer sounding every 1-minute for only the Instructional Assistants to hear. When the timer sounds the Instructional Assistants will make a "√" if the student was performing the task and a " – "if not.

*Tests.*

*Oral test.* Students were shown a series of 6 words on flashcards and asked to sound out each word. The teacher showed the cards individually to the student. The student would get a 5 second of wait time before being asked "What is this word?" If the

student sounded out the word a √ was made on the sheet, if not a – was made. (See an example in Appendix C) Worksheet. Students were given a worksheet with the same 6 words to correctly identify and practice in writing and spelling. The teacher read each word aloud and required each student to find and circle that word one by one for all six words. Then, the students were given a worksheet to practice in copying and writing the words. They were required to name the word and correctly spell the word.

**Research Design**

A single subject research design with ABAB phases was used in this study. During Phase A1, the baseline, students were observed during Language Arts class of 20 minutes when they were assigned to complete an assignment for 5 days. During Phase B1, the first intervention, the students were taught to use "Choiceworks" to watch the posted image and check their own behaviors. The same observations were conducted and the student behaviors were recorded for 15 days. During Phase A2, the second baseline, the iPad was taken away and the students were told that they were not going to be using the iPad. The student behaviors were recorded for 5 days using the same observation checklist. During Phase B2, the second intervention, the iPad was resumed in class, and the same process was conducted for 15 days.

**Data Analysis**

A visual graph with each student's behaviors was presented, as well as means and standard deviation scores presented in a table to compare the difference of each phase.

# Chapter 4

## Results

There were three on task behaviors each student was expected to display: facing

forward, engaging in assignment, and looking at teacher in class. A fourth task was

required in addition to the previous three for one student, Student D: remaining in

assigned seat. All students' behaviors were observed using the interval recording

method and recorded with number of occurrences and converted to percentages from the

number of check marks received in the 20 minute time period.

Table 3

*Percentages of the Behavior Occurrences* (*Facing Forward)*

| Student | Baseline $A_1$ | | Intervention $B_1$ | | Baseline $A_2$ | | Intervention $B_2$ | |
|---------|------|------|-------|------|------|------|-------|------|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| A | 53 | 8.37 | 92.67 | 6.51 | 48 | 5.7 | 91.67 | 5.88 |
| B | 64 | 4.18 | 91.67 | 7.24 | 49 | 2.24 | 92.67 | 4.58 |
| C | 47 | 5.70 | 89.33 | 11 | 50 | 5 | 88.33 | 6.17 |
| D | 37 | 7.58 | 82.67 | 8.63 | 38 | 4.47 | 80.67 | 12.23 |

Table 4

*Percentages of the Behavior Occurrences (Engaging in Assignment)*

| Student | Baseline A$_1$ | | Intervention B$_1$ | | Baseline A$_2$ | | Intervention B$_2$ | |
|---------|------|------|------|------|------|------|------|------|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| A | 42 | 5.7 | 85.33 | 9.9 | 37 | 2.74 | 85.67 | 6.78 |
| B | 42 | 13.51 | 85.67 | 9.98 | 37 | 4.47 | 88 | 4.55 |
| C | 33 | 10.37 | 79 | 15.83 | 34 | 2.24 | 84 | 5.41 |
| D | 13 | 9.08 | 68.33 | 12.91 | 29 | 4.18 | 73.67 | 14.7 |

Table 5

*Percentages of the Behavior Occurrences (Looking at teacher)*

| Student | Baseline A$_1$ | | Intervention B$_1$ | | Baseline A$_2$ | | Intervention B$_2$ | |
|---------|------|------|------|------|------|------|------|------|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| A | 43 | 2.74 | 88 | 8.41 | 41 | 5.48 | 89 | 6.87 |
| B | 53 | 7.58 | 89 | 8.9 | 40 | 6.12 | 90.33 | 4.81 |
| C | 35 | 5 | 83.33 | 14.35 | 41 | 5.48 | 86.67 | 4.88 |
| D | 25 | 7.07 | 73.67 | 11.57 | 35 | 3.54 | 79.67 | 11.57 |

Table 6

*Percentages of the Behavior Occurrences (Remaining in assigned seat)*

| Student | Baseline A$_1$ | | Intervention B$_1$ | | Baseline A$_2$ | | Intervention B$_2$ | |
|---------|------|------|------|------|------|------|------|------|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| D | 33 | 12.04 | 84.67 | 8.55 | 45 | 7.91 | 86 | 8.49 |
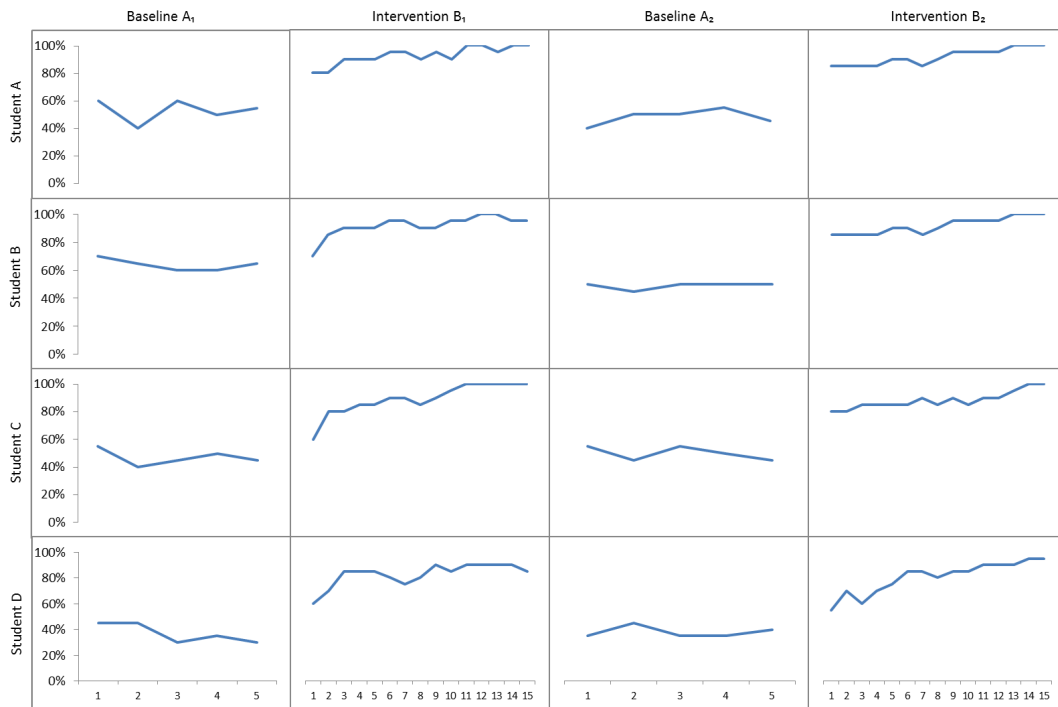
*Figure 1*. Facing Forward. This figure presents the facing forward behavior across phases.
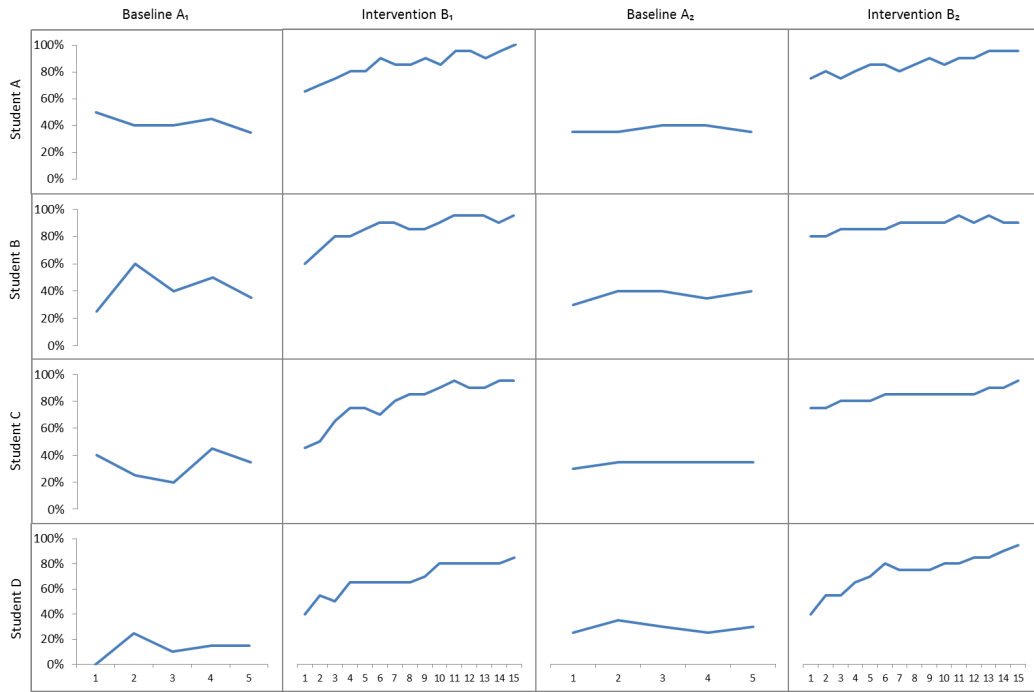
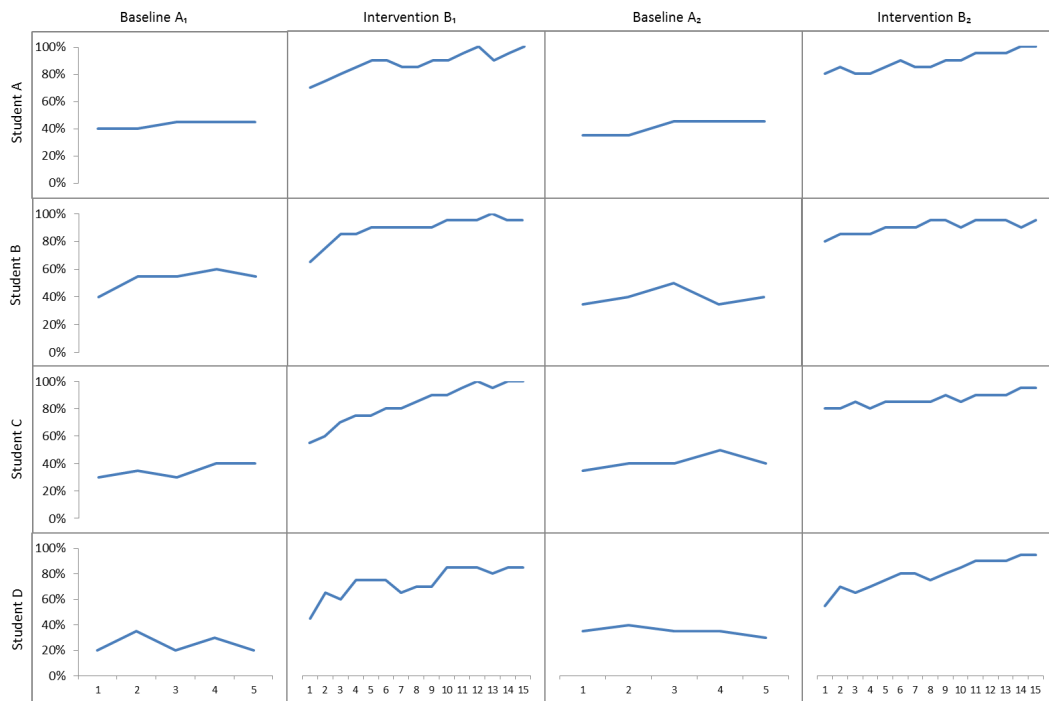*Figure 2.* Engaging in Assignment. Figure 2 presents the attending to assignment behavior across the phases.

*Figure 3.* Looking at Teacher. Figure 3 presents the looking at teacher behavior across the phases.
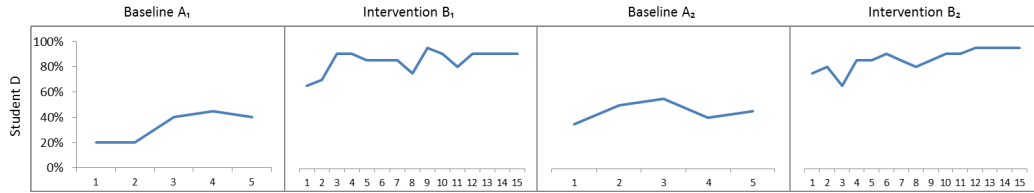
*Figure 4.* Remaining in Assigned Seat. Figure 4 shows the percentages of one student's remaining in seat behavior across the phases.

A teacher made assessment, in which the teacher would use flashcards and have the student say the word on the flashcard, evaluated all students' learning of sight words weekly. The following table shows the percentages of the scores across all phases.

Table 7

*Means of Percentage Scores of Sight Words*

|  | Baseline A$_1$ | Intervention B$_2$ | Baseline A$_2$ | Intervention B$_2$ |
|---|---|---|---|---|
| Student A | 40 | 53 | 53 | 53 |
| Student B | 40 | 46 | 46 | 53 |
| Student C | 40 | 46 | 46 | 53 |
| Student D | 0 | 13 | 13 | 26 |

The students completed a survey at the end of the second intervention. Table 7 presents their responses.

Table 8

*Student Survey Responses*

| Questions | Percentage | Student A | Student B | Student C | Student D |
|---|---|---|---|---|---|
| 1. Did you like to use the iPad? | 100 | yes | yes | yes | yes |
| 2. Did you like to see your picture on the iPad? | 75 | yes | no | yes | yes |
| 3. Did you like to keep track of your behavior? | 50 | no | yes | yes | no |
| 4. Do you want to use the iPad again? | 100 | yes | yes | yes | yes |

All students (100%) showed their preference in using the iPad, and 3 out of 4 (75%) liked to see their own pictures posted on the screen to remind their appropriate behavior, and 2 out of 4 (50%) liked to keep track of their own behaviors, and all (100%) wanted to use the iPad again.

# Chapter 5

## Discussion

The purpose of this study was to determine if students with ASD could effectively use an iPad to successfully self-monitor their on-task behaviors, which would then improve the students' academic performance. Choiceworks app was downloaded on the iPad screen, as well as the individual student's images posted to demonstrate the refined on-task behavior such as facing forward, looking at teacher, engaging in assignment and remaining in an assigned seat, as a model for self-management. Their on-task behaviors were recorded to compare the difference where an iPad was used. The results show that all participating students increased their on-task behaviors.

The first research question asked whether students with ASD would increase their on-task behavior while using an iPad to self-monitor their behavior. Results show the students' on-task behavior increased when the iPad was used in their self-monitoring process. However, when the iPad was taken away, their on-task behavior dropped, and increased again when the iPad resumed. For example, Student A's mean of the occurrences of looking at teacher during the baseline was 43% and increased to 88% in the intervention. Student B's was 53% and increased to 89% during the intervention.

Student C's was 35% and increased to 83.33% during the intervention. Student D's was 25% and increased to 73.67% during the intervention. In addition, their behavior of engaging in assignment was increased too. For example, Student A's mean of occurrences during the baseline was 42% and increased to 85.33% during the

intervention. Student B's baseline was 42% and increased to 85.67% in the intervention. Student C's was 33% and increased to 79% during the intervention. Student D's was 13% and increased to 68.33% during the intervention. The students' behavior of facing forward also increased while using the iPad. For example, Student A's mean of the occurrences during the baseline was 53% and increased to 92.67% during the intervention. Student B's was 64% and increased to 91.67% during the intervention. Student C's baseline was 47% and increased to 89.33%. Student D's was 37% and increased to 82.67% during the intervention. There was one student who had one additional on-task behavior to self-monitor, remaining in his assigned seat. This student's mean of the occurrences of remaining in assigned seat during the baseline was 33% and increased to 84.67% during the intervention.

These findings correlate with those of Holifield's study (2011) to support the self- monitoring process allowing students with ASD to record their own behaviors in order to enhance their on-task behaviors. While the recording method in Holifield's study (2011) was using paper sheets and pencils, iPads were used to replace the traditional paper and pencil in this study. Cihak's study (2010) provided a handheld device, such as an iPod, increased the on-task behaviors of students with ASD. Instead of using an iPod, this study used an iPad as the handheld device for the students to self-monitor their own behavior by watching their own images on the screen as a model to perform the tasks.

The second research question asked whether students with ASD would increase their scores in learning sight words while their on-task behavior increased. It is asserted that because of their increased on-task behavior, students were paying more attention in

learning, which enhanced to improve their sight word retention. Although their scores increased slightly, it was not as much of an improvement as anticipated. This study tried to link two areas, behavior and academic learning, but much needs to be done to improve their academic performance. It seems that their increased scores have reflected positively in their academic work, though the increase was slight. Over time, an additional academic intervention could increase the scores even more.

Reviewing research on self-monitoring for students with ASD, it is found that most studies were focused on behavior changes only, not many were presented to address their academic performance. This area needs to be explored in future research to support these students in both behavioral and academic performance.

**Limitations**

Despite positive results of this present study, there are some limitations. For example, limited sample size of 4 students from one classroom may impact the results. If more students from multiple classrooms were able to participate, a broader view of the data would be helpful to strengthen the findings. During the study, state testing was being conducted. Students were being pulled in and out of the classroom, which might be distracting. The scheduled time for the observations were changed because of the testing, which might impact the consistence of the data collection. If the data was collected each day at the same time, the results might have shown more of an increase in the on-task behavior has well as the students' academic performance.

**Implications**

The challenging behavior that students with ASD exhibit, impact their ability to learn. This study presented a new pathway for teachers. Using technology based self-

monitoring to increase their on-task behaviors creates another avenue for special education teachers. A handheld device is available to incorporate a self-monitoring process with an iPad, school administrators may consider using such a technology device to support teachers and students in classrooms.

**Conclusion**

This study showed that students with ASD are able to improve their on-task behaviors by using a self-monitoring system on an iPad. The iPad app downloaded together with individual images posted seems to keep the students' attention and encourage them to be aware of their own behaviors. As a result, they learned and improved their on-task behaviors. Using technology may provide a new path for these students with ASD to learn self-monitoring process to improve their on-task behaviors

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**Appendix A**

**Choiceworks App**

# Appendix B

## Observation Chart

Student Name: _____     Date: _____

| Looking at Teacher |
|---|

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |    |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|   |   |   |   |   |   |   |   |   |    |

A ✓ will be made if the student performs the  task.
A – will be made if the student does not perform the task.

| Attending/Engaging in Assignment |
|---|

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |    |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|   |   |   |   |   |   |   |   |   |    |

A ✓ will be made if the student performs the  task.
A – will be made if the student does not perform the task.

| Facing Forward |
|---|

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |    |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|   |   |   |   |   |   |   |   |   |    |

A ✓ will be made if the student performs the  task.
A – will be made if the student does not perform the task.

**Appendix C**

**Sight Word Checklist**

Student Name: _____

Word Week: _____

The student will be asked to say the word on the card.

A ✔ will be made if the student knows the word.

A – will be made if the student does not know the word.

| Sight Word | Date | Date | Date | Date | Date |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Name: _____

1. Did you like to use the iPad?

    YES            NO

2. Did you like to see your picture on the iPad?

    YES            NO

3. Did you like to keep track of your behavior?

    YES            NO

4. Do you want to use the iPad again?

    YES            NO