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Increasing On-Task Behavior Using the I-Connect Application at Home for an Individual with Autism

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INCREASING ON-TASK BEHAVIOR USING THE I-CONNECT APPLICATION AT HOME FOR AN INDIVIDUAL WITH AUTISM

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By

John Joseph Augustine

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ABSTRACT

This study assessed the effects of the research-based strategy, I-Connect self-monitoring application (Wills & Mason, 2014), with an individual diagnosed with autism. I-Connect is an electronic self-monitoring application that was utilized with an electronic device (iPad) to monitor on- and off-task behavior in the home environment. Data were collected using direct observation (e.g., momentary time sampling) for on- and off-task behavior and permanent product for academic accuracy. A reinforcement inventory was also utilized to determine highly preferred reinforcers of the participant. A single-subject withdrawal design (Kazdin, 2011) was used to assess the effects of the I-Connect application on academic on- and off-task behavior of one participant diagnosed with autism. Following the conclusion of the study, both academic on-task behavior increased as well as academic accuracy.

KEYWORDS: autism, self-monitoring, I-Connect, on-task behavior, academic accuracy

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CHAPTER I: INTRODUCTION

Individuals with Autism Spectrum Disorders (ASD) have persistent deficits in social interaction, social communication, and demonstrate restricted and repetitive patterns of behavior, interests, or activities that significantly impair functioning and learning (American Psychiatric Association, 2013). Lord, Brugha, Charman, et al. (2020) noted that ASD is a heterogeneous disorder, and the term 'autism' has been used in various ways. A diagnosis of ASD is reached after an observation of individual behavior and a detailed developmental history acknowledged by caregivers (Lord et al., 2020). A diagnosis of ASD is a lifelong neurodevelopmental condition, mentioned by Cotugno (2009).

Autism requires specialized interventions that directly meet the needs to each individual's academic needs. Specialized interventions are provided for each student with an Individualized Educational Program (IEP) in an educational setting but often are not transferred to the home setting to assist with homework. When specialized interventions are not transferred to the home environment, students with ASD may lack independence that necessitates frequent caregiver prompting during homework activities (Hume, Plavnick, & Odom, 2012). Due to an increase in online learning (i.e., 2020 and 2021) that occurs in the home environment and other variables that may decrease productivity, students with ASD must receive individualized interventions to complete academic activities in the home environment (Hampshire, Butera, & Dustin, 2014). These research-based interventions are needed to treat behavioral challenges (e.g., stereotypy, repetitive movements) and academic deficits that individuals with ASD display in school and home environments.

Self-monitoring is an example of an individualized intervention that treats behavioral challenges and academic deficits among students with disabilities (Beckman, Mason, Wills, et al., 2019; Clemons, Mason, Garrison-Kane, et al., 2016; Crutchfield, Mason, Chambers, et al., 2015; Romans, Wills, Huffman, et al., 2020; Rosenbloom, Mason, Wills, et al., 2016; Wills & Mason, 2014). Self-monitoring is a procedure where an individual systematically observes their behavior and records the occurrence or nonoccurrence of a target behavior that can be easily implemented in different environments (Cooper, Heron, & Heward, 2020). A self-monitoring intervention, especially in the home environment, has the potential to assist an individual with autism to regulate behaviors, and acquire goals as they work towards independence thereby decreasing a caregiver's role over time (Hampshire et al., 2014).

Purpose of the Study

The purpose of this research study was to extend and investigate the effect of the web-based program designed to increase on-task behavior and academic accuracy through the use of I-Connect, a self-monitoring application installed on an iPad Pro 2, for an individual with autism. The participant worked on academic activities (i.e., history) in the home environment. A visual prompt was displayed on the screen every 15-s on the iPad that probed the question, "Are you on-task?" with a 'yes' or 'no' for a response by the participant. The results of this study expected to increase on-task behavior and academic accuracy of homework assignments for the participant, and to further support existing literature on the effects of I-Connect on individuals with autism (Beckman et al., 2019; Clemons et al., 2016; Crutchfield et al., 2015; Romans et al., 2020; Rosenbloom et al., 2016; Wills & Mason, 2014).

This study seeks to contribute to the existing literature in the field of web-based self-monitoring applications and evidence-based strategies to utilize in the field of ASD. Recent research of I-Connect had been used to help students with ASD monitor their own behavior in an education setting (Beckman et al., 2019; Clemons et al., 2016; Crutchfield et al., 2015; Romans et al., 2020; Rosenbloom et al., 2016; Wills & Mason, 2014). This study seeks to investigate the effects of the I-Connect application in the home environment while engaging in homework activities to increase on-task behavior.

In addition to increasing on-task behavior, the use of this application may also increase the academic accuracy of the participant. I-Connect may reduce the amount of caregiver prompts and decrease caregiver reliance in which the application may become student-oriented.

Research Questions

In order to investigate a functional relationship between the implementation of I-Connect as a self-monitoring program and operationally defined on-task behavior, three research questions were assessed:

1. To what extent will the web-based self-monitoring application improve the on-task behavior of an individual with autism in their home setting?
2. To what extent does I-Connect increase the level of accuracy or correct responding in the online assignments completed by the participant?
3. To what extent will the I-Connect application with caregiver implementation improve the on-task behavior of an individual with autism in their home setting?

It was hypothesized that the use of I-Connect would increase the on-task behavior of the participant with autism in their home setting. As a result of an increase of on-task behavior, it was hypothesized that the academic accuracy of the participant's educational assignments would increase. Finally, it was hypothesized that the participant would demonstrate high percentages of on-task behavior within parent implementation on the I-Connect application.

Research Design

A single-subject withdrawal design (Kazdin, 2011) was used to assess the research questions and evaluate the hypothesis for this study. A withdrawal design involves repeated measures of behavior in one setting. The phases in a withdrawal design include an initial baseline phase, and intervention phase in which the independent variable is introduced, and then a return to baseline, in which the intervention is withdrawn and baseline conditions are re-implemented (Cooper et al., 2020). The baseline (A phase) is when no intervention is in effect, while the intervention phase (B phase) is when the intervention is implemented. As stated previously, the baseline phase is when the behavior is observed under conditions before the intervention is applied. During this phase, observations continue until there is a stable rate of response, or until the response did not improve over time (Kazdin, 2011). The intervention phase (B phase) in similar to the baseline in that observation of the behavior is continued, but the intervention is introduced, and observers can test whether the intervention increases from baseline. For this study, a variation of the ABAB design was used to observe behavior for one participant, in which baseline and intervention data were collected, and adding a generalization phase (C phase) after the second intervention phase (ABABC).

