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The Effect of Web-Based Self-Monitoring, I-Connect, to Increase On-Task Behavior of High School Students with Autism

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THE EFFECT OF WEB-BASED SELF-MONITORING, I-CONNECT, TO INCREASE ON-TASK BEHAVIOR OF HIGH SCHOOL STUDENTS WITH AUTISM

A Master's Thesis

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In Partial Fulfillment

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Master of Science in Education, Special Education

By

Sara Katherine Romans

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ABSTRACT

Individuals with Autism Spectrum Disorders (ASD) often demonstrate behaviors that impair their school experiences. Therefore, the implementation of research-based strategies that will foster success for students with ASD is critical. Moreover, individuals with ASD experience greater challenges transitioning from high school to post-secondary opportunities, including higher education, employment, and independent living. The purpose of this study was to investigate the effect of a web-based program designed to increase student engagement and academic gains through the use of the I-Connect self-monitoring application installed on a mobile device in a high school setting. An ABAB withdrawal design was employed with two high school students diagnosed with ASD to evaluate the effectiveness of the I-Connect self-monitoring system on their on-task behaviors and academic performance. In the results of this intervention, Participant One increased his on-task behaviors from 47% to 100% and academic accuracy from 20% to 98%. Participant Two increased his on-task behaviors from 47% to 94% and academic accuracy from 51% to 73%.

KEYWORDS: autism, on-task behavior, self-monitoring, i-connect, high school students

This abstract is approved as to form and content

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CHAPTER I: INTRODUCTION

Individuals with Autism Spectrum Disorders (ASD) often demonstrate behaviors that can negatively impact their learning processes and school experiences. Included with these difficulties are impairments in speech, non-verbal communication, social interaction, repetitive and resistance to change, motor coordination, skills and interest, and school experiences (Wing, 1981). The implementation of evidence-based practices is critical to foster success for students with ASD (Simpson, 2005). Individuals with ASD face great challenges in their transition from high school to post-secondary opportunities, including education, jobs, and independent living (Hendricks, 2010; Lee & Carter, 2012; Müller, Schuler, Burton, & Yates, 2003; Taylor and Seltzer, 2010; Wagner, Newman, Cameto, Garza, & Levine, 2005).

One evidence-based practice that has proven to be effective with students with ASD is the utilization of self-monitoring programs to help increase on-task behaviors (Briere III & Simonsen, 2011; Carr, Moore, & Anderson, 2014; Dalton, Martella, & Marchand-Martella, 1999; Prater, Hogan, & Miller, 1992). More recently, self-monitoring programs have used technology as a more socially acceptable and efficient tool to help increase on-task behaviors (Amato-Zech, Hoff, & Doepke, 2006; Boswell, Knight, & Spriggs, 2013; Bruhn, McDaniel, & Kreigh, 2015; Legge et al., 2010).

Recent research has investigated the effect of I-Connect, a self-monitoring application installed on an electronic device, to help students with ASD and other disabilities monitor their behaviors (Beckman, 2015; Clemons, Mason, Garrison-Kane, &

Wills, 2015; Crutchfield, Mason, Chambers, Wills, & Mason, 2015; Rosenbloom, Mason, Wills, & Mason, 2015; Wills & Mason, 2014).

Purpose of the Study

The purpose of this study was to investigate the effect of a web-based program designed to increase student engagement and academic gains through the use of the I-Connect, a self-monitoring application installed on a mobile device, for two high school students with autism. A visual prompt was displayed on each participant's screen every 30 s with a prompted question of "Are you on task?" with a binary yes/no option as a response. The results of this study were expected to demonstrate improvements in on-task behavior and academic achievement using I-Connect, further support existing literature (Beckman, 2015; Clemons et al., 2015; Crutchfield et al., 2015; Rosenbloom et al., 2015; Wills & Mason, 2014).

Significance of the Study

Previous results have shown that student-oriented self-monitoring programs take less time for teachers to implement and helps to decrease problem behaviors (Rock & Thead, 2007). Giving high school students with ASD the opportunity to practice self-monitoring on-task behaviors could help prepare them for successful employment.

Additionally, the expected positive outcome of this study would better prepare participants for a successful transition into any post-secondary education they may choose to attend by helping them establish a habit of engaging in on-task behavior to help with time management and task completion.

Research Questions

In order to investigate a relationship between the use of I-Connect as a self-monitoring program and on-task behavior, two research questions were assessed.

1. What is the effect of a web-based self-monitoring system on the on-task behavior for high school students with autism?
2. To what extent does I-Connect increase the level of academic acquisition in the areas of math and written expression?

Research Hypothesis

It was hypothesized that the use of I-Connect, a web-based self-monitoring system, would increase the on-task behavior of high school students with autism. As a result, it was also hypothesized that levels of academic acquisition would increase in the areas of math and written expression.

Research Design

A single-subject ABAB withdrawal design (Kazdin, 2011) was used to assess the research questions for this study. This design was selected to evaluate the effectiveness of the I-Connect self-monitoring system on the on-task behavior and academic achievement of high school students with autism.

In order to demonstrate a functional relationship between the I-Connect self-monitoring system and on-task behavior, the baseline condition (A phase) and I-Connect self-monitoring intervention condition (B phase) were alternated. A functional relationship was determined if there was an improvement from baseline (A1) performance to the performance in the first intervention (B1) condition, and a decrease in

performance in the return to baseline condition (A2), and an increase again in performance in the return to intervention (B2) condition.

Social Validity

Students with ASD may engage in off-task behaviors that can result in disruptions to their learning and productivity. This may also limit their ability to experience success within classroom settings, as well as present challenges maintaining a job in the future. With appropriate and effective supports, individuals with ASD can successfully self-monitor their on-task behaviors to improve their focus, which may also result in academic achievements (Bruhn & Watt, 2012). The use of technology can assist with self-monitoring procedures by providing efficient and discreet methods of monitoring behavior (Legge et al., 2010; Wills & Mason, 2014). Implementing a self-monitoring intervention can help increase socially appropriate behaviors, as well as productivity in individuals with ASD (Bruhn et al., 2015; Carr, Moore, & Anderson, 2014)

CHAPTER II: REVIEW OF RELATED LITERATURE

Autism Spectrum Disorders

Autism is a neurological disorder that results in social and behavioral deficits, and, according to the most recent data released by the Centers for Disease Control (CDC), ASD is now diagnosed in approximately 1 in 68 children (2012).

Leo Kanner is considered to be a pioneer researcher in the area of Autism Spectrum Disorders. He conducted one of the most significant studies in the identification of ASD in 1943. In his study, he collected in-depth qualitative data and observational information of 11 children with aberrant behaviors. He reviewed social, behavioral, and health information of 11 children to identify "individual differences in the degree of their disturbance, the manifestation of specific features, the family constellation, and the step-by-step development in the course of years (Kanner, 1943, p. 241-42)." The results of this study revealed a common characteristic of social and communication deficits, such as echolalia, an inability to generalize words with different connotations, and a lack of ability to formulate communicational initiations and responses to social and verbal situations. Kanner, who many consider the father of childhood psychology and was one of the first to introduce the label of autism, helped set the stage for future studies in Autism Spectrum Disorders.

Common characteristics associated with ASD were explained by Lorna Wing (1981) and include impairments in speech, non-verbal communication, social interaction, repetitive and resistance to change, motor coordination, skills and interest, and school experiences. The school experiences impairment is supplemental to the social and

communication impairments as well as the specific skill strengths and deficits. Those impairments can have an adverse effect on the student's involvement with and acceptance by peers, though some are fortunate to attend schools in which they are more accepted and respected for their unique abilities (Wing, 1981). Wing also suggested a few additional components in the developmental history that were not noted by Hans Asperger, some of which can be identified through appropriate questioning of parents. The first year of a child's life may have consisted of lack of normal interest and pleasure of other people that is typically present from birth. Additionally, the child may not have drawn attention to environmental events and interests to share with others. Overall, the lack of intensity in communication, movement, facial expressions, laughter, and eventually speech can serve as red flags for a child with ASD as opposed to a child with typical development (Wing, 1981). These factors are important to consider when developing plans for education and ensuring that the child receives effective and appropriate education.

Simpson (2005) found that with a variety of recent educational reforms and reorganizational efforts, there has been a greater emphasis on using effective and evidence-based practices with students with ASD. In particular, the No Child Left Behind Act (NCLB) of 2001 was an attempt by the United States Congress to ensure that all children had access to an equal opportunity to receive a high-quality education and minimally meet proficiency on state assessments. The expectation for significant progress has sparked intense debate, but a general agreement still exists that it is important and critical to improve students' performance. Accordingly, there is a need beyond NCLB to ensure that all students, especially those with autism, are receiving interventions and

practices that are research-based. Included in these practices are applied behavior analysis, discrete-trial teaching, pivotal response training, Picture Exchange Communication System (PECS), incidental teaching, structured teaching, augmentative alternative communication, assistive technology, and joint-action routines. Because students with ASD have a poorer prognosis compared to other students with disabilities, it is critical for them to receive consistent evidence-based instruction and interventions (Simpson, 2005).

Autism Spectrum Disorders Manifested in the Secondary School Setting

High school often consists of less consistent, less organized structure throughout the various environments – hallways, classrooms, lunch, etc. – that are difficult for many adolescents to effectively manage. When an ASD is present, the challenges faced can be even greater than that of a typically developing teenager.

Hedges, Kirby, Sreckovic, Kucharczyk, Hume, and Pace (2014) argued that many general education teachers have a large number of students with Individualized Education Plans (IEPs) in their classes, making it difficult to effectively meet all of their needs. The expectation becomes higher for students with ASD to be more independent in their academic functioning and organizational skills.

Effect on Transition into Post-Secondary Options

There has been a disappointing pattern in low numbers of competitive employment or enrollment in post-secondary education following high school completion for individuals with ASD. Even among the small number of those who have obtained

employment, many of them still do not work full time, receive satisfactory pay, or receive benefits that are often included in many jobs (Lee & Carter, 2012). In fact, groundbreaking research from the Special Education Elementary Longitudinal Study (SEELS) found that students with ASD had the lowest employment, advocacy, and social outcomes in post-secondary living (Wagner et al., 2005).

Taylor and Seltzer (2010) found that the pattern of underemployment for young adults with ASD remains consistent with previous trends, if not greater. They also suggested a high likelihood that there is a group of adolescents with ASD that are not quite severe enough to receive adult day services but too severe to function independently. According to Taylor and Seltzer, those individuals were falling through the cracks, which they suggested could correlate with the developmental service system appearing to fail to accommodate individual needs of individuals with ASD who do not have an Intellectual Disability. It is critical to teach students with ASD the necessary skills for a successful transition, including teaching them how to better monitor and manage their on-task behaviors to efficiently complete tasks given to them both at school and work.

Individuals with ASD often have many strengths and positive traits to offer to their local communities. However, many communities lack the necessary tools and resources to assist with the transition process, leaving individuals with ASD little to no opportunity to gain employment, attend post-secondary education, or live as independently as is appropriate per individual. With proper training and practice, many individuals with ASD have the ability to perform duties at places of employment with

little to no necessary accommodations, the ability to navigate the community and stores independently, and the ability to live fully or semi-independently.

Many individuals with Asperger Syndrome refer to previous work experience in negative terms for a combination of reasons, including a poor job match, insufficient time provided to learn a new task, low level of tolerance for variations in the work environment, and communication deficits that made it difficult to interact and communicate appropriately with co-workers and supervisors. These previous failures in vocation placements can result in feelings of depression, low self-esteem, and frustration when they cannot provide for themselves or families (Müller et al., 2003). This further supports the need for pre-vocational training starting in high school or earlier in order to promote future job success, which would include better management of on-task behaviors.

Some symptoms associated with ASD include difficulty with social interactions, expressive and receptive communication, and limited ability in problem solving, all of which are necessary skills when on the job (Taylor & Seltzer, 2010). When students with disabilities receive the opportunity to acquire self-determined behaviors such as choice making, problem solving, goal setting, and self-advocacy, their chances of success in adulthood is much greater (Sayman, 2015). One study investigated the college experience for individuals with high-functioning ASD (Cai & Richdale, 2015). Reports from the college students with ASD included that while they felt that their educational needs were being addressed, they did not feel that they were getting the social supports that they needed. Additionally, the authors stated that executive functioning skills such as organization, time management, and attention were common challenges the students

faced, largely contributing to their difficulties in college. This study emphasized the need for these skills to be addressed earlier on to better prepare these students for a successful college experience (Cai & Richdale, 2015).

Students with ASD should be provided with opportunities to practice and further develop self-determination skills that would be utilized in the environments they need them (Carter, Lane, Pierson, & Stang, 2008). Self-determination manifests itself in the lives of individuals with ASD in ways such as self-awareness, decision making, self-management, and self-regulation (Carter et al., 2008; Wehmeyer et al., 2010), all of which could be increased through the use of a self-monitoring system to enhance awareness and engagement in on-task behaviors. In order to obtain and maintain a job, learning time management and other job skills is essential (Hendricks, 2010; Müller et al., 2003). Learning to better manage on-task behaviors would help individuals with ASD in their acquisition of self-determined behaviors to increase likelihood of success.

The Utilization of Visual Supports for Students with Autism

Research has suggested the use of visual supports to be an effective strategy to supplement instruction and activities for individuals with ASD. More specifically, the use of an electronic device such as a smart phone or similar handheld device has recently developed into a more socially acceptable and readily available selection for providing visual supports for individuals with ASD in school and in the community. Using technology may also help decrease the possibility of error from teacher or paraprofessional through the consistency and systematic programming of visual prompts (Bereznak, Ayres, Mechling, & Alexander, 2012).

Focus has recently shifted from language-based instruction to visually cued supports for children with ASD as they help them focus, manage transitions, accept changes in routine, and follow procedures (Quill, 1995). Visual cues can help to increase independence and competence by allowing the individual to become less reliant on adult directives.

The use of visual supports was investigated by Dettmer, Simpson, Myles, and Ganz (2000) with two young boys with autism, both of which had difficulty transitioning between activities. Various visual supports including visual schedules, timers, and routines were given to the participants during intervention. Results from this study showed a decrease in latency for transitions between activities and an overall improvement in their ability to transition with fewer problems. For one participant, his average time spent transitioning between activities decreased from 6.2 min during baseline to 1.2 min during intervention. For the other participant, his average time spent transitioning decreased from 2.5 min during baseline to 0.7 min during intervention (Dettmer et al., 2000). These results demonstrate the positive effect of visual supports for individuals with autism.

The Utilization of Self-Monitoring with Individuals with Autism

Self-monitoring is a strategy used to help individuals identify and have better management of their behaviors. With self-monitoring, the individual is taught to be aware of his or her behavior and be able to record if they demonstrated the desired behavior (Bruhn & Watt, 2012). Freeman and Dexter-Mazza (2004) suggested that a likely essential supplement to self-monitoring is behavior-specific praise and feedback. This

was found through the results of a study using an ABCBC design (Kazdin, 2011) that compared self-monitoring by itself and self-monitoring with adult feedback. The provision of adult feedback helped the self-monitoring system to be more effective.

Self-monitoring programs can be very beneficial for the selected students and as a result, beneficial for those who work with them through an increase in positive behaviors. Dalton, Martella, and Marchand-Martella (1999) implemented a self-monitoring system for two adolescent male students whose off-task behaviors were severe and frequent enough that teachers were requesting them to be placed in other classes. After implementation of the self-monitoring intervention, both students' off-task behaviors decreased to an average of 17% and 10%, respectively. The teachers reported four benefits of self-monitoring: decrease in off-task behavior, increase in time efficiency, improvements in academic performance and work productivity, and an increase in additional desirable behaviors other than on-task behaviors. Not only is self-monitoring beneficial for students, but it can also be beneficial for teachers who work with them. When students effectively self-monitor their behaviors, it allows the teachers to spend more time teaching and less time managing problem behaviors (Rosenbaum & Drabman, 1979).

A self-monitoring intervention was implemented with at-risk middle school students to compare functionally relevant and non-relevant replacement behaviors. This intervention resulted in a larger decrease in off-task behavior when the functionally relevant intervention was implemented than when a functionally non-relevant intervention was implemented (Briere III & Simonsen, 2011). The self-monitoring sheet

aligned with the school's expectations, and students used a vibrating timer to ensure that they rated their behavior every five minutes.

A meta-analysis of self-management conducted by Carr, Moore, and Anderson (2014) noted that self-monitoring continues to be an effective behavior management strategy for students with autism. Results from 14 students across five studies indicated a reduction in problem behaviors, a direct result of self-management interventions. Included in these results were students who were taught to self-manage organization skills (Dorminy, Luscre, & Gast, 2009), attending to a task (Holifield, Goodman, Hazelkorn, & Heflin, 2010), communication skills (Koegel & Frea, 1993), social skills (Koegel, Koegel, Hurley, & Frea, 1992), and following schedules (Newman, Buffington, O'Grady, McDonald, Poulson, & Hemmes, 1995). In addition to self-monitoring, goal setting was also utilized within intervention packages and suggested to be an effective component of self-regulation. The use of goal setting was further validated in a study conducted by Bruhn and colleagues (2015) in which one of the participants identified her favorite part of the self-monitoring program was developing and achieving goals. This qualitative data further supports including goal setting in self-monitoring interventions (Bruhn et al., 2015). Previous studies (Dalton et al., 1999; Rosenbaum & Drabman, 1979) lacked findings regarding the effect of self-monitoring on academic performance, but more recent studies have shown that self-monitoring is a highly effective intervention for increasing both positive behaviors and academic skills (Asaro-Saddler & Saddler, 2010; Bruhn & Watt, 2012; Bruhn et al., 2015; Briere III & Simonsen, 2011; Holifield et al., 2010; Legge et al., 2010; Lienemann & Reid, 2008).

Self-Monitoring Utilizing Technology

Recent research has increasingly included the use of technology as an effective tool in self-monitoring interventions (Beckman, 2015; Boswell et al., 2013; Clemons et al., 2015; Crutchfield et al., 2015; Ganz, Heath, Davis, & Vannest, 2013; Legge et al., 2010; Rosenbloom et al., 2015; Wills & Mason, 2014). Bruhn, Vogelgesang, Schabilion, Waller, and Fernando (2015) conducted a study with two middle school students who demonstrated off-task behaviors to determine the effect of a self-monitoring program through the use of an application called SCORE IT installed on an iPad. Students were taught to navigate through the SCORE IT application and select an activity to rate, score based on meeting expectations, view scoreboard, and view graph progress for the week. The teacher then followed this same procedure and provided feedback once complete. Feedback was given in the form of behavior-specific praise, corrective feedback, or guidelines for future behavior. Improvements in academic engagement and decreases in disruptive behaviors were observed. The results of this study are promising for future research utilizing technology in increasing positive behaviors for students of varying abilities.

Self-monitoring utilizing technology has also proven to be effective for individuals with ASD (Legge et al., 2010). Legge and colleagues conducted a study with a pager-like device called a MotivAider®, which was clipped onto the waistband of three students diagnosed with ASD. The MotivAider® device was set to vibrate at fixed 2-minute intervals in the beginning of the study, then faded to 4-minute to 10-minute intervals towards the end. When the MotivAider® vibrated, the student recorded whether he or she was on- or off-task at that moment in time. Results for all three students

demonstrated immediate increases in on-task behavior for the students. One participant's on-task behavior increased from an average of 26% to 91%, another participant's average increased from 53% to 98%, and the final participant's on-task behavior increased from an average of 77% to 97%, all ranging consistently between 80%-100% on-task during intervention (Legge et al., 2010).

Additional noteworthy studies have been conducted on the use of the MotivAider® to increase on-task behavior for students with various learning disabilities (Amato-Zech et al., 2006; Boswell et al., 2013). Amato-Zech and colleagues (2006) used the MotivAider® to increase on-task behaviors for three elementary students in a special education classroom. Two students had speech and language impairments and specific learning disabilities. The third student had an emotional disturbance and speech and language impairment. The students demonstrated substantial increases in on-task behavior from a baseline of 55% to 90% of the time spent on-task during observed intervals. The authors noted the time-efficiency of the MotivAider®, as a positive factor for implementation in the school setting (Amato-Zech et al., 2006).

In a more recent study that involved the use of the MotivAider® following an ABAB withdrawal design, Boswell and colleagues (2013) also found an increase in on-task behavior for a middle school student with a moderate intellectual disability. The student's on-task behaviors increased from baseline levels of 29% (A1) and 33% (A2) to 88% (B1) and 100% (B2), respectively, showing a strong positive effect of the MotivAider® on increasing on-task behavior. In addition to increased levels of on-task behaviors, the student also made gains in math fluency. These results further support

existing data that self-monitoring programs utilizing technology can improve on-task behaviors and academic achievement for students with disabilities (Boswell et al.).

Recent studies have utilized other methods of technology for self-monitoring programs, including the I-Connect application developed by Howard Wills and colleagues at The University of Kansas. In a pilot study, Wills and Mason (2014) used the I-Connect application installed on a Samsung Galaxy device with adolescent male students receiving special education services who had difficulties staying on-task. The web-based intervention was used to teach students to self-monitor their behavior in effort to increase on-task behavior. One of the participants, a 15-year-old male with specific learning disabilities, ADHD, a mood disorder, and anxiety, had increases of average on-task behavior levels from 51% during baseline to 95% following intervention. The second participant, a 14-year-old male with ADHD, had increases in average on-task behavior levels from 18% during baseline to 88% following intervention. The results showed that the I-Connect application was effective in increasing on-task behavior, though further research is needed in generalization of on-task behaviors into other environments.

Other I-Connect studies that followed the pilot study also resulted in increases of on-task behavior or decreases in disruptive behavior. Crutchfield et al. (2015) examined the effect of I-Connect on stereotypic behaviors of two 14-year-old students with ASD using an ABAB reversal design with an embedded multiple baseline design across participants. Results found that both participants decreased from an average baseline range of 60-100% of intervals in which they engaged in stereotypy behaviors to an average of 40% during intervention.

Clemons et al. (2015) investigated the effect of I-Connect on on-task behaviors of three high school students with ASD and other developmental disabilities using an ABAB reversal design. From baseline (A1) to the first intervention phase (B1), Participant One's on-task behavior increased from an average of 45% to 92%, Participant Two's on-task behavior increased from an average of 58% to 97.4%, and Participant Three's on-task behavior increased from an average of 35.6% to 92%. Beckman (2015) also investigated the effect of I-Connect on on-task behavior for two upper elementary students with ASD using an ABAB reversal design. From baseline (A1) to the first intervention phase (B1), Participant One's on-task behavior increased from an average of 40.6% to 95% and Participant Two's on-task behavior increased from an average of 9% to 91.8%. The results from all of these studies confirm the successful outcomes through the utilization of I-Connect as part of a behavior intervention method.

Another I-Connect study (Rosenbloom et al., 2015) consisted of utilizing the application to increase on-task behavior and decrease disruptive behavior of a 9-year-old male with high functioning autism. The results of this study found an increase in on-task behavior from baseline (22.45% average on-task) to intervention (83.1% average on-task). Additionally, the student's disruptive behaviors decreased from 41.2 disruptive behaviors per session to no more than 5 disruptive behaviors per session. These results further support the positive impact of the I-Connect self-monitoring program on on-task behaviors and other disruptive behaviors.

The current study investigated the effect of a web-based self-monitoring application, I-Connect, on on-task behaviors for high school students with ASD, an area that has not yet been a primary focus in existing literature with the I-Connect application

(Beckman, 2015; Clemons et al., 2015; Crutchfield et al., 2015; Rosenbloom et al., 2015; Wills & Mason, 2014).

CHAPTER III: METHODOLOGY

Setting

The study was conducted in a rural public high school in southwest Missouri. It was the only high school in the district, with approximately 1,604 students enrolled during the school year the study was conducted. The school district population was approximately 5,390 students, with 35.9% receiving free/reduced lunch and 89.4% white. The percentage of students in the district receiving special education services under an Individualized Education Plan (IEP) was 9.16%.

The study took place in a special education classroom. The special education teacher was the implementer of the study. All students enrolled received special education services under an IEP. Sixteen of 18 students were in this classroom once a day and spent the rest of their time in other regular or special education classes. Most students enrolled in this class qualified for special services under the eligibility category of Emotional Disturbance, Other Health Impairment (most commonly ADHD), Specific Learning Disabilities, or Autism Spectrum Disorder. The time in this class was used for students to receive additional instruction on assignments from other classes and to receive instruction on behavior and transition skills necessary to promote success in the regular education environment and post-secondary opportunities. All students had their own personal laptop provided by the district as part of the high school's adoption of a 1:1 technology initiative. The classroom had flexible seating arrangements available based on student preference and in which position they worked most successfully, including one group table, three independent work tables, and a corner with various bean bags and

cushioned chairs. All group work was done at the group table. Otherwise, students chose their seat based on preference and what best supported their learning. For the purpose of this study, the students were instructed to sit at a specific table where the teacher could video tape the sessions. The students were on an A/B day block schedule.

Participant One, Jacob, had the special education class once every other day for 86 min. The class period he was in started at 8:00 am every other day. It had three other students, a special education teacher, and a student teacher. A paraprofessional was available intermittently depending on the needs in a nearby classroom.

Participant Two, Zane, was enrolled in this class for four of eight of his classes, or twice per day for 86 min each class period. He started and ended each day in this class with two other classes in between. The class period in which he participated in this study occurred at 8:00 am. It had four other students, a special education teacher, and a student teacher. A paraprofessional was available intermittently depending on the needs in a nearby classroom.

Research Approval

A Human Subject Institutional Review Board (IRB) application was submitted prior to the initiation of this study. The Missouri State University IRB approved the study on January 11, 2016 (See Appendix A for Missouri State University State Institutional Approval letter). In addition to IRB approval, principal and parent permission were also received (See Appendices B and C).

Participant Selection

The students selected for this student were enrolled in special education classes and received special education services under an IEP. They both had received a medical diagnosis under the Autism Spectrum Disorder (ASD) category. Both students frequently exhibited off-task behaviors and had transition plans to prepare them for post-secondary opportunities. To best prepare them for post-secondary education or training and/or employment, they were selected for this study to increase on-task behaviors to assist their development as independent, competent individuals in education, employment, and independent living arrangements.

Participants

Pseudonyms were used for both participants in this study. See Table 1 for a visual comparison of the demographics of each participant.

Table 1. Participant Demographics.

Participant	Age	Gender	Grade	Diagnoses	IQ
Participant One	17	M	11	PDD-NOS ADHD Mild ID	69
Participant Two	15	M	9	Asperger's ADHD	106

Note. PDD-NOS = Pervasive Development Disorder Not Otherwise Specified; ADHD = Attention Deficit Hyperactivity Disorder; Mild ID = Mild Intellectual Disability

Participant One. Jacob was a 17-year-old 11th grade student. He qualified for special education services under the eligibility category of Other Health Impairment (OHI) for the following diagnoses: Pervasive Developmental Disorder-Not Otherwise

Specified (PDD-NOS), Attention Deficit Hyperactivity Disorder (ADHD), and a Mild Intellectual Disability with a Full Scale IQ of 69. He was enrolled in all special education core classes and two regular education electives (art and JROTC, a high school military program) without special supports. He was in regular education classes 28% of the time and in special education classes the remaining 72% of the time. As a result of his mild intellectual disability, he performed below grade level in all academic areas. He needed extra time and differentiated instruction as he worked towards mastering specific skills. He was selected for this study due to frequent off-task behaviors demonstrated through high rates of quoting scenes from movies or verbalizing off-topic, hypothetical situations during independent work time, which had a negative impact on his performance in school.

Participant Two. Zane was a 15-year-old 9th grade student. He qualified for special education services under the eligibility category of Other Health Impairment (OHI) for ADHD and Asperger's syndrome. Academically, he was functioning at or slightly below grade level and had a Full Scale IQ of 106. He was enrolled in all 9th grade level classes, alternating between regular education seated classes and online classes that he worked on in the special education environment. He was enrolled in four special education classes where he received additional instruction on assignments. He was enrolled in four regular education classes, three of which he had access to a paraprofessional (English 1, Physical Science, and Concepts of Algebra 1A) to help redirect as he frequently engaged in off-task behaviors. The only class he did not need paraprofessional support was his physical education class. He was in special education classes 48% of the time and had access to special education supports in his classes 85%

of the time. He needed additional time to complete his work because he had difficulty staying on-task and needed constant redirection, thus contributing to why he was selected for this study to help increase on-task behaviors.

Dependent Variables

The dependent variable for this study was the on-task and off-task behavior exhibited by the participants. For Jacob, off-task behavior was defined as wandering away from work area, quoting and/or acting out movie scenes, off-topic discussion either to himself or with a peer, engaging or attempt at engaging in any activity other than assigned task, and browsing websites that were unrelated to the assigned task. On-task behaviors were defined as sitting in designated work area, eyes on task, actively participating in task (i.e. pencil in hand and writing information related to task), and not talking to classmates or self. For Zane, off-task behaviors were defined as off-topic discussion, wandering away from work area, fidgeting inappropriately (i.e. not using a fidget or school supply appropriately to assist with learning, but instead all attention was focused on the fidget and not on the task at hand), browsing websites that were unrelated to the task, engaging in any activity other than the task, and head down on desk. On-task behavior was defined as sitting in designated work area, eyes on task, actively participating in task (i.e. pencil in hand and writing information related to task), quiet, and not talking to classmates.

Momentary-time sampling was used to record the on-task and off-task behavior of the participants. Intervals of 30-s were used for both students to collect data for 10-min sessions. The observer collected data in 15-s intervals instead of 30-s intervals in order to

obtain a larger sample of data. Using an interval timer installed on an iPhone that vibrated every 15-s, the observer marked whether the student was on-task or off-task at the end of each 15-s interval. Video recording of each session was used to view and record data at a later time, as well as to measure inter-observer agreement.

A second dependent variable measured was the percentage of correct responding on the academic permanent products of the students during the self-monitoring. With increased on-task behavior expected, academic gains were also expected. Permanent products were collected from student work to measure progress over time as the students increased their on-task behavior. Jacob's target academic skill was in the area of pre-algebra concepts, with specific focus on solving one-step equations. Zane's target academic skill was in the area of written expression with a goal to improve his accuracy of a written paragraph given a prompt.

Research Design

A single-subject ABAB withdrawal design (Kazdin, 2011) was used to assess the research questions for this study. This design was selected to evaluate the effectiveness of the I- Connect self-monitoring system on on-task behavior and academic achievement of high school students with autism.

In order to demonstrate a functional relationship between the I-Connect self-monitoring system and on-task behavior, the baseline condition (A phase) and I-Connect self-monitoring intervention condition (B phase) were alternated. A functional relationship was determined if there was an improvement from baseline (A1) performance to the performance in the first intervention (B1) condition, and a decrease in

performance in the return to baseline condition (A2), and an increase again in performance in the return to intervention (B2) condition.

Independent Variable

The independent variable implemented in this study was a mobile application called I-Connect, which was installed on a Samsung Galaxy 5.0 device. The I-Connect self-monitoring application was designed to help reduce the number of drop outs for at-risk secondary students, but has since been implemented across various grade levels and behaviors (Beckman, 2015; Clemons et al., 2015; Crutchfield et al., 2015). The application was developed through the Juniper Gardens Children Project which received funding from the United States Department of Education, Office of Special Education Programs, Grant CFDA 84.327A. The application features were customized to provide visual cues as a method for students with ASD to self-monitor on-task behavior. It consisted of three components, including self-monitoring pre-determined goals, an attendance program, and completion of homework. For this study, the self-monitoring feature was used in which the question: “Am I on-task?” visually appeared on the screen every 30 s with a simultaneous vibration alert. The students chose either the “yes” or “no” option located directly below the question.

Following each 10-min session, the participants were given reinforcers if they self-recorded with at least 80% accuracy during the session. If the student self-recorded with less than 80% accuracy, a booster session was conducted to provide additional training on the self-monitoring process, including reviewing each student’s operational definitions of on- and off-task behaviors. Following each 10-min session, the observer

and student immediately reviewed data collected. If the student correctly self-recorded, reinforcers were provided through a pre-determined preferred item or activity selected by reinforcement inventories and preference assessments.

Materials

The I-Connect application was installed on a Samsung Galaxy Player 5.0 device. WiFi was made available so the students could self-monitor behavior through the application. The settings on the application were customized to vibrate every 30-s during sessions where data was collected. A Dell Latitude 3340 laptop used to video record sessions using Windows Movie Maker to assist with the data collection process. An interval timer application was installed on an Apple iPhone 6 for the observer to use while collecting data. Data was recorded by the teacher on a chart using a paper/pencil momentary time sampling method (Appendix D).

Additional task analyses and materials were included in the appendices, including a lesson plan for teaching students how to use I-Connect (Appendix E), a task analysis of intervention implementation (Appendix F), and a task analysis for how to use I-Connect (Appendix G).

Inter-observer Agreement

Data was collected by the primary observer across all phases of the study while the secondary observer, the classroom's student teacher who also was an accelerated Masters student in the Autism Spectrum Disorders program, collected data during 20% of the sessions for inter-observer agreement (IOA).

Inter-observer agreement for on-task behavior was conducted through the viewing of recorded video sessions using an interval timer application as the observers collected data simultaneously. Agreements were divided by the total amount of intervals (agreements and disagreements) and multiplied by 100 to determine the percent accuracy.

Inter-observer agreement for task accuracy was conducted through the scoring of math equations using specific criterion and permanent product samples using a writing rubric (Appendix H). Agreements were divided by the total number of points given between the two observers (agreements and disagreements) and multiplied by 100 to determine the percent accuracy.

Procedures

A task analysis was developed (Appendix F) of intervention implementation to increase reliability and validity of the study. Additionally, a lesson plan was created (Appendix E) to promote consistency with teaching the use of the I-Connect application to participants.

Data was collected during the baseline (A1) phase in the special education classroom for both participants. The participants' operationally defined off-task behaviors were observed for 10-min sessions using momentary time sampling. Every 15-s, the observer recorded whether the participant was on-task or off-task at that particular moment in time. The students were given tasks in their respective target academic areas during baseline sessions to identify their level of performance before intervention.

Additionally, students were given reinforcement inventories through question and answer sessions with the teacher during the baseline time frame. Both students were

administered the Reinforcement Inventory for Adults ("Reinforcement Inventories", 1993) and the Reinforcement Assessment for Individuals with Severe Disabilities (Fisher et al., 1996) to identify potential reinforcers to be delivered throughout the study. The delivery of the questions were slightly modified as they were directed towards the students instead of a parent/caregiver as the survey is written. Results from the indirect assessments were used to develop a reinforcement menu to use throughout the study (see Appendix J), as well as consider the accessibility of items and what would be appropriate to deliver in the classroom.

Prior to implementing the intervention, students received instruction on what on-task and off-task behaviors look like and were provided opportunities to identify their specific off-task behaviors and what the desired on-task behaviors were. The primary observer and participants watched videos from three 10 min baseline sessions each and recorded their on-task and off-task behavior through the use of the I-Connect. This was completed to ensure the participants knew how to correctly use I-Connect and had a clear understanding of the difference between their on-task and off-task behaviors. Following three consecutive trials resulting in 80% accuracy or higher matching data with the teacher, the student was ready for the initiation of the intervention phase (B1).

Following successful completion of training on how to use I-Connect, the first intervention phase (B1) began. Participants were given a task and instructed to press "yes" if they were on-task or "no" if they were off-task when the visual prompt displayed in 30-s intervals. The participant self-monitored for 10-min sessions. The teacher simultaneously collected data using a paper/pencil method in 15-s intervals. Following completion of each session, the teacher and participant compared data for matching

purposes. If the participant and teacher's data matched for at least 80% of the data points, the student received a reward from a reinforcement menu, using items that were identified as potential reinforcers through reinforcement inventories. If the student did not achieve 80% accuracy or higher, a booster session was conducted. During a booster session, the teacher and student reviewed operational definitions of behavior and correct use of the application. The student self-monitored again, but only for five minutes during booster sessions. Once 80% accuracy or higher was achieved, the student could then select a reward from the reinforcement menu.

The withdrawal phase (A2) consisted of returning to baseline conditions. The participants did not have access to their device to self-monitor on-task behavior using the I-Connect application or the reinforcement used throughout the intervention. The observers continued to collect data for on-task and off-task behavior using momentary time sampling in 15-s intervals. Additionally, data was collected through permanent products provided by the participants.

During the return to intervention phase (B2), the intervention phase was replicated. Participants used the I-Connect self-monitoring device to track on-task behavior. The observers continued to collect data identically to how they collected data in previous phases, and the delivery of potential reinforcers was provided if the student was able to match data accurately with the teacher for at least 80% of the responses. If not, booster sessions were conducted until the student achieved 80% accuracy or higher.

CHAPTER IV: RESULTS

Participant One (Jacob)

Jacob was observed in his special education classroom during independent math work. The on-task data obtained across the five baseline sessions were 78%, 40%, 47%, 52%, and 20%, with an average of 47.4% on-task.

Jacob was administered the Reinforcement Inventory for Adults ("Reinforcement Inventories," 1993) to identify potential reinforcers to deliver throughout the study. An observation from the results of this reinforcement inventory was that Jacob identified liking 97/127 items (76%) the highest rating of "very much." Throughout the interview, he became excited about several items listed, even if he had not tried them but thought it sounded like something he might be interested in. Jacob has a large variety of interests and typically enjoys most activities he participates in, so the high amount of items being rated as liking "very much" were likely reliable responses. Some potential reinforcers identified from this survey included electronic entertainment (video games, music, lava lamps, and computers), edibles (candy bars, coffee, and soda), and physical activities (running and sports).

Jacob was also administered the Reinforcement Assessment for Individuals with Severe Disabilities (Fisher, Piazza, Bowman, & Amari, 1996). Results from this survey suggested additional potential reinforcers of comic books and playing Minecraft. The results also confirmed results from the previous survey, including music, computers, and being active.

Results from the indirect assessments were used to develop a reinforcement menu to be used throughout the study. The items selected for Jacob's reinforcement menu were "Would you rather?" questions found on a website, computer time, listen to music, and walk around the building with teacher or paraprofessional.

Prior to intervention, Jacob participated in three training sessions to ensure mastery of correct implementation of the I-Connect app and identification of on-task and off-task behaviors. Accuracy of his data collection during training: 80%, 95%, and 94% accuracy

Jacob received instruction on how to use the I-Connect app during independent math work in the special education classroom. Jacob's rate of on-task behavior was 100% for all six sessions.

Following six successful intervention sessions, the intervention was removed and Jacob returned to baseline conditions with the removal of the I-Connect app during math work. Jacob's rates of on-task behavior during the return to baseline conditions were 100%, 65%, 87%, and 82%, with an overall average of 83.5% on-task.

Following four withdrawal sessions, I-Connect was reintroduced and Jacob was instructed to utilize the app again during math work. Jacob's rate of on-task behavior was 100% across all six sessions. See Figure 1 for a visual representation of on-task data.

Permanent product samples were collected following each session to measure any improvements in task accuracy as a potential result of the I-Connect self-monitoring device affecting academic achievement. The academic skill of focus throughout the study was solving one-step algebraic equations. Each problem was worth 1 point, with ½ point

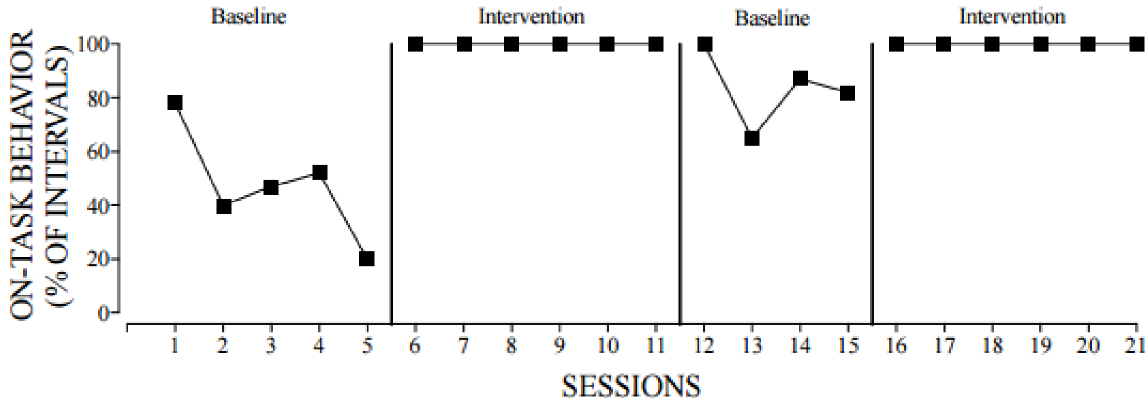

Figure 1. Percentage of on-task behavior for Jacob.

given for demonstrating the correct step in moving one part of the equation to the other side, and the other ½ point given for providing the correct answer.

As seen in Figure 2, during baseline (A1), Jacob's task accuracy across sessions was 50%, 50%, 0%, 0%, and 0%, with an overall average of 20% accuracy. During intervention (B1), Jacob's task accuracy scores were 92%, 82%, 58%, 90%, 97%, and 64%, with an overall average of 80.5% accuracy. During return to baseline conditions (A2), Jacob's task accuracy scores were 100%, 96%, 61%, and 39% with an overall average of 74% accuracy. During return to intervention conditions (B2), Jacob's task accuracy scores were 96%, 98%, 97%, 98% 97%, and 100%, with an overall average of 98% accuracy.

Participant Two (Zane)

Zane was observed in his special education classroom during practice with written expression. The data obtained across the five baseline sessions were 52%, 52%, 55%, 32%, and 45%, with an average of 47.2%.

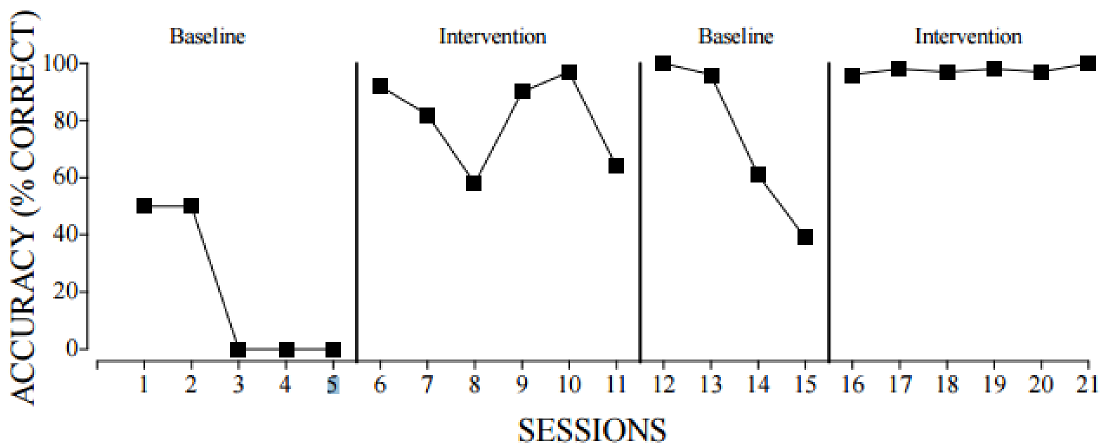

Figure 2. Percentage of correct responding on one-step equations for Jacob.

Zane was administered the Reinforcement Inventory for Adults ("Reinforcement Inventories", 1993) to identify potential reinforcers to be delivered throughout the study. Some potential reinforcers identified from this survey included electronic entertainment (music, computer games, and My Little Pony videos), drinks (chocolate milk, soda, and sweet tea), and physical activity (running and aerobics).

Zane was also administered the Reinforcement Assessment for Individuals with Severe Disabilities (Fisher et al., 1996). Results from this survey identified additional interests in jogging and pizza. He also mentioned that he likes how everything has its own textures and looks, suggesting he enjoys sensory items. The results also confirmed items from the previous survey, particularly music.

Results from the indirect assessments were used to develop a reinforcement menu to use throughout the study. The items selected for Zane's reinforcement menu were "Would you rather?" questions found on a website, computer time, listen to music, looking at the lava lamp, and walk around the building with teacher or para. The

opportunity to look at the lava lamp was added after Zane had been observed to spend a lot of time near the lava lamp, including him pulling up a chair to sit in front of it and stare at it for over five minutes at a time.

Prior to intervention, Zane participated in three training sessions to ensure mastery of correct implementation of the I-Connect app and identification of on-task and off-task behaviors. He received 90%, 70%, and 100% accuracy during data collection training. It is important to note that the second training session in which 70% of data points were matching was due to the primary observer being interrupted by another staff member stepping in to ask a question during data collection, causing the primary observer to unintentionally miss one data point, thus resulting in each subsequent data point being one off from where Zane was on his data collection sheet. To ensure there weren't any other factors contributing to this lower matching score, the primary observer reviewed the operational definitions of behavior and how to use the application. Matching data for the next session was 100%. The primary observer decided not to conduct any more training sessions, being confident that Zane had sufficiently demonstrated correct understanding of I-Connect self-monitoring procedures.

Zane was instructed to use the I-Connect app during practice with written expression in the special education classroom. Zane's rate of on-task behavior across all sessions were 98%, 100%, 93%, 98%, and 95%, with an overall average of 96.8% on-task.

Following five sessions of successful intervention, the intervention was removed and Zane returned to baseline conditions with the removal of the I-Connect app during

writing tasks. Zane's rates of on-task behavior during the return to baseline conditions were 67%, 57%, 30%, and 45%, with an overall average of 49.8% on-task.

Following four withdrawal sessions, I-Connect was reintroduced and Zane was instructed to utilize the app again during writing tasks. Zane's rates of on-task behavior were 95%, 98%, 90%, 92%, 98%, and 93%, with an overall average of 94.3% on-task. See Figure 3 for a visual representation of on-task data.

Permanent product samples were collected following each session to measure any improvements in task accuracy as a potential result of the I-Connect self-monitoring device affecting academic achievement. The academic skill of focus for Zane throughout the study was written expression. A modified version of Alexandra Beckman's rubric was used (Beckman, 2015; see Appendix H). The writing rubric assessed introduction, supporting details, conclusion, on-topic writing, length of writing, and grammar, punctuation, and mechanics for a total of 18 points possible for each writing.

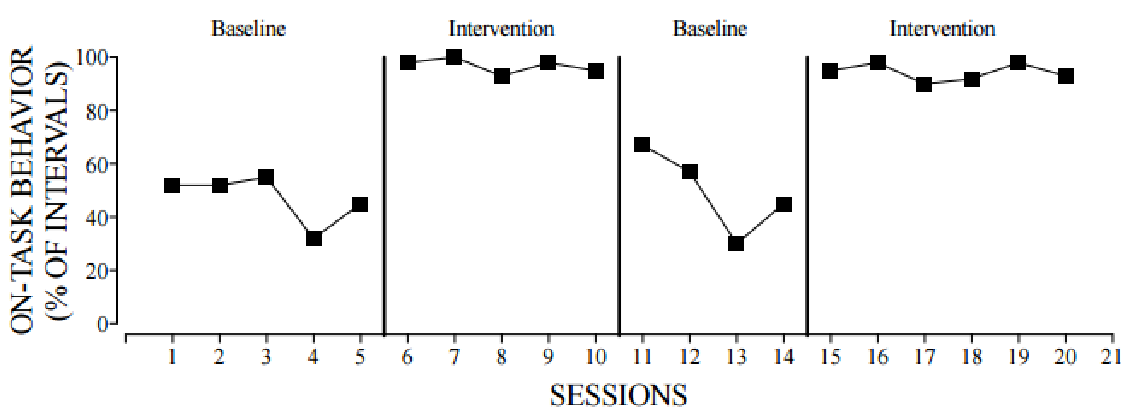

Figure 3. Percentage of on-task behavior for Zane.

As seen in Figure 4, during baseline (A1), Zane's task accuracy across sessions was 50%, 50%, 56%, 56%, and 44%, with an overall average of 51.2% accuracy. During intervention (B1), Zane's task accuracy across sessions was 72%, 56%, 56%, 56%, and 57% with an overall average of 59.4%. During return to baseline conditions (A2), Zane's task accuracy across sessions was 67%, 61%, 44%, and 33% with an overall average of 51.3%. During the second intervention phase (B2), Zane's task accuracy across sessions was 56%, 72%, 72%, 83%, 78%, and 78% with an overall average of 73.2%.

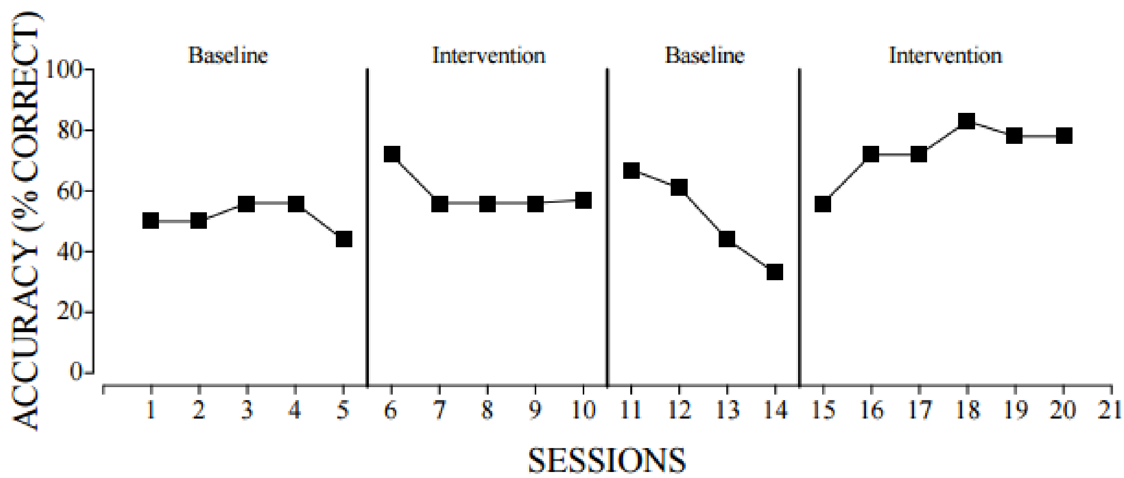

Figure 4. Percentage of correct responding on writing prompts for Zane.

Matching

During both intervention phases (B1 and B2), both of the participants and observer collected data simultaneously during the sessions. Following each session, they compared data to determine if at least 80% of the results matched to help increase reliability of data collected by participants. At least 80% matching was achieved for both participants following each session during both intervention phases, further supporting the reliability of the data.

Inter-observer Reliability

All sessions were video recorded to assist in conducting inter-observer agreement and fidelity of treatment of the intervention. The secondary observer, the student teacher, assisted with inter-observer reliability for on-task behavior by watching videos and collecting data with the primary observer. Reliability for Jacob's on-task behavior data across all phases ranged from 95%-100% with an average of 99% agreement. Reliability for Zane's on-task behavior data across all phases ranged from 98%-100% with an average of 98.8% agreement.

In addition to reliability for on-task behavior, inter-observer reliability was also conducted for task accuracy scores. The secondary observer was instructed on how to score permanent products using specific criterion for Jacob's one-step equation problems and a rubric for Zane's writing samples. This was conducted for at least 20% of each phase for each participant, with the exception of no inter-observer reliability conducted during Jacob's baseline (A1) phase due to the observer documenting his scores and then asking him to make corrections, resulting in Jacob erasing his answers prior to the observer being able to make a copy of his original answers. Because his original answers were erased, the secondary observer was not able to score his responses for reliability purposes. For the remaining phases, the secondary observer was directed to give ½ point if Jacob used the correct operation to move the correct number from one side of the equation to the other and ½ point for providing the correct answer. Reliability for Jacob's permanent product data across all phases ranged from 95%-100% with an average of 98.8% agreement.

For Zane's permanent product samples, the secondary observer was given the same writing rubric (Appendix H) the primary observer used to measure Zane's writing samples. Reliability for Zane's permanent product data across all phases ranged from 60%-100% with an average of 89% agreement.

CHAPTER V: DISCUSSION

The purpose of the current study was to determine the effect of self-monitoring on-task behavior for high school students with autism, specifically using technology through an application called I-Connect installed on a Samsung Galaxy device. Research has shown the need for evidence-based practices for students with ASD in the school setting (Simpson, 2005). In order to best prepare students with ASD for their transition into post-secondary opportunities, including employment, education/training, and independent living, they must receive instruction and practice with skill deficits while in school.

More recent research shows that self-monitoring can help students increase on-task behavior. (Asaro-Saddler & Saddler, 2010; Bruhn & Watt, 2012; Bruhn et al., 2015; Lienemann & Reid, 2008). More specifically, utilizing technology to self-monitor can improve on-task behavior and academic skill acquisition for students with disabilities (Beckman, 2015; Boswell et al., 2013; Clemons et al., 2015; Crutchfield et al., 2015; Wills & Mason, 2014). The current study investigated the effect of a self-monitoring application, I-Connect, on the improvement of on-task behavior and academic achievement for two high school students with an ASD diagnosis. Using an ABAB research design, the I-Connect self-monitoring program was paired with a reinforcement system in which the students were given a reward following successful completion of a self-monitoring session.

This chapter discusses the results with their respective research questions, a functional relationship between intervention and improvements in on-task behavior and

academic skill acquisition, permanent product results, confounding variables, limitations, and areas for future research to address.

Research Questions

Results from this study helped provide answers for both of the research questions. The first research question, "What is the effect of a web-based self-monitoring system on the on-task behavior for high school students with autism?", was answered through the results reflecting the on-task behavior of both participants. Jacob's on-task behavior increased from an average of 47.5% during baseline (A1) to 100% on-task during the first intervention phase (B1). Zane's on-task behavior increased from an average of 47.2% on-task during baseline (A1) to 96.8% on-task during the first intervention phase (B1). This improvement in on-task behavior is consistent with previous research that showed improvements in on-task, stereotypic, and other disruptive behaviors (Beckman, 2015; Clemons et al., 2015; Crutchfield et al., 2015; Rosenbloom et al., 2015; Wills & Mason, 2014;).

The second research question, "To what extent does I-Connect increase the level of academic acquisition in the areas of math and written expression?", was answered through results from permanent products for both participants. Jacob's ability to solve one-step algebraic equations improved from an average of 20% accuracy during baseline (A1) to 80.5% accuracy during the first intervention phase (B1) and 98% accuracy during the second intervention phase (B2). Zane's written expression skills improved from an average of 51.2% accuracy during baseline (A1) to 60% accuracy during the first intervention phase (B1) and 76.6% accuracy during the second intervention phase (B2).

The current study was the first know study utilizing I-Connect that was able to measure academic progress for each session, although other studies that measured various amounts of academic achievement observed improvements (Beckman, 2015; Clemons et al., 2015). This is explained further in the Permanent Product section below.

Functional Relationship

A functional relationship was established between the utilization of the I-Connect self-monitoring application and the improvement of on-task behavior for both participants. Kazdin (2011) explained that visual inspection occurs when “a decision is reached about whether the data pattern reflects a systematic intervention effect” (p. 286).

A change in means across phases occurred throughout this study. For Jacob, the mean changed from 47.4% during baseline (A1) to 83.5% during return to baseline conditions (A2). The first data point in A2 was 100%, increasing the average for this phase. The next data point following 100% dropped to 65%, and then went back up to 87% and 82%. The first data point in A2 could suggest carry-over from B1, but any carry-over effect was quickly diminished as the second data point in A2 showed a 35% decrease in on-task behavior. The mean for both intervention phases remained the same, with each intervention phase (B1 and B2) maintaining a mean of 100%. For Zane, the mean changed from 47.2% during baseline (A1) to 49.8% during return to baseline conditions (A2), and from 96.8% during the first intervention phase (B1) to 94.3% during the second intervention phase (B2).

Aside from the aforementioned possible carry-over effect for Zane from B1 to A2 that quickly diminished, there otherwise were no overlapping data points. The dramatic

changes between phases suggests the existence of a functional relationship between the I-Connect self-monitoring program and on-task behavior.

Permanent product

Academic gains were measured via permanent product samples that were collected for all sessions by both participants. The selection of target academic skills was made with consideration to the participants' educational disabilities and what areas received a negative impact as the result of those deficits. Additionally, in order to further promote the reliability of the data, the skills selected were areas that the students had been working on for at least one semester prior to the study while still demonstrating difficulty and receiving low scores, showing that increases in academic achievement were not due to the content selected being too easy for their current level of performance.

Jacob had been requesting practice with solving one-step equations for the entire school year to prepare him for a test that held a lot of value to him and his career goals. He had previous exposure to this skill, but repeated practice had not yet resulted in anything greater than 50% accuracy prior to the study. Results from this study showed that academic gains were likely a direct result of an increase of on-task behavior from the I-Connect self-monitoring program. Jacob's accuracy during baseline (A1) was an average of 20%. That number increased by 60.5% to an average of 80.5% accuracy during the first intervention phase (B1). His accuracy slightly decreased during A2 to 74%. However, with academic achievement being the skill being measured, it would not be expected for the participant to suddenly lose the ability to demonstrate the skill, so a slight decrease would be expected more than the skill being totally erased (Kazdin,

2011). Jacob's task accuracy was 98% during the second intervention phase (B2). Overall, Jacob increased his task accuracy by 78% from A1 (20%) to B2 (98%), suggesting that I-Connect's positive impact on his on-task behavior helped him to achieve academic gains.

Zane had a long history in school with difficulties related to written expression. Paragraph writing had been an academic focus for at least eight years of his education experience prior to the study, and it was still something he demonstrated consistent difficulty with minimal progress. In order to help improve his writing skills, paragraph writing was selected as his target academic skill. During baseline (A1), his average score on written expression was 51.2%. That increased by 8.8% to 60% during B1. His accuracy decreased to 51.3% during the withdrawal phase (A2), and increased by 25.5% to 76.8% during the final intervention phase. Overall, Zane increased his task accuracy by 25.4% from A1 (51.2%) to B2 (76.8%). When considering the length of time that had been spent trying to improve his writing skills, a 25.4% increase in accuracy over the course of only three months demonstrated the positive impact his improvement in on-task behavior through I-Connect made on his writing skills.

It should be noted that while the writing rubric was developed to be as objective as possible for inter-observer reliability, scoring writing samples can easily result in slight subjectivity due to the variability of details within the writing, as seen in the 60% agreement for baseline (A1). On this writing sample, the primary observer considered listed items to be supporting details, whereas the secondary observer did not consider listed items to be supporting details as she was looking for further elaboration of those items. Following IOA data collection for the baseline (A1) phase, the observers compared

results to further clarify measurement procedures for the participant's writing samples. Additionally, the secondary observer later understood why listed items could be considered supporting details, but the IOA score remained the same to maintain reliability of the data. This clarification of measurement procedures proved to be effective as seen in the higher remaining IOA scores for Zane's task accuracy.

Previous research that utilized I-Connect (Clemons et al., 2015) discussed the need for future research to acquire more control over the academic tasks and grading criterion. Clemons's study was limited in this area due to the inability to control the tasks the students were given throughout the study and the measurement procedures for each task as part of the study took place within general education environments which were under the control of the general education teacher. The results of the current study supported this suggested area of research as it achieved complete control of the provided tasks and measurement criteria, which helped with the development of stronger conclusions regarding academic gains as the result of the study.

Other studies that have utilized I-Connect as an on-task behavior self-monitoring strategy included some or no concurrent measurement of academic progress. The pilot study of I-Connect measured on-task and disruptive behaviors, but did not measure academic progress. This was discussed as a limitation of the study, although results still showed improvements in on-task behavior (Wills & Mason, 2014). Another study involving I-Connect measured stereotypic behavior of two participants, but did not measure academic progress (Crutchfield et al., 2015). In another I-Connect study, permanent product samples were not able to be collected for every session for one participant, although some samples were still collected and measured (Beckman, 2015).

Of the samples collected, improvements in performance were observed. Additionally, Beckman's study showed a decrease in academic performance from intervention to withdrawal conditions, further supporting the role I-Connect played in academic performance.

The present study is the first known study utilizing I-Connect which collected permanent product samples following each session, demonstrating stronger reliability of the effect of I-Connect on academic achievement. Further research is needed to investigate the effect of I-Connect in a larger variety of subject areas but with greater control over the given tasks.

Confounding Variables

There were a few extraneous and confounding variables worth noting. First, there were a few sessions conducted at a different time of day due to absences. Jacob was in the special education classroom once every other day for class and every Monday through Thursday for a 30 minute advisory period in the middle of the morning. All sessions except two were collected during normal class time. Due to two absences during data collection, some of Jacob's sessions had to be conducted during advisory. Zane was in the special education classroom more frequently than Jacob, with Jacob being in the special education classroom one of eight class periods and Zane being in the special education classroom for four of eight class periods. Zane was absent five data collection days, but due to the extra time he had in the special education class, missed sessions were conducted in another class period. Although there may have been different students in

those class periods as well as it being a different time of day, the physical environment and staff remained the same.

In addition to participant absences, there were breaks throughout the study, including spring break, Easter weekend break, and significant schedule changes over the course of two weeks to allow for state testing, meaning sometimes the original class period for the study may have been changed to a different time of day and was shorter or longer than usual, which may have presented different extraneous variables. Anecdotal observations suggested that these changes in data collection times did not have any impact on the reliability of the data, as it remained consistent with the data collected during their respective phases.

A second extraneous variable that conflicted with data collection was the presence of technical difficulties. During four sessions, the I-Connect server was down, resulting in the application force closing during use. Sessions were terminated when this occurred. Because sessions were incomplete, those days were not included in the data of the study. The I-Connect team was quick in resolving the issue, though the time it took to reboot the system usually surpassed the time allotted that day for data collection.

Another minor technical difficulty was that the headphone jack did not work on the device. In effort to be discreet and not disrupt the environment, participants were directed to wear their personal earbuds that were plugged into the device. However, the sound still played through the speaker and not through the earbuds. This reflected an issue with the device itself and not with the I-Connect application, confirmed through finding that the headphone jack did not work for other applications on the device. Anecdotal observations found that the quiet beeping noise did not disrupt the

environment, as most students did not even hear it. On one occasion when the classroom was quieter than usual, one student in the class asked what the beeping noise was but did not ask about it again nor did he seem to notice it after that.

A third confounding variable was that no component analysis was conducted, similar to previous I-Connect research (Beckman, 2015). This makes it difficult to determine if I-Connect was solely responsible for increases in on-task behavior and academic achievement, or if it was the treatment package that combined I-Connect and a reward system. A component analysis would compare the effect of each independent variable independently to determine if one was more successful than the other, or if it was necessary to include both components to achieve better results. However, one study (Crutchfield et al., 2015) investigated the effect of utilizing only I-Connect without other components in effort to observe its effect without it being part of a treatment package. Results found that I-Connect was effective in decreasing stereotypic behavior, suggesting positive outcomes when I-Connect is utilized in isolation.

Limitations

Although a functional relationship was established, there were some limitations within this study that are important to note. First, time was limited. The study took place for approximately three months during the spring semester. The students were on a block schedule, meaning classes alternated each day. In order to maintain consistent environments throughout the study to help prevent confounding variables, the intervention was mostly implemented during the same block for each student, meaning some weeks the participants only completed two to three sessions.

Second, in effort to maintain consistency throughout the study and thus improve reliability, the participants only worked on the target academic skills assigned to them during intervention. The results showed a positive impact on the acquisition of academic skills, but the study could not determine the effect of the intervention on multiple skill areas being addressed concurrently throughout the study.

Third, the setting remained constant to limit confounding variables. The participants only used the I-Connect application in their special education classroom. The study was unable to measure the effect of I-Connect in various environments which would help to investigate generalization of on-task behavior.

Although a consumer satisfaction form was developed (see Appendix I), time constraints prevented the delivery of this survey as data collection was conducted on the last days of school. However, anecdotal observations demonstrated the satisfaction of this intervention by the participants. Jacob was observed to report that he tried looking for this application on his own personal device so he could use it in other classes to improve his focus. Zane was observed to show disappointment when the application was removed during return to baseline conditions, and excitement when the application was reintroduced during the second intervention phase. During the withdrawal phase, both participants asked several times when they would get to use the application again. Both participants made statements that they believed I-Connect helped them to stay focused better. In addition to student reports, the staff who worked with the participants in the special education classroom made frequent comments about the improvements they could see with their ability to stay focused, even with external events happening in the classroom that would typically remove their attention from their tasks. These informal

observations provided responses similar to what the consumer satisfaction forms would have provided and can imply overall satisfaction with the intervention.

The results of the current study further supports existing research on self-monitoring programs that utilize technology (Amato-Zech et al., 2006; Boswell et al., 2013; Bruhn et al., 2015; Legge et al., 2010). Additionally, results further support the I-Connect application (Wills & Mason, 2014; Beckman, 2015; Clemons et al., 2015; Crutchfield et al., 2015; Rosenbloom et al., 2015). Future replication of studies utilizing I-Connect is essential to further strengthen its effect on improving on-task behavior and academic achievement for students with autism.

Future Research

The current study was a replication of previous studies that have been conducted using the I-Connect self-monitoring program (Wills & Mason, 2014; Beckman, 2015; Clemons et al., 2015; Crutchfield et al., 2015; Rosenbloom et al., 2015). Using the limitations from this study, directions for future research can be established, including time, settings, and target skill acquisition.

When developing future plans to conduct research that utilizes I-Connect, it should be considered to implement the study over longer periods of time. In addition to the current study, two of the other existing studies have also identified time as a limitation (Beckman, 2015; Clemons et al., 2015). It would be beneficial to obtain further data with the study being extended over longer periods of time.

Many of the previous I-Connect studies have been limited to research being conducted within the special education classroom setting using an ABAB research design

(Beckman, 2015; Clemons et al., 2015, Crutchfield et al., 2015; Rosenbloom et al., 2015; Wills & Mason, 2015). In order to determine the effectiveness of the I-Connect self-monitoring system in various settings, a Multiple Baseline research design should be used to measure the effect across settings and subjects. This would provide valuable information regarding the effect of self-monitoring strategies, specifically I-Connect, on on-task behaviors for students with disabilities in various environments, including school, employment, and in the community.

When given opportunities to practice and improve behaviors through self-monitoring utilizing I-Connect, individuals with disabilities can have greater opportunities for success in various environments during school years and beyond.

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APPENDICES

Appendix A

IRB Proposal

1. Brief description of the purpose of the proposed project, including specific goals.

The goal of the proposed project is to increase student engagement and academic gains through the use of the I-Connect self-monitoring application (Wills, 2012). I-Connect is a web based self-monitoring application on a mobile device. A visual prompt (flashing screen) is displayed every 30 seconds (or other consistent interval of time) with a prompted question of "are you on task" with a binary yes/no option as a response. This project would provide research to support the I-Connect self-monitoring application as an effective behavior management strategy. Also, two students have the opportunity to experience success in classes that will help further their education and future success.

The proposed project would evaluate the effectiveness of the I-Connect application on the on-task behavior of two students with autism and ADHD in a high school setting. A single subject ABAB design would be used to demonstrate the effectiveness of the I-Connect application. The I-Connect application is a self-monitoring strategy that allows students to use versatile electronic devices in the classroom setting to monitor their own behaviors. For this study, the participants will monitor their on-task behavior by indicating whether or not they were on task when prompted by the device. Data would be collected using direct observations and indirect measures to help determine potential reinforcers. The researcher will observe both participants in the classroom setting and record on and off task behavior using momentary time sampling procedures with 20-s intervals.

2. Research protocol, that includes:

Description of participants to be used:

Two participants will be selected for this study from a special education classroom. The participants will be selected based on their academic performance and classroom behavior. Participants must have a diagnosis of Autism to be selected for this study. Prior to working with the students using the I-Connect device, parents will be notified of the potential benefit of being a participant for this study as well as a description of the components of the study. At that time, they will be provided with consent forms and asked if they would like their child to participate. If the parent refuses, another child may be identified as a potential participant. Once again, the parent will be notified and consent requested. The participants will be observed throughout the duration of the study. They will meet with the researcher and complete interviews and interest surveys. Maintenance and generalization probes will also be administered to the participants to examine the long lasting effect of the intervention. Data collection will occur for approximately 32 weeks.

Procedures:

The study will occur in a public high school located in a rural town in a mid-western state. This school includes 9^{th}-12^{th} grades. Both students receive services in a special education classroom that include a special education teacher and a paraprofessional. The class size when the participants are in the special education setting range from 2-8 students.

The participants will be identified and informed consent provided to their parents. After informed consent from parents has been obtained, the observer will conduct observations and teach the participants the I-Connect self-monitoring strategies. A single-subject, ABAB design (Kennedy, 2005) will be used to demonstrated the effect of the I-Connect self-monitoring where the participants will be observed a minimum of five data sessions for each phase of the study. In addition to the direct observations, indirect assessments will be completed on each participant to assist in developing an intervention package that meets the function of each participant's behaviors. All indirect assessments are attached to the application [i.e *The Children's Reinforcement Schedule Survey* (Cautela, 1977*),* and *The Project FACILE Problem Behavior Questionnaire (PBQ*; Lewis, Scott, & Sugai, 1994)]. Then, the I-Connect application will be implemented for the intervention in addition to reinforcement contingent on self-monitoring. The student will be observed during an intervention phase, a withdrawal to baseline phase, and a return to intervention phase. Maintenance and generalization probes will also be administered to determine the long-lasting effects of the intervention.

An on-task and off-task data collection sheet (see attached) will be used during observations to record the students on and off-task behavior over a thirty minute data session. The students will be observed using a 20-s interval, momentary time sampling procedure. Student solicitation of help (i.e. verbal or gestural) will be observed as well as teacher prompts (i.e., physical, gestural, or verbal) any time during intervals. To address confidentiality, pseudo names will be provided for each participant and all permanent products will be kept in a locked file when the names are not blackened. Names will be blackened on all documents to protect the identifying information of the student. The data from this study will be completed to meet these requirements for a master's degree in special education in autism.

3. Benefits:

The participants of this study have the opportunity to use emerging technology to increase their academic engagement which in turn should help them be more successful in classes. This study could increase their academic achievement and provide them with a behavior management strategy which they could use throughout the rest of their high school career and in future post-secondary settings. This study could potentially support a behavior management strategy which could help many students to manage their behavior by providing evidence that the I-Connect self-monitoring application is an effective behavior management tool.

4. Risks:

There are no foreseen risks for this study. The study will use a research-based educational strategy to increase student learning.

5. Analysis of Risk:Benefit Ratio When Relevant:

For this project, the participants could potentially learn a new behavior management strategy that could be used in multiple settings throughout life to help them control impulses and their behavior. The participants could benefit from academic gains during the study as well as in the future.

6. Procedures for Minimizing Risk: Describe precautions that will be taken to minimize the risks described above, including more detail about how data confidentiality will be maintained, and the final disposition of data.

Steps will be taken to ensure the maintenance of confidentiality during the study. A pseudo-name will be given to the participants to keep their identity confidential. Data will be kept

secure in the principal investigator's office to protect the identity of the participants. All individual participants will be given pseudo names to ensure confidentiality. Parent permission will be obtained to participate will be obtained to participate in the study. See the parent permission form attached.

7. Procedures for obtaining informed consent

See the attached consent form that will be provided to the parents prior to their child participating in the study. See attached consent form for the building principal.

8. The project proposal shall end with the following, verbatim:

I hereby agree to conduct this study in accordance with the procedures set forth in my project description, to uphold the ethical guidelines as set forth in the Code of Federal Regulations 45 CFR 46, 45 CFR 160 and 164, and the Missouri State University HIPAA Policy, and to report to the IRB any outcomes or reactions to the experiment which were not anticipated in the risks description which might influence the IRBs decision to sustain approval of the project.

______________________________	______________________________
Department Head	Principal Investigator (Dr. Garrison-Kane)
______________________________	______________________________
Sara Romans	Other Investigators
Date: ________________________	Date: ________________________

Appendix B

PRINCIPAL CONSENT

Title: IConnect Self-Monitoring

Dear Principal,

As part of my thesis project for my masters in special education in autism at Missouri State University, I plan to implement an intervention program to teach on task behavior for specific students with autism. These students are selected based upon a high rate of off-task behavior. The following information is provided for informed consent to allow or disallow the study.

What is the purpose of the project?
The purpose of this project is to develop and implement behavior interventions within my classroom who may be at risk for emotional or behavioral problems with autism. The project is to provide further research on the effectiveness of the IConnect web-based self-monitoring system to increase on-task behavior and task completion. Self-monitoring is an effective research-based practice for increasing on-task behavior for students with autism. The intervention will not interfere with current IEP and will only enhance the progress on IEP goals. The resulting information may be disseminated at regional and national behavior conferences such as the Midwest Symposium for Leadership in Behavior Disorders or Association for Behavior Analysis International. This study is completed to meet thesis requirements for a master's degree in special education in autism.

What are the behavioral assessments?
Assessment for behavior includes teacher rating scales and interviews, and observations of student on task performance and inappropriate behaviors. The observations are conducted by the researcher and school staff involved in the students.

What are the behavioral interventions?
Behavioral intervention is based on best practices, and includes these options: 1) student self-monitoring with goal setting and rewards for performance 2) individual or class lessons on classroom/school rules, 3) teacher monitoring and tutoring of student behavior. The IConnect software is a web-based self-monitoring system your child would utilize while completing work on a Samsung galaxy Player 5.0. The options for students' consequences for inappropriate behaviors will remain the same as if they were not participating in the study. Interventions are implemented for specific students with autism as selected by the teacher. The intervention will not interfere with current IEP and will only enhance the progress on IEP goals.

What are the benefits of your participation in the project?
Students may benefit from participation in the assessment and intervention programs. Improved learning, classroom behavior and social interactions with peers and teachers is expected. Self-monitoring is a research-based practice for students with autism. This

research will increase research-based effective instructional procedures for students with autism within your school.

Video Recording: We may videotape samples of the classroom instruction and intervention for later review by the research and development team and for training purposes. This recording may be accessed by members of the research project to inform development of the IConnect program. No personally identifying information will be disseminated. It will only be used to ensure the fidelity of treatment and efficacy of the study.

What are confidentiality procedures?
Your permission allows a copy of all information obtained from assessment and interventions to be provided to the Missouri State University staff involved in this study. This information will be kept confidential in closed files at Missouri State University with Dr. Garrison-Kane. An alias will be used for each student and no identifying information will be included. All school policies on confidentiality will be followed. Information from assessments or observations shared in verbal or written reports only to the school staff who assist each student. Parent permission will be granted through a separate permission form and will be provided access to all data and information collected upon request.

Should you desire any additional information or have questions, please contact Dr. Garrison-Kane at Missouri State University.

Title: IConnect Self-Monitoring

PARTICIPANT CERTIFICATION:

If you agree to participate in this study please sign where indicated, then tear off this section and return it to the investigator. Keep the consent information for your records.

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding the study and the use and disclosures of information about my child for the study.

I agree to take part in this study. I understand that information will be used to help the school. Assistance with behavior support will be developed by the school student support team with consultation from Missouri State University staff.

I also understand that my permission allows for classroom observation student performance and sharing of school records (discipline contracts) with research staff.

____
Principal's first and last name

____________________________________ ________________________________
Principal's signature Date

With my signature I affirm that I have been given a copy of this consent form.

I understand that if I have any additional questions about my rights as a research participant, I may contact

Dr. Garrison-Kane, Professor
Missouri State University
(417) 836-6960
LGKane@Missouristate.edu
901 S. National, College of Education
Springfield, MO 65897

Appendix C

PARENT CONSENT

Title: IConnect Self-Monitoring

Dear Parent,

What is the purpose of the project?
The purpose of this project is to assist teachers in developing and implementing behavior interventions for classrooms and small groups or individual students. The goal of this study is to show the effectiveness of the IConnect system of self-monitoring on increasing on-task behavior and task completion for students with autism.

What are the behavioral assessments?
Assessment for behavior includes teacher rating scales and interviews, behavior and academic records (including academic assessments, IEPs, and office discipline records), and observations of student on task performance and inappropriate behaviors. The observations are conducted by school staff with assistance from the Missouri State University staff.

What are the behavioral interventions?
Behavioral intervention is based on best practices, and include these options: 1) student self-monitoring with goal setting and rewards for performance 2) individual or class lessons on classroom/school rules, 3) teacher monitoring and tutoring of student behavior. The IConnect software is a web-based self-monitoring system your child would utilize while completing work on a Samsung galaxy Player 5.0. The options for students' consequences for inappropriate behaviors will remain the same as if they were not participating in the study. Interventions are implemented for specific students with autism as selected by the teacher.

What are the benefits of your child participating in the project?
Your child may benefit from participation in the assessment and intervention programs. We expect to see improved learning, classroom behavior and social interactions with peers and teachers. Self-monitoring is a research-based practice for students with autism.

Video Recording: We may videotape samples of the classroom instruction and intervention for later review by the research and development team and for training purposes. This recording may only be accessed by members of the project or school district to inform development of the IConnect program. It will only be used to ensure the fidelity of treatment and efficacy of the study.

What are confidentiality procedures?
Missouri State University supports the practice of protection for human participants taking part in our research programs. Your child has been given the opportunity to participate in a research study using an intervention program to teach on task behavior in

the upcoming school year. The following information is provided for you to decide whether you wish your child to participate in the measurement portion of the present study. You may refuse to sign this form and not have your child participate in this study. You should be aware that even if you agree to participate, you are free to withdraw your child from the study at any time. If you do withdraw from this study, it will not affect your relationship with the school, the services it may provide to you or your child, or Missouri State University.

Your permission allows a copy of all information obtained from assessment and interventions to be provided to the Missouri State University staff involved in this study. This information will be kept confidential in closed files at Missouri State University. All school policies on confidentiality will be followed. Information from assessments or observations shared in verbal or written reports only to the school staff who assist your child. These persons will have the information available for parents to review.

Sincerely,

Sara Romans
Ozark High School
(417) 582 5901 ex 3111
sararomans@mail.ozark.k12.mo.us

Title: IConnect Self-Monitoring

PARTICIPANT CERTIFICATION:

If you agree to have your child participate in this study please sign where indicated, then tear off this section and return it to the investigator. Keep the consent information for your records.

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding the study and the use and disclosures of information about my child for the study.

I agree to allow my child to take part in this study. By my signature I affirm that I am the parent/guardian of the child and that I have received a copy of this Consent and Authorization form.

I understand this means he/she may be observed and that information will be used to help the school and my child's teacher support my child.
I also understand that my permission allows for classroom observation of my child's performance and sharing of school records (discipline contracts) with project staff.

____
Child's first and last name

____
Print Parent's name

________________________________ ________________________________
Parent's signature Date

With my signature I affirm that I have been given a copy of this consent form.

I understand that if I have any additional questions about my rights as a research participant, I may contact:

Sara Romans
Ozark High School
(417) 582 5901 ex 3111
sararomans@mail.ozark.k12.mo.us

Dr. Garrison-Kane
Missouri State University Professor
(417) 836-6960
LGKane@Missouristate.edu

Appendix D

Momentary Time Sampling Data Sheet

Observer: ____________________

Student: ______________ Date: __________ Time: _____________ Phase: A1 B1 A2 B2

Activity: ____ Inter-Observer Agreement: Yes No

Codes: On-Task: + Off-Task: -	Occurrence: /

Min	:15	:30	:45	:60	Solicitation of Help Verbal	Gestural	Teacher Prompts Verbal	Gestural	Notes
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
				Total					

*Use shaded columns for matching data with student

Total + __________/40 = ________ x 100 = __________% On-Task

Total - __________/40 = ________ x 100 = __________% Off-Task

Appendix E

Teaching Students How to Use I-Connect Lesson Plan

Purpose: The purpose of this lesson is to teach students how to correctly use the I-Connect self-monitoring application to promote independence through the achievement of higher rates of on-task behavior.

Objective:

- Students will be able to correctly self-monitor their on-task and off-task behavior using the I-Connect application with 80% accuracy or higher.

Mastery Criterion:

- 80% accuracy or higher for 5 consecutive trials

Materials:

- Samsung Galaxy 5.0 Player device (or other Android device with I-Connect application installed)
- I-Connect application
- Teacher data collection sheet (see attached)
- Computer or tablet device that can video record sessions
- Pencil
- Earbuds (only if student chooses to hear sound over vibration)

Preparation:

- Before lesson, type up what on-task and off-task behavior looks like for each student. Print copy for student. Leave space for student to add anything that he thinks should be added to what on-task or off-task behavior looks like.
- For the purpose of this study, students will review videos that were recorded during baseline sessions.

Procedure:

1. Gather materials
2. Instruct student to sit at designated work area.
3. To better achieve motivation from student, the beginning of the lesson should be engaging and student-centered. Ask questions such as:
    a. *"How is the year going for you?"*
    b. *"What are some things you're really proud of?"*
    c. *"What's your favorite class? Why?"*
    d. *"What are you looking forward to for next school year?"*
    e. *"Can you think of anything that are sometimes hard for you to do in school?"*
4. Allow time for the student to think and give his answers (approximately 2-5 min.). Provide specific feedback based on answers. If the student does not mention that he sometimes has a hard time focusing or staying on-task, direct

conversation towards that topic. Tell student that you are going to give him the chance to try something new and exciting to help him focus better in his classes.

5. Before introducing I-Connect, review operational definitions of on-task and off-task behavior. Say:
    a. *"For the rest of this semester, I am going to help you try out a new tool that will help you focus better in your classes so you get the most out of it. This also will help you get ready for jobs in the future. What kind of career would you like to have?"*
    b. Wait for student response, then build on his answer. *"That sounds like a really important job! You will play a very important role at that job, which means your co-workers and supervisor will be counting on you. Why do you think it's important to stay focused and on-task at work?"*
    c. Wait for student response, then build on his answer. *"Any position you take at a job is very important. You will be expected to follow rules and complete the tasks that are given to you. However, this might be difficult to do if you have a hard time staying focused. Let's practice increasing your on-task behavior now. This will help you for the remainder of high school with understanding lessons and turning work in on time. This will also help you on the job where your boss will know that you are reliable and will get the job done. How does that sound?"*
    d. Wait for student response, then say *"Great! Let's start by breaking it down and defining what exactly it looks like to be on-task, and what it looks like to be off-task. Let's start with being on-task. Here's a list of things I came up with of what it looks like when you are on-task."*
    e. Review list with student (list will vary based on student's individual operational definitions). Ask specific questions throughout list to ensure student understands and is following along, such as *"What message might this positive behavior send to the teacher?"* or *"Why is it important to do this in class?"*
    f. Ask, *"Is there anything else you would add to this that you think shows good on-task behavior?"*
    g. Allow time for student to think and provide a response, if any. Add any of the student's ideas to his personal list of on-task behavior.
    h. Say, *"Now that we've talked about what it looks like to be on-task, let's talk about what it looks like to be off-task. Here's a list I came up with of things that would show that you are not focused or on-task."*
    i. Review list with student (list will vary based on student's individual operational definitions). Ask specific questions throughout list to ensure student understands and is following along, such as *"What message might this off-task behavior send to the teacher?"* or *"Why is it important to not do this in class?"*
    j. Ask, *"Is there anything else you would add to this that you think shows off-task behavior?"*
    k. Allow time for student to think and provide a response, if any. Add any of the student's ideas to his personal list of off-task behavior.

l. Say*, "Now that we've talked about what on-task and off-task behavior looks like, we're going to move on to the part where I will show you the tool you will be using to help you stay on-task in your classes. Are you ready?"*
m. Place Samsung device between you and student. Say, *"This is a really cool device that you will get to use in my class for the rest of this semester. On this device is an application called I-Connect. This is going to help you keep track of your on-task and off-task behavior while you are working on an assignment I give you. Are you ready to check it out?"*
n. Login for student the first few times and pull up screen that has start button. Student will be taught at a later time how to log in. For now, the main focus is teaching the student how to answer the questions and knowing what on-task and off-task behavior looks like.
o. Say, *"Every 30 seconds, a question will appear that says 'Are you on-task?'. When you see that question, answer honestly by clicking 'yes' or 'no', and then continue working. You will continue with this for 10 minutes. At the end of the 10 minutes, you and I will compare our responses. I also will be keeping track, but I will keep track on paper. If your answers are the same as mine for at least 80% of the responses, you will get to choose a reward from the reinforcement menu. Do you have any questions yet?"* Answer any questions the student has. If there are no questions, move on to next step.
p. Say, *"When the question appears, it can either vibrate or make a sound. You get to decide which one you'd rather it be. You can choose for it to vibrate, or you can use earbuds and choose a sound. Which would you prefer as we practice together how to use I-Connect?"* Select option that student decides.
q. Say, *"I am going to show you some videos that I took—with permission—of you working independently in my class. We are going to use these videos as practice for reviewing what being on-task and off-task looks like, and so you can learn how to use I-Connect. When I say start, we will watch the video together. When the question pops up, you will answer honestly if you were on-task or off-task at that specific moment in time. Don't answer if you were on-task or off-task any time before or after that point. Choose your answer based on that specific moment. Do you have any questions about that part?"* Answer any questions the student has. If there are no questions, move on to next step.
r. Say, *"Alright, I'm ready if you are! When you click start, we will begin watching the video. I may pause the video to point out and explain why something you were doing was on-task or off-task. After our practice round, we will compare our responses. Our goal is to have at least 80% of our responses the same. Do you have any questions?"* Answer any questions the student has. If there are no questions, move on to next step.
s. Say, *"Click 'Start'."*
t. Collect data with student. Give verbal cues as necessary as student learns how to use application. Fade verbal prompts so the student gets used to

answering visual prompts on his own. Pause as necessary to explain behavior specifically to student.

u. After 10 minutes have passed, stop video and compare data. Calculate matching data using the following formula:
Agreements/20 (# of intervals) = _____ x 100 = _____% Accuracy

v. If student and teacher data matches at least 80%, give student reinforcement menu. Allow him to choose reward, then start 5-minute timer for break. Place in front of student. If the matching data is below 80%, conduct a booster session by following the same procedure in a 5-minute session. Continue with this until student and teacher data matches for at least 80% of the responses, and provide reinforcement contingent upon accuracy.

w. After break is over, say *"We are going to do another practice round for 10 minutes. Is there anything you'd like to go over again before we start?"*

x. Repeat steps s-v.

y. Repeat procedures until student achieves 80% accuracy or higher for 5 consecutive trials.

When student achieves mastery, provide directions and login information. Give him the following directions. Have him practice logging in until he gets to screen that says "Start" at least 3 times. Once he successfully logs in 3 times without support, he is ready to begin.

1. Press top right button on side of phone, then swipe screen to unlock.
2. Open the I-Connect application.
3. Click the green "**Sync**" button.
4. Enter login information. Fill out specific login information for student on index card that student must turn in to teacher following session.
    a. Name
    b. Username
    c. Password
5. The next box that appears will say "Schedule Information for (Student)". Click "**Ok**"
6. This will take you back to the home screen. Sometimes, the previous message appears again. If so, click "**Ok**" again, and then click "**Enter Data**".
7. Click desired class, then click "**Next**".
8. The question "Do you want to self-monitor citizenship goals?" will appear. Click "**Yes**"
9. This will take you to the screen where you can make alert changes if you wish. The default Timer Alert Type is set to vibrate. If you want it to vibrate, move on to next step. If you want it to make a sound, click the arrow in the drop down box and select "Notification Ringtone"
10. Once everything is ready, click "**Start Timer**".
11. Begin working on assignment and answer prompt as it appears.
12. When finished, click "**Stop (Return to Main Menu)**"

13. You will see the “Schedule Information for (Student)” appear again. Click “**Change**”, then click “**Exit**”.
14. Return device and index card with login information to teacher.

Appendix F

Task Analysis for I-Connect Self-Monitoring System

Baseline (A1)

Administration of Curriculum-Based Measurements and Identification of Potential Reinforcers

1. Administer preference assessments to identify potential reinforcers.
    a. Reinforcement Assessment for Individuals with Severe Disabilities (RAISD)
        i. Directly ask students questions to identify potential reinforcers
    b. Reinforcement Inventory for Children and Adults
        i. Directly ask students questions to identify potential reinforcers
    c. Use a Free Operant Preference Assessment to identify potential reinforcers (see attached data collection sheet and procedure for directions)
        i. Conduct at least 3 times towards the end of baseline during 5 minute breaks
2. Administer Curriculum-Based Measurements (CBMs) during baseline sessions.

Baseline Data Collection Procedures

1. Gather materials for session (teacher laptop, teacher data collection sheet, cell phone interval timer application, student task, pencil for student and teacher, Samsung Galaxy device)
2. Place teacher laptop near designated student work area so student is visible and able to be easily observed later during video viewing.
3. Turn on video recording program on laptop via Windows Movie Maker. Begin recording and minimize application so student cannot see himself during recording.
4. Instruct student to sit in designated seat for session.
5. Open interval timer application on phone and set to vibrate every 15 seconds for a 10 minute period. Do not click Start until student is instructed to work independently.
6. Provide directions for task to student (varies based on student and activity). Provide modeling as necessary and instruct student to work independently.
7. Begin data collection immediately following directions given to student to begin working. Each time the phone vibrates, the teacher marks if the student was on-task (+) or off-task (-) for that moment in time, based on pre-determined operational definitions of on-task and off-task behavior.
8. End data collection following completion of 10 minute session, or 40 intervals.
9. Allow the student to take a 5-minute break. Place a visual timer in front of the student and tell the student he is taking a 5-minute break.
    a. For at least 3 data points towards the end of baseline, conduct a free operant preference assessment to observe what activity or activities the student prefers to engage in during that time to identify potential reinforcers.
10. Following completion of 5-minute break, begin recording again.

11. Instruct student to continue working on task.
12. Repeat step 7.
13. End data collection following completion of 10-minute session.
14. Continue with baseline data collection until trends are observed.

Pre-Intervention: Teaching How to Use I-Connect

1. (See attached lesson)

Intervention (B1)

1. Gather materials for session (teacher laptop, teacher data collection sheet, cell phone interval timer application, student task, pencil for student and teacher)
2. Place teacher laptop near designated student work area so student is visible and able to be easily observed later during video viewing.
3. Turn on video recording program on laptop via Windows Movie Maker. Begin recording and minimize application so student cannot see himself during recording.
4. Instruct student to sit in designated seat for session.
5. Open interval timer application on phone and set to vibrate every 15 seconds for a 10 minute period. Do not click Start until student is instructed to work independently and presses Start on the I-Connect application.
6. Provide directions for task to student (varies based on student and activity). Provide modeling as necessary and instruct student to work independently.
7. Instruct student to open I-Connect application. Direct student to go to screen to enter data. Tell student to press "yes" if he was on-task or "no" if he was off-task at each moment in time he is prompted and to continue working after answering question. Allow student to decide if he wants the device to vibrate or if he wants to hear a sound through headphones.
8. The teacher and student should simultaneously click start on their devices to ensure accurate sampling. Each time the teacher's phone vibrates (every 15 seconds), the teacher marks if the student was on-task (+) or off-task (-) for that moment in time, based on pre-determined operational definitions of on-task and off-task behavior. Each time the student's device displays the prompt (every 30 seconds), the student marks if he was on-task (+) or off-task (-) for that moment in time.
9. End data collection following completion of 10 minute session.
10. Allow the student to take a 5-minute break. Place a visual timer in front of the student and tell the student he is taking a 5-minute break.
11. Following completion of 5-minute break, begin recording again.
12. Instruct student to continue working on task.
13. Repeat steps 7 and 8.
14. End data collection following completion of 10-minute session.

Matching

1. Following each 10-minute session, the teacher and student sit down to compare data for matching purposes. The teacher only uses data collected from every 30-second interval so it matches the student's 30-second intervals.

2. Calculate matching accuracy using the following formula:
    a. Agreements/20 (# of intervals) = _______ x 100 = _______% Accuracy
3. If the student achieved 80% accuracy or higher on his data collection, he has the opportunity to choose a reward from his reinforcement menu.
4. Once a reward has been selected, the 5-minute break begins.
5. If the student did not achieve 80% accuracy or higher on his data collection, conduct a booster session.
    a. Booster Session Procedures:
        i. Review operational definitions of on-task and off-task behavior and how to correctly use the I-Connect application.
        ii. Explain that the student can receive reinforcement once he achieves 80% accuracy with his recording. For timing purposes, conduct a shorter session of 5 minutes instead of 10 minutes for booster sessions. Compare data from the 5-minute session. If the student achieves 80% accuracy or higher from booster session, provide reinforcement.

Return to Baseline/Withdrawal Intervention (A2)

1. Repeat procedure from baseline data collection procedures for at least 5 sessions, only do not conduct free operant preference assessment during breaks.

Return to Intervention (B2)

1. Reintroduce I-Connect application and follow same procedures as B1.

Submission of Consumer Satisfaction Forms

1. Following completion of the study, a consumer satisfaction form was delivered to each participant.
2. A separate consumer satisfaction form was delivered to the staff who work with the participants.

Research Journal

1. Qualitative information was obtained during all phases by the observer typing a written reflection at the end of each session

Appendix G

How to Use I-Connect

1. Connect to Wi-Fi
2. Open I-Connect
3. Click green “sync” button
4. Enter login information for student.
    a. Name
    b. Username
    c. Password
5. Click “Ok” when next message appears
6. You should be back at the home screen. If so, click “Enter Data”
7. Click desired class, then click “next”
8. The question “Do you want to monitor citizenship goals?” will appear. Click “yes”
9. This will take you to the screen where you make changes if you wish. The default setting is for the app to vibrate, but students can change it to make a sound if desired.
10. Once everything is ready, click “Start”
11. When finished, click “Done”
12. To change students, click “Change”, click “Exit”, then close out of app.
13. Re-open app, and repeat steps 3-12.

Appendix H

Writing Rubric

	3	2	1	0
Introduction	Clear introduction to topic in an interesting, attention grabbing way	Clear introduction to topic	Introduction is evident but not clear or specific to topic	No introductory sentence(s) towards the topic
Supporting Details	3+ supporting details	2 supporting details	1 supporting detail	No details evident or none that are related to topic
Conclusion	Clear conclusion, summarizes topic in an interesting way	Clear conclusion to the topic	Conclusion is evident but not clear or specific to topic	No conclusion sentence(s) towards the topic
On-Topic	All writing is on topic	Most writing is on topic	Some writing on topic	Writing is not on topic to the prompt
Length of Writing	5+ sentences or 1+ paragraphs	3-4 sentences	1-2 sentences	No complete sentences
Grammar, punctuation, & mechanics	0-1 errors with grammar, punctuation, and mechanics. Strongly communicates message	2-4 errors, still able to follow writing	5-6 errors, writing is difficult to follow	7+ errors and/or unable to understand writing

Student: ______________________ Date: ____________

Score: ____/18

Appendix I

I-Connect Student Satisfaction Survey

1. What did you like about the I-Connect self-monitoring system?

2. Was there anything you did not like about the I-Connect self-monitoring system?

3. Do you feel like you were benefited by the I-Connect system? If so, how?

4. Would you be interested in using the I-Connect system again next year? Why or why not?

5. Would you recommend I-Connect to any of your friends?

On a scale from 1-5, 1 being the lowest and 5 being the highest, how would you rate your overall experience with the I-Connect application? Circle one.

1	2	3	4	5
I didn't like it at all	I liked it a little	I liked it	I liked it a lot	Excellent; I'd like to see more students use it

Other comments:

I-Connect Staff Satisfaction Survey

1. What did you like about the I-Connect system?

2. Was there anything you did not like about I-Connect and/or how it was implemented in your class?

3. Did you observe benefits gained by the student through the use of I-Connect? If so, explain the benefits.

4. Would you be interested in utilizing this intervention in your class in the future for other students who have difficulty remaining on-task?

5. What changes, if any, would you recommend to improve the application and/or the method of implementation?

On a scale from 1-5, 1 being the lowest and 5 being the highest, how would you rate your overall satisfaction with the I-Connect application and the impact it made on the students? Circle one.

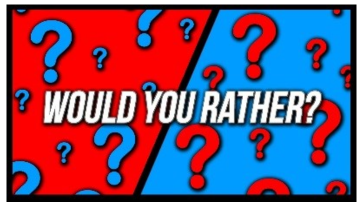
1	2	3	4	5
I didn't like it at all	I liked it a little	I liked it	I liked it a lot	Excellent; I'd like to see more students use it

Other comments:

Appendix J

Reinforcement Menu (Jacob)

"Would You Rather?" questions with staff of choice



Computer time

Listen to music on Pandora

Walk around the building with staff of choice

Reinforcement Menu (Zane)

"Would You Rather?" questions with staff of choice

Computer time

Listen to music on Pandora

Lava lamp

Walk around the building with staff of choice