In order to demonstrate a functional relationship between the I-Connect self-monitoring application and on-task behavior, the baseline condition (A1 and A2 phase) and the I-Connect self-monitoring intervention condition (B1 and B2 phase) were examined to assess if the on-task behaviors increased when and only when the intervention was implemented, as well as the C phase when I-Connect was administered by the participant's caregiver. The design begins with observations of baseline performance, and after the baseline data has reached a stable rate, the I-Connect intervention was applied to the participant. After a stable rate and an increase of on-task behavior in the intervention phase, the I-Connect application was removed to observe baseline data without the intervention. After stable rates in the second baseline phase, I-Connect was re-introduced to determine the effects of the intervention. A functional relationship was determined if the effect of the intervention is demonstrated when a change in each participant's on-task performance when I-Connect was introduced.

Social Validity

Students with ASD may engage in off-task behavior that may result in low academic accuracy and disruption of other members of the home environment (Blicha & Belfiore, 2013). Since the location of this study was conducted in the home environment, individuals with autism may engage in off-task behaviors around their home environment or disrupt members living in the home. The National Autism Center (2009) reported that evidence-based practices should be implemented across multiple settings, which included the home setting. The implementation of technology based self-monitoring procedures may increase the independence of the individual within the home environment (Beckman et al., 2019; Clemons et al., 2016; Crutchfield et al., 2015; Romans et al., 2020; Rosenbloom et al., 2016; Wills & Mason, 2014).

CHAPTER II: REVIEW OF LITERATURE

Autism Spectrum Disorders

A defining feature of autism spectrum disorder (ASD) is the presence of an impairment in the nature and quality of social and communicative development which is influenced by biological and environmental circumstances of the individual. Individuals with autism demonstrate persistent deficits in social communication and interaction, as well as restricted, repetitive patterns of behavior, interests or activities (American Psychiatric Association, 2013). Due to the social communication and restricted, repetitive pattens of behavior the individuals with autism display, their educational and learning experience may be affected, especially in the home environment.

Individuals diagnosed with autism receive individualized education programs (IEP) from the school they attend if their educational performance is adversely affected. Within the IEP, students receive individualized support and instruction from evidence-based practices due to their specific area(s) of deficit. It has been documented that evidence-based practices are critical for individuals with autism in the school setting (Romans et al., 2020), but it has not been well documented on the treatment of deficits among individuals with ASD in the home environment for educational achievement (Hampshire et al., 2014). The purpose of this abbreviated review of literature is to discuss executive functioning among individuals with ASD, self-management and self-monitoring, with an increased focus on electronic self-monitoring and homework.

Executive Function Among Individuals with ASD

Executive function are behaviors that are exhibited in individuals that are typically considered to be goal-directed or their problem-solving behaviors. These behaviors involve a flexible and strategic plan of sequences and an ability to deter a response or defer it to a more appropriate time (McEvoy, Rogers, & Pennington, 1993). Robinson, Goddard, Dritschel, and colleagues (2009) state that individuals with ASD exhibit an impairment of their executive functions. McEvoy et al. (1993) investigated if children with ASD have poor executive functioning skills when compared to children who are developmentally delayed with similar mental age and typically developing peers. The procedures of the study implemented four tasks that included: a Piagetian AB error task, a delayed response task, a spatial reversal task, and an alteration task. A social communication measure was also used to assess the social and communication skills of the students. The communication measures three functions which included social interaction, joint attention, and behavior regulation.

In the seminal study, McEvoy and colleagues (1993) concluded that the group of students with ASD demonstrated deficits in joint attention compared to the developmentally delayed students and the neurotypical students. Results from the executive function tasks concluded that the children with ASD had more perseverative errors compared to the other students (McEvoy et al., 1993). It was concluded that executive function deficits may not be unique to children with ASD but could still be a core deficit with the disorder.

Another study, focused on the increase of independence among children with ASD, was conducted by Hume, Loftin, and Lantz (2009). The authors state that deficits of executive function can decrease independence among individuals diagnosed with ASD. Hume and others (2009) state that one intervention that can be successful to promote independence is self-

monitoring because the individual is taught to discriminate their own behavior and increase independence.

Self-Management

Self-management is a skill that many individuals demonstrate in today's society. It is critical to identify the use and the benefits of a self-management procedure (Cooper et al., 2020). Maag (2016), states that the teaching of self-management can provide a means for teachers to spend more time teaching and less time trying to control students' undesirable behaviors and there is a possibility that appropriate behaviors will increase over time and be generalized into new settings (p. 290). Maag (2016) provides three steps in order for self-management to occur, which include: self-monitoring, self-evaluation, and self-reinforcement. There are many self-monitoring strategies that can be used as interventions to increase performance and/or attention (Bruhn & Wills, 2020; Maag, 2016). The following pages will provide an overview of self-management, with description of certain techniques, juxtaposing literature on the self-management term, itself, and self-monitoring overview.

To begin, it is important to define and understand the term self-management. Cooper et al. (2020) define self-management as behavior a person emits to influence another behavior (p. 682). Maag (2016), similarly agrees, defining self-management as the range of activities, measurable or not, in which individuals may engage to increase or decrease the probability of certain behavior. Self-control involves the responses of the target behavior that is to be controlled or changes and the behavior displayed to control or change the target behavior (Maag, 2016). Cooper et al. (2020) state the term self-control and self-management cannot be interchangeable because they have different meanings. Self-control, or impulse control, entails

responding to achieve a delayed, but larger and high-quality reinforcer, instead of acting to obtain an immediate, less valuable, reinforcer. Self-control can be a goal or outcome of any intervention implemented, but Maag (2016) believes that self-control is only related to self-management. Maag (2016) believes the term self-control and self-management are interchangeable and can be, "irrelevant" to discuss which term to use (p. 290). Later, he states that self-management is the more desirable term used throughout the profession. Understanding the terminology of self-management will lead to the implementation and understanding of self-monitoring as an intervention to increase or decrease behavior.

A self-management meta-analysis conducted by Lee, Simpson, and Shrogen (2007) noted that self-management interventions continue to be an effective behavior management intervention for students with autism. Results from 34 students across eleven studies indicated a reduction in problem behaviors, a result from the self-management procedure. Integrated in the results were students who were taught to self-manage verbal responses and attempts (Koegel, Koegel, Hurley, et al., 1992), increase social communicative behaviors (Koegel & Frea, 1993), increase initiations (Morrison, Kamps, Garcia, et al., 2001), increase appropriate conversation (Newman, Buffington, & Hemmes, 1996), increase schedule following (Newman, Buffington, O'Grady, et al., 1995), increase responding (Newman, Reinecke, & Meinberg, 2000), living skills (Pierce & Schreibman, 1994), play skills (Reinecke, Newman, & Meinberg, 1999; Stahmer & Schreibman, 1992), interactions with nondisabled peers (Shearer, Kohler, Buchan, et al., 1996), and social interaction (Strain, Kohler, Storey, et al., 1994).

Self-Monitoring

Self-monitoring is a procedure where a person systematically observes their behavior and records the occurrence or nonoccurrence of a target behavior (Cooper et al., 2020). Maag (2016) and Cooper and colleagues (2020), discuss the effect that reactivity or reactive effects when implementing a self-monitoring procedure. Reactivity, which is not mentioned by Bruhn and Wills (2020), refers to a person's behavior change when that person observes and records its occurrence. Cooper et al. (2020) state that reactivity is highly variable and must be minimized, while Maag (2016) believes reactivity is what can decrease inappropriate behavior.

It is mentioned that there are two types of self-monitoring: self-monitoring attention (SMA) and self-monitoring performance (SMP) (Maag, 2016). Maag (2016) continued to state that there must be two different procedures for each type of self-monitoring. Although it is revealed that there are different strategies used to treat behaviors using self-monitoring, there is not a specific term used to treat for certain behaviors (Cooper et al., 2020). To further discuss SMA, Maag (2016) states that an auditory tone is required while implementing the self-monitoring procedure to prompt students to fill out their sheet, click a button, or circle a face.

As mentioned earlier, Maag (2016) states that there are two self-monitoring interventions that can be used for students, SMA and SMP. These two self-monitoring styles are very similar and contain three requirements. First, is self-observation. Self-observation occurs when students/individuals become aware of their own target behavior. It is essential that target behaviors are operationally defined for accurate discriminations to occur. The next requirement of any self-monitoring intervention is self-recording. Self-recording requires students/individuals to record the frequency, duration of a target behavior or situations in which the behavior occurs. The style of the self-recording can be variable with the use of cards, tokens, or technology-based self-monitoring, as mentioned by Bruhn and Wills (2020). The last required component of a self-

monitoring system is self-graphing. The self-graphing requirement is only mentioned by Maag (2016) but involves having students take the data from the self-monitoring cards and chart their data on a graph. Not mentioned by Maag (2016), is self-evaluation. Cooper and colleagues (2020) state that an important component for self-monitoring interventions, students, and teachers is a self-evaluation. Self-evaluation, or self-assessment, compares the performance with a predetermined goal or standard that is made by the teacher, student, or individual themselves (Cooper et al., 2020, p. 694). Understanding components of a self-monitoring intervention is important to implementing a successful intervention for students.

Although a self-monitoring system is important in increasing appropriate behavior and decreasing inappropriate behavior, there are certain dimensions that should be targeted by a self-monitoring intervention. A person should self-monitor the dimension that, should desired changes in its value occur, would yield the more direct and significant progress towards their self-management goal (Cooper et al., 2020). There have been numerous studies that have examined the question of whether students should self-monitor their on-task behavior or their academic performance or productivity. Some researchers have reported self-monitoring of attention more effective (Harris, Friedlander, Saddler, et al., 2005; Kneedler & Hallahan, 1981), while other research has found self-monitoring performance to be more effective (Lam, Cole, Shapiro, et al., 1994; Maag, Reid, & DiGangi, 1993; Reid, 1996). Cooper and colleagues (2020) suggest teaching students to self-monitor a measure of academic productivity (e.g., number of problems or items attempted, number of problems of items correct) rather than whether they are on-task. Cooper et al. (2020) go on to say that increasing on-task behavior, whether by self-monitoring or by reinforcement, does not necessarily result in collateral increase in productivity.

Electronic Self-Monitoring. I-Connect is a self-monitoring application that probes questions such as “Are you on task?” and “Are you being appropriate?” at fixed or variable intervals. Students respond with a “Yes” or “No” by tapping the button on the screen. The application, for Android or iOS, offers options for the notification that includes a flashing screen, a chime notification, or a vibration. Bruhn and Wills (2020) note technology developments in self-monitoring that alter some of that Maag (2016) noted as essential. Maag (2016) also mentioned that, following the completion of a self-monitoring session, the student is required to fill out a graph themselves to report their progress (p. 293). I-Connect and Score It are two self-monitoring applications that will graph results from the self-monitoring session, following the conclusion of the session. This way, the student is able to visually analyze the data from the session, compared to other sessions. The I-Connect application graph can be selected by the teacher on whether it is a bar or line graph. As stated previously, there is a debate on the terms used for self-monitoring but there is a wide agreement on which behaviors should be targeted.

The I-Connect self-monitoring application has been used in numerous studies in recent years (Beckman et al., 2019; Clemons et al., 2016; Crutchfield et al., 2015; Romans et al., 2020; Rosenbloom et al., 2016; Wills & Mason, 2014), and is automatically set up to prompt self-monitoring questions such as, “Are you on task?” and “Are you being appropriate?”, as previously stated. Although they are pre-entered in the application, it is possible to edit these configurations of texts and to add a new one. I-Connect has been used to reduce stereotypy of middle-school students with autism, the engagement and productivity of elementary students with autism, and increase on-task behavior for three high-school students with disabilities (Bruhn & Wills, 2020). All three of these research studies implemented the configuration text of “Are you on-task?” while measuring on-task behavior and sometimes used as a self-monitoring

package to measure productivity. Similarly, each student either increased their on-task time in their classroom or reduced their inappropriate behavior. Future research must be conducted to find the effects that the I-Connect self-monitoring application has on productivity for students in school. There are other technology-based self-monitoring applications that measure productivity.

SCORE IT is another technology-based self-monitoring application that can be programmed to occur on an interval-based system or used for an instructional activity (Bruhn & Wills, 2020). The instructional activity-based system was developed originally to correspond to the educational programming in certain targeted reading intervention curriculum, such as READ 180 and System 44, in which students begin with whole-group instruction and then rotate through a series of small-group or individual activities. Functionally related academic engagement and productivity have been shown in research studies using the SCORE IT self-monitoring application.

Homework. Homework is schoolwork that students are to complete in the home environment (Corno, 1996). Certain skills and behaviors must be emitted by individuals to fulfill the homework activities which include planning (i.e., completing different assignments in time), flexibility, and monitoring (i.e., managing progress, behavior, checking for mistakes; Endedijk, Denessen, & Hendriks, 2011). All three of these behaviors are critical to the completion of homework assignments and are established from executive functioning (Endedijk et al., 2011). As stated previously, individuals with ASD demonstrate low levels of executive functioning which leads to poor planning, flexibility, working memory, and verbal fluency (Endedijk et al., 2011). Pellicano (2012) also states that poor executive functioning skills are manifested as perseverative responses (i.e., getting "stuck" on homework problems). While low executive

functioning levels are common among individuals with ASD, it remains to be said that executive functioning plays a considerable role in individual's development.

Students with ASD and low executive functioning skills may affect their social competence, theory of mind (ToM), adaptive behavior, and success in school (Pellicano, 2012). It is widely known that success in school depends on work inside and outside of the classroom in which students must demonstrate skills in remembering and following instructions, completing tasks independently, transitioning between assignments, and decreasing inappropriate behaviors. It also requires students to pay attention to a task, avoid distractions, set goals, and organize materials (Stockhall, 2017). Stockhall (2017) states that the use of auditory and visual prompts to evoke particular behavior may support students with ASD and the completion of homework.

A study conducted by Endedijk and colleagues (2011) show a negative relationship between student's levels of executive functioning and homework difficulties. Parents of the students from the study indicated their students have high levels of difficulty in completing homework assignments. The use of homework for students with ASD may depend on if the student can acquire planning and monitoring skills. Endedijk and colleagues (2011) suggest adequate support is needed during homework with cueing procedures with the intention of teaching monitoring skills and behaviors.

Blicha and Belfiore (2013) conducted a study that implemented automated prompting and self-monitoring for homework completion for a student with ADHD and ASD in fifth grade. A wristwatch was provided for a student as an antecedent manipulation that vibrated to prompt the student to grab his homework materials, as well as a self-monitoring checklist for homework that was to be completed. The student increased the number of homework tasks completed for intervention and the follow-up.

For students diagnosed with ASD that exhibit low executive functioning skills, self-monitoring skills must be taught to reach independence in education. Self-monitoring requires the ability to attend to a task, transition from one task to another, and discriminate between behaviors. A self-monitoring procedure with auditory and visual prompts can lead to success in homework completion and accuracy and can later lead to better skills or remembering, following instructions, and transitions for school.

CHAPTER III: METHODOLOGY

Setting

The study was conducted in the setting of the home environment for the participant. The table (34 in by 34 in) and chair that were provided for the research study was perpendicular to the front door, placed in the corner of the home's living room.

Research Approval

A Human Subject Institutional Review Board (IRB-FY2021-247) application was submitted prior to the beginning of this study. In addition to the IRB approval, parent permission was also provided and received to implement the intervention, as well as have access to the home setting. The Missouri State University IRB approved the study on November 14, 2020 (See Appendix A for Missouri State University Institutional Approval Letter). The parent permission was received on November 16, 2020 (See Appendix B).

Participant

The participant for this study had received a medical diagnosis under the Autism Spectrum Disorder, Diagnostic Statistical Manual, 5th edition. In addition to his diagnosis of autism, Ron engaged in a high percentage of off-task behaviors in the home and educational setting. His academic behaviors and work completion were lower than same age peers and he struggled to complete his assigned homework. Two years prior to this study, this participant worked with the first author in his classroom environment. At the time, a positive relationship with the parent was established which provided the researcher access to this participant for the

implementation of the current study and was selected to increase his time on-task during academic activities and to increase independence and academic percentage. Ron was a 13-year-old 8th grade student diagnosed with autism spectrum disorder (ASD) from a pediatric neurologist. Ron currently resides with his mother and his 15-year-old sister. Ron is a Caucasian male.

Dependent Variables

Three dependent variables were measured for this study. The first two dependent variables measured were off-task and on-task behavior, respectively. Ron's *off-task behavior* were gazing, out of seat, disturbances, inappropriate vocalizations, and refusal to comply. Gazing was defined as eyes focused on stimuli other than materials for the homework activity instructed by the caregiver for 3-s or more. Out of seat was defined as standing or moving more than one step away from the chair when instructed not to. Disturbances were defined as an occurrence of fidgeting with table, belongings (e.g., banging computer keys, picking nose), speaking to himself while his eyes are not on the activity, or any objects on the chair or table that are not permitted. Inappropriate vocalizations were defined as talking about subjects or topics unrelated to the homework activity or requesting for other members of the home without permission from the caregiver or researcher. Refusal to comply was defined as not following caregiver or researcher related to the task.

On-task behaviors included writing, reading, appropriate vocalizations, typing, and listening. Writing was operationally defined as holding a writing utensil appropriately (with appropriate materials, while eyes are on the activity. Reading was defined as looking at the stimuli (i.e., books, iPad, Chromebook) and making an attempt to complete the reading and

assignment. Appropriate vocalizations were defined as appropriate requests for immediate needs (i.e., help) or on-topic conversational exchanges as directed by the caregiver or researcher. Typing was defined as hands on the Chromebook in an appropriate manner, making an attempt of typing or completing an activity. Listening was defined as eyes on the activity and actively participating in the assignment.

The third, and last, dependent variable was the percentage of accuracy on the academic permanent product of the academic assignments. It was hypothesized that an increase of on-task behavior for Ron would result in high academic accuracy in the home environment. Permanent products were collected from student online and tangible work assignments. History/Social studies was the academic subject that was measured for Ron. See Appendix C for the permanent product grading rubric.

Measurement. A momentary-time sampling measurement system (see Appendix D) was used to record Ron's on and off-task behavior. The researcher collected data on a 15-s interval, and the same interval was set on the I-Connect application for Ron based upon his inter-response time (IRT). During the session, along with scoring the behavior of the participant, the researcher would record if the participant agreed with recording his on or off-task behavior. Following the conclusion of the session, the researcher would meet with the participant to go over the percentage that the researcher and student agreed upon. Each session was recorded on a University iPad to later record data and collect interobserver agreement (IOA).

Interobserver Agreement. On-task, off-task, and academic accuracy were all measured in this study, in which the primary researcher collected data across all of the phases. One other observer was selected to collect interobserver agreement throughout the study. The secondary observer was a Graduate Assistant for the Department of Special Education and a Masters

student in the Autism Spectrum Disorders program. The secondary observer collected data for 40% of the sessions for IOA across all phases of the study. An Excel spreadsheet with all the sessions was created to randomize the sessions to be scored for and calculated for IOA.

Interobserver agreement for on and off-task behavior were collected through the viewing of the recorded sessions where an interval timer was used for the secondary observers to collect the data simultaneously. Agreements from the on and off-task behavior were calculated by the total amount of agreements, divided by the total number of intervals (agreements plus disagreements), and then multiple by 100 to find the percentage of accuracy. An IOA percentage of 80% or higher was required for each session.

Interobserver agreement for the percentage of accuracy on academic assignments was calculated by referencing the rubric that was created to score permanent products. Permanent product total count was calculated, where the smaller count was divided by the larger count and multiplied by 100 to find the percentage for interobserver agreement. Again, a percentage of 80% or higher needed to be met for each IOA calculation.

Research Design

As stated previously, a single-subject withdrawal design (Kazdin, 2011) was utilized to evaluate the effectiveness of the I-Connect application and Ron's on-task behavior. The withdrawal design involved repeated measures of Ron's on-task behavior with an initial baseline phase, intervention phase in which I-Connect was introduced, a withdrawal of the intervention, and then a return to intervention. Baseline (A phase) was when no intervention was in effect and when the behavior was observed under conditions before the I-Connect intervention was applied. The baseline phase continued until there was stable percentage of behavior, or until the behavior

did not improve. Similarly, to the baseline phase, the intervention phase (B phase) continued to measure Ron's on -and off-task behavior but within the utilization of the I-Connect application. For the current study, a variation of the withdrawal design was assessed with the addition of a generalization phase (C phase) after the second intervention phase in which sessions were caregiver-led.

Independent Variable

The independent variable investigated in this study was an electronic self-monitoring application named I-Connect. The self-monitoring application, I-Connect, was installed on two University owned iPad Pros. The web-based self-monitoring application was originally created to decrease the amount dropouts for at-risk students in secondary education (Wills & Mason, 2014). Since then, much research has been conducted to expand the use of I-Connect by increasing on-task behavior of students in a high school setting (Romans et al., 2020), students who pursued post-secondary education (Huffman, Bross, Watson, et al., 2019), and to reduce stereotypic behavior among two students with autism (Crutchfield et al., 2015). The application features a customizable visual cued screen for individuals to self-monitor their own behavior. For this study, a visual cue, followed with the vibration of the iPad asked the question: "Am I on-task?" every 15 s. Along with the question, there is an option below where the participant can either answer "yes" or "no."

Sessions in this study were based upon further research conducted by Romans et al. (2020), which had 15 min sessions for each participant. Following each session, the participant was provided self-determined reinforcement if they self-recorded with 85% accuracy or higher. If the student was not able to accurately self-record their own behavior with 85% accuracy or

higher, there was a booster session on what on and off-task behavior is to provide additional support on the self-monitoring process. Following the conclusion of the session, the participant and researcher would review the data collected and the graph of percentage of on-task behavior provided by the I-Connect application. If the participant correctly self-recorded with 85% accuracy or higher, they were provided reinforcement that was determined from a reinforcement menu with highly preferred items/activities, based on reinforcement inventories and indirect assessments.

Materials

The I-Connect application was installed on two University owned iPad Pros. Wi-Fi was available in the participant's home to ensure the I-Connect application could be used. The application was customized for Ron to either vibrate, flash screen, or a bell as an auditory prompt. The second University iPad was set up in the living room (measurement) to video record the sessions. A momentary time-sampling data sheet and a pencil were materials needed to collect data for the on and off-task behavior of the participant. Other materials that were needed for the present study were easyCBM passage reading fluency sheets, along with the reinforcement inventory. Task analyses were included in the appendices which included a lesson plan for the rationale of I-Connect (Appendix E), a task analysis of the procedures (Appendix F) how to access the I-Connect application (Appendix G).

Procedures

Baseline (A1). Baseline sessions were recorded via iPad and the researcher was not present. An Apple iPad 2 was placed on a bookshelf cattycorner to the participant's work area in

that it was unrecognizable to the participant. Ron's caregiver was instructed to start the video on the iPad for 15-min and stop the video following the conclusion of each sessions.

Following the conclusion of the six baselines sessions, Ron was administered easyCBM reading probes (Alonzo, Tindal, Ulmer, et al., 2006) to determine an instructional level of reading. Then, Ron was assessed the Reinforcement Inventory for Children (Reinforcement Inventories for Children and Adults, 1993), in which some questions were modified to be more individualistic, and some were omitted because they were not appropriate for the current study. The results of the reinforcement inventory were used to develop potential and appropriate reinforcers to deliver in the home environment.

Training. After all baseline sessions, easyCBMs, and reinforcement sessions were conducted, Ron was trained to use the I-Connect application (i.e., sign-in and setting) and taught to discriminate between his on-task and off-task behaviors based upon a task analysis. A rationale to the implementation was provided to Ron, in which the researcher explained I-Connect will help him in school. Three training sessions were administered in which Ron and the lead researcher viewed baseline sessions while Ron scored his behavior on the I-Connect application, and the research collected data on the momentary time sampling data sheet. The first training session, the researcher provided additional prompts to Ron to score his behavior, along with the I-Connect prompt, every 15-s interval. The second training session, the researcher only prompted Ron to score his behavior if he did not respond to the auditory and visual prompt from I-Connect. The final training session, the researcher did not provide any additional prompts. After each training session, the researcher collaborated with Ron for accuracy of responses. A mastery criterion of 85% accuracy for three consecutive sessions for discrimination of on -and off-task behavior was required before the transition to the intervention phase.

Intervention (B1). After Ron had met the 85% accuracy for three consecutive sessions, the intervention was introduced. For intervention sessions only Ron and the main researcher were in the room. Prior to the on-set of the session, Ron was prompted to sign-in to the I-Connect application to monitor his behavior and was prompted to open up videos and assignments to complete for homework. When the session began, the researcher moved to a location in the room that Ron was not able to see. For each session, the I-Connect application was set-up to provide auditory and visual prompts every 15-s that probed, "Are you on-task?" in which Ron would select 'Yes' or 'No.' The 15-s interval was used due to Ron's IRT, in which in baseline sessions, Ron's longest duration was approximately 30-s. The primary researcher collected data with the same intervals at the time of the session.

When the session had concluded, the primary researcher and participant would compare and contrast the data that was collected, and to determine if Ron accurately recorded his on -and off-task behavior to meet the 85% criterion. If the 85% accuracy was met, Ron was provided with a reinforcement menu (See Appendix H) based upon high-preferred items or activities from the reinforcement inventory. If the 85% accuracy was not achieved, a booster session occurred in which the researcher and participant read through the operational definitions and how to discriminate between behaviors on the I-Connect application.

Withdrawal (A2). Following a successful intervention phase, the I-Connect application was withdrawn. Following an extended break from school, data collection continued for the withdrawal phase and procedures were similar to those in the first baseline phase. The primary researcher did not attend, and Ron's caregiver placed the iPad cattycorner to the work area to record sessions for 15-min.

Training. After five withdrawal sessions, training of the I-Connect application was taught again due to the extended time without the I-Connect application. Again, three training sessions occurred in which Ron had to score his on -and off-task behavior with at least 85% accuracy when he viewed baseline sessions. The first session the primary researcher prompted on 15-s interval along with the I-Connect application. For the second training session, the researcher only provided prompts if Ron did not respond the I-Connect prompts, and the researcher did not provide any prompts during the final training session.

Return to Intervention (B2). Following the completion of the withdrawal and training sessions, I-Connect was re-introduced to Ron in which sessions were identical to those in B1. Ron was prompted to open the I-Connect application to use for his homework. The main researcher moved to a location in the room that Ron could not see. Each session, the I-Connect application was set to provide a visual and auditory prompt on a 15-s interval. When the 15-min session concluded, the researcher and Ron would compare and contrast the data, and if Ron had accurately recorded 85% of his behavior. If Ron met the 85% criterion, he was provided access to a reinforcement menu to select highly-preferred items. If the 85% criterion was not met, a booster session was incorporated.

Generalization. Finally, a generalization phase was incorporated to assess the effectiveness of the I-Connect application in the absence of the primary researcher. First, the primary research trained Ron's caregiver how to implement and utilize I-Connect. After the caregiver had been trained, sessions were completed similar to those of previous intervention sessions. Ron's caregiver prompted Ron to open the I-Connect application and record his on -and off-task behavior during homework time.

Consumer Satisfaction

Following the completion of the study, a consumer satisfaction (See Appendix I) form was completed with Ron in the form of an interview. The participant was interviewed and asked five, open-ended questions about the I-Connect application, with the sixth questions being a rating (scale 1-5) on their experience with the I-Connect application. The interviews were recorded on the iPad to refer to later if any answer was missed. A separate consumer satisfaction from was given to the caregiver. This form was similar in that it had five, open-ended questions about the I-Connect application and the progress of their child. The final question probed if the parent was to consider using I-Connect in the future. The form was given to a researcher after the final session of the study.

CHAPTER IV: RESULTS

Participant One

Baseline (A1). Ron was observed in his home environment while completing history assignments assigned to him from his current Junior High School. The on-task data obtained across the six baseline sessions were 40%, 0%, 0%, 52%, 55%, and 25%, with an average of 29% on-task behavior. Permanent product data were also collected during the baseline sessions in which Ron earned 0% accuracy across all six sessions. Ron was then administered a reinforcement inventory (Reinforcement Inventories for Children and Adults, 1993) to identify highly-preferred stimuli to be included in the reinforcement menu. During completion of the reinforcement inventory (Reinforcement Inventories for Children and Adults, 1993), Ron stated that his favorite activities are those that include arts and crafts and being alone. Some potential reinforcers identified from this survey included clay, age-appropriate videos on YouTube ®, drawing, creating figures from aluminum foil, and being by himself.

Training. As previously stated, prior to the onset of the I-Connect intervention, Ron received instruction on discrimination between on-task and off-task behavior. Instruction was comprised of three sessions in which Ron would view his own behavior from a previously completed baseline session. A mastery criterion of 85% or higher had to be met for three consecutive sessions for I-Connect to be implemented. Ron's accuracy of his data collection during the three training sessions were 96%, 95%, and 100%, respectively.

Intervention (B1). Following the three successful training sessions, I-Connect was implemented during Ron's academic work time in his home environment. Ron's rate of on-task behavior was 98%, 95%, 95%, 93%, 100%, and 98%, with an average of 97% on-task behavior.

Ron's accuracy of self-monitoring his behavior during the six intervention sessions were 98%, 95%, 97%, 93%, 100%, and 98%, respectively. When I-Connect was introduced, Ron earned scores of 20%, 0%, 50%, 70%, 80%, and 80%, respectively on data collected upon permanent product of accuracy of history assignments. After six intervention sessions, a break in school occurred and the intervention was withdrawn.

Withdrawal (A2). After the six sessions of I-Connect, the application was removed, and the researcher did not attend any sessions during the withdrawal of the intervention. As for the baseline and withdrawal phase, the participant was instructed by the caregiver to work on his history homework. The caregiver placed the iPad to record sessions and after the conclusion of the session, researchers collected data of on-task and off-task behavior from the recorded sessions. Five withdrawal sessions were completed, and Ron's on-task behavior were 33%, 0%, 43%, 43%, and 3% with an average of 24% on-task. During the withdrawal phase, similar to the first baseline phase, Ron did not work on any assignment or submit and work, therefore he earned 0% academic accuracy for all five sessions in the withdrawal phase.

Training. Then, the I-Connect application was reintroduced to Ron, beginning with 3 training sessions. As stated previously, Ron was provided direct instruction for the discrimination of his on- and off-task behavior. The mastery criterion was again set at 85% accuracy for three consecutive sessions, and Ron accurately recorded his behavior with 98%, 100%, and 98%, respectively.

Return to Intervention (B2). After the training sessions, the intervention was introduced. Ron's on-task behavior for the second intervention phase was 92%, 98%, 95%, 98%, 93%, and 95% respectively. When the intervention was added again, Ron's academic accuracy assignments increased to 50%, 0%, 10%, 50%, 60%, and 80% respectively.

Generalization. Following the completion of six sessions when I-Connect was re-introduced, a generalization phase was incorporated to assess the effectiveness of I-Connect when the caregiver instructed Ron to open the application and work on homework. During these sessions, the first author was not present. Ron's on-task behavior for the first sessions was 15% on-task. During this session, Ron placed his phone on the computer screen and attended to the phone video rather than his homework. Ron's on-task behavior increased in the second session, but still remained at baseline levels with 68% on-task. During the second generalization session, Ron consumed a popsicle midway through the session. Ron's third session of generalization increased to 85% on-task and his fourth and final session, Ron was 72% on-task. Data of Ron's accuracy while recording his own behavior did not occur in generalization because of the positioning of the I-Connect application. See Figure 1 for a visual representation of Ron's on- and off-task behavior. Also, see Figure 2 for a visual representation of Ron's academic accuracy across phases.

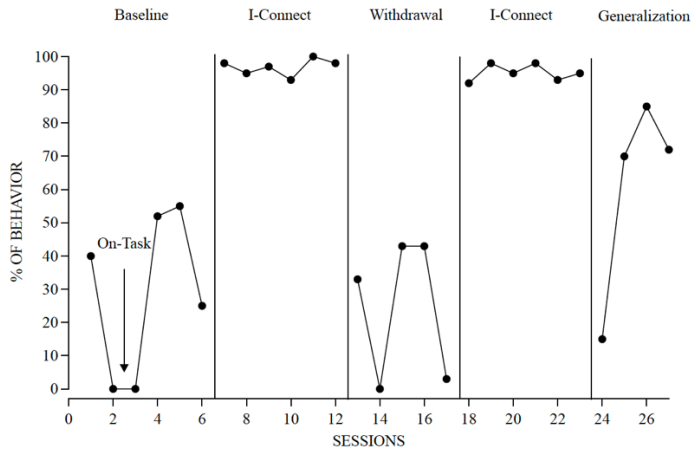

Figure 1. Percentage of Ron's on-task and off-task behavior.

Matching. As an extra measure of the independent variable, matching between the primary researcher and participant of the responses to on- and off-task behavior were collected throughout the training and intervention sessions. During the 15-min training and intervention sessions, the participant and primary researcher recorded on-task or off-task at the end of every 15-s interval. Matching of responses was conducted after each session had concluded to confirm accurate responses to the I-Connect prompt, to ensure the reinforcement menu was provided to Ron when he met the 85% criterion, and to ensure if a booster session was required. The matching data were calculated by calculating the total number of agreements, divided by the total number of opportunities to respond and multiplied by 100 to get a percentage.

Matching data were collected and calculated for 100% of the training and intervention sessions. The first training phase, Ron recorded his on -and off-task behavior with an average of 97% accuracy (range: 96-100%). Ron accurately recorded his behavior in the first intervention phase (B1) with an average of 97% (range: 93-100%). Again, after the second phase of training sessions had been completed, Ron accurately recorded his behavior at an average of 99% (range: 97-100%). The last intervention phase (B2), Ron's average of accurate responses was 95% (range: 92-98%).

Consumer Satisfaction

After the conclusion of sessions, consumer satisfaction forms were provided to Ron and his caregiver that probed questions about the utilization of I-Connect in the home environment. First, Ron answered the consumer satisfaction in the form of an interview where the primary researcher asked him questions about the application and Ron responded. Ron stated that he liked the I-Connect application and that it helped him with his homework. Before the utilization

of the application, Ron said he never finished or worked on his homework, but the I-Connect application helped him get homework completed. Ron specified that I-Connect was the best application ever, although he would like the application to chime, vibrate, and flash concurrently.

Ron's caregiver answered the consumer satisfaction similarly. Ron's caregiver confirmed that the utilization of I-Connect in the home environment helped Ron remain on-task during his academic assignments. Ron's caregiver stated that she observed Ron to assess his on-task behavior and that she loved the utilization of the application in home. Ron's caregiver suggested one-change; to implement the I-Connect application in a classroom setting.

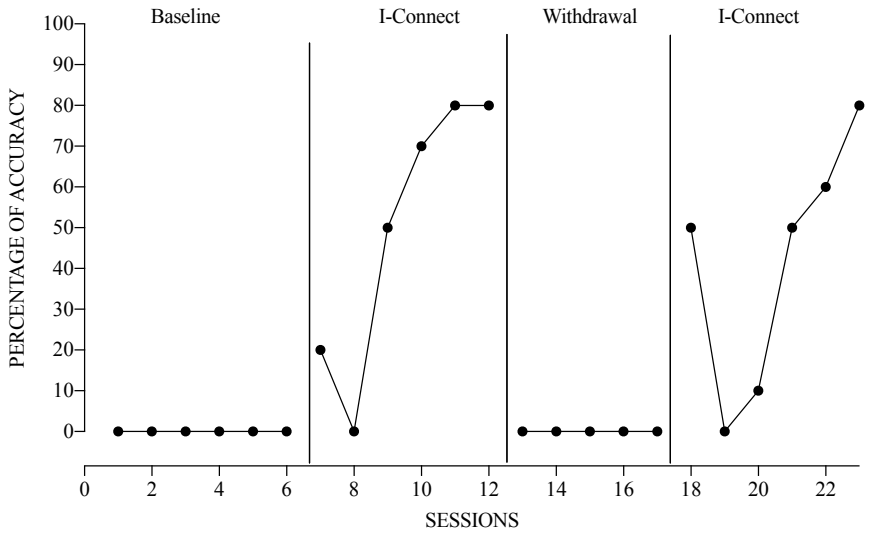

Figure 2. Percentage of correct responses on academic assignments.

Fidelity of Treatment

Fidelity of treatment (Appendix J) was scored and calculated for interobserver agreement for intervention sessions. Fidelity of treatment was scored to ensure the reliability of the administration of the I-Connect application to Ron. A criterion of 80% or higher was required for

each session. If the primary researcher did not meet the 80% criterion, a booster session was indicated. For each intervention session, fidelity of treatment scored 100%.

Interobserver Agreement

All sessions were video recorded to conduct and calculate interobserver agreement. The secondary observer, a graduate assistant, collected interobserver agreement by watching videos and collecting data on the on- and off-task behavior of Ron, academic accuracy, and fidelity. Reliability occurred for 40% of sessions in each phase of the study. Reliability for Ron's on-task behavior data across all four phases ranged from 97%-100% with an average of 98% agreement, shown in Table 1. Refer to Appendix K for the full IOA scored across all sessions.

In addition to the collection of interobserver agreement of on- and off-task behavior, it was also conducted and calculated for permanent products to measure academic accuracy of history assignments. Again, interobserver agreement for permanent products were conducted for at least 40% of each phase. Reliability for Ron's permanent product data across all phases ranged from 80%-100% with an average of 95% agreement.

Table 1. Range of IOA Scores

IOA	A1	B1	A2	B2
On-Task	97-100	93-100	93-100	97-98
Accuracy	100	80-100	90-100	90-100
Fidelity	N/A	100	N/A	100

CHAPTER V: DISCUSSION

The purpose of this study was to examine and extend the effects of an electronic self-monitoring application of I-Connect installed on an Apple iPad Pro second generation. The application was administered to examine the effects of on-task behavior for a student with autism in the home environment. Previous research has showed that evidence-based practices are effective in the school environment, but these do not transition into the home environment, although they should (Hampshire et al., 2014). For students with ASD to increase their independence skills and increase academic accuracy, they must receive instruction and practice discrimination of on- and off-task behavior in the home environment.

Previous research has been demonstrated to show that the electronic self-monitoring application can help students increase their on-task behavior, as well as their academic accuracy (Beckman et al., 2019; Clemons et al., 2016; Crutchfield et al., 2015; Romans et al., 2020; Rosenbloom et al., 2016; Wills & Mason, 2014). The current study investigated the effect of the I-Connect application on the increase of on-task behavior and academic accuracy for an individual diagnosed with ASD, implemented in the home setting. An ABABC withdrawal design (Kazdin, 2011) was implemented with the I-Connect application and reinforcement. A highly preferred stimuli or activity was provided to the participant following a session of the self-monitoring in home.

This chapter discusses the results in respect to the research questions mentioned in Chapter 1, a functional relationship between the on- and off-task behavior and academic accuracy of the participant and the I-Connect intervention, confounding variables, limitations, and avenues for future research.

Research Questions

To assess the effectiveness of the intervention and current research study, research questions were created at the on-set of the study and answered following the completion. The first research question, "To what extent will the web-based self-monitoring application have on the on-task behavior with an individual with autism in their home setting?" was answered through the results and increase of Ron's on-task behavior. During the first baseline phase (A1), Ron's on-task behavior was highly variable but with an average of 29% on-task followed by 97% on-task behavior during the first intervention phase (B1). Following the withdrawal of the I-Connect application (A2), Ron's on-task behavior decreased to baseline levels with 24% on-task and, again, increased his on-task behavior to 95% on-task when the I-Connect application was re-introduced (B2). Although the current study was conducted in a home setting, the increase in on-task behavior is consistent with previous research that has been conducted to increase on-task behavior and decrease disruptive behavior in a school setting (Beckman et al., 2019; Clemons et al., 2016; Crutchfield et al., 2015; Romans et al., 2020; Rosenbloom et al., 2016; Wills & Mason, 2014).

The second research question, "To what extend does I-Connect increase the level of academic achievement in the online assignments assigned to the participant?", was answered with the results of Ron's academic accuracy. As mentioned previously, the current study focused on self-monitoring of attention (SMA), although Cooper et al. (2020) suggested teaching students to monitor academic productivity and that to monitor on-task behavior does not result in increase in productivity. In the current study, Ron's baseline score (A1) of academic accuracy was 0% because he did not answer, nor submit any assignments, which was similar to the withdrawal phase (A2) in which he scored 0% on all academic assignments. In the first

intervention phase (B1), Ron increased his academic accuracy of assignments to an average of 50% and an average of 42% accuracy in the second intervention phase (B2). It is important to mention, again, that Ron's assignments were on a 7th grade reading level, although Ron read at a 2nd grade instructional level.

The third and final research question, "To what extent will the I-Connect application generalize to parent implementation?", was answered through the results of Ron's on-task behavior while the caregiver served as the researcher while Ron used I-Connect. Although the first session of generalization were near baseline levels, Ron's on-task behavior increased his on-task behavior over the next three sessions.

Functional Relationship

A functional relationship was determined between the use of the I-Connect self-monitoring intervention and the increase of on-task behavior for Ron. There were dramatic changes between the baseline and intervention phases, which suggests a functional relationship was established.

In the first baseline phase (A1), Ron's on-task behavior was at a mean of 29% and a mean of 24% in the withdrawal phase (A2). As for the intervention phases, Ron's mean on-task behavior when I-Connect was first implemented was 97%, and a mean of 95% on-task behavior when the intervention was re-introduced. Throughout the study, there were no overlapping data points from baseline to intervention phase.

There were some extraneous and confounding variables that occurred through the current study. All sessions were conducted late afternoons of early evenings, with four sessions per week. Ron was also involved in extracurricular activities at the school, involved in Boy Scouts,

receiving music lessons, as well as other applied behavior analytic (ABA) services from a nearby clinic. Due to other responsibilities throughout the week, some sessions were later than others. When Ron arrived home for sessions of the current study, other responsibilities (i.e., eat dinner and charge laptop) had to be completed.

A second extraneous variable that conflicted with sessions was technical difficulties in the home environment. During the first baseline phase (A1), the Wi-Fi in the home failed that resulted in the participant unable to have access to classwork. Data collection did not occur for these sessions because the participant did not have an opportunity to work on assignments and were later made up. This also occurred in the second intervention phase (B2), but sessions could not occur because the participant could not log-in to the I-Connect application.

Another technological difficulty that occurred during sessions was the "Vibration" choice on the self-monitoring application did not work on some sessions. The participant was able to select the choices of the auditory or visual prompt by a ding, the iPad vibrates, or by a flash of the screen, but for some sessions the iPad would not vibrate. If the participant selected for the auditory prompt to vibrate and it did not work, he was instructed to choose a different form of prompt.

The second confounding variable in the current study were the other individuals and pets that lived in the house. Ron's biological sister resided in the home during the first baseline (A1) and intervention (B1) phases of the study. During these phases, Ron's sister may have played music or interrupted sessions because she was in the same room as where data collection occurred. If music or another activity disrupted the participant, Ron's biological caregiver instructed them to stop and leave the area. Along with Ron's sibling, the house canine and feline

sometimes disrupted sessions. The canine would sometimes bark, and the feline would sometimes jump on the table of area where the participant conducted their homework.

The third and final confounding variable that was identified for this research study was the table and chairs provided to the participant for the study. Prior to the start of the research study, in a participant recruitment meeting, Ron's caregiver stated Ron completes homework at the kitchen countertops and would often make crafts or go to the kitchen when it was time to do homework. Therefore, researchers provided Ron with a table and two chairs to complete his homework at, as mentioned in Chapter 3. To diminish the likelihood that the table and chair would be a confounding variable, data collection did not begin until a week after the table was provided to the house. From the time of the delivery of the table and chairs, Ron completed all homework at that table.

Limitations

As stated previously, a functional relationship was demonstrated with I-Connect and the on-task behavior of Ron, although, there were some limitations of the study. The first limitation was that time was limited for each session and when each session could be conducted. As mentioned before, Ron participated in activities outside of school, which meant researchers were able to conduct sessions for two days of the week for approximately four sessions per week. In order to prevent an extraneous variable, sessions were conducted on the same days and approximately at the same time. Only four generalization sessions were administered because of the limited time of the study.

The second limitation of the current study was the participant only worked on an academic subject that was mentioned by the caregiver prior to the on-set of the study. This was

the only academic subject to be completed to maintain consistency and reliability throughout the study.

The final limitation of the study was that sessions were only conducted in one setting. Although generalization sessions were administered with the caregiver as the main researcher, all sessions were conducted in the home environment. This was also implemented to decrease the likelihood of confounding variables during sessions.

Future Research

The current study replicated previous research (Beckman et al., 2019; Clemons et al., 2016; Crutchfield et al., 2015; Romans et al., 2020; Rosenbloom et al., 2016; Wills & Mason, 2014) that have implemented the self-monitoring application of I-Connect, as well as extending the research to the implementation of I-Connect in the home environment. From the limitation of the current study, future research may be conducted to extend the effects of electronic self-monitoring and I-Connect as an evidence-based practice.

Upon further research that incorporated I-Connect, whether in the home or school setting, one may consider to use I-Connect across different academic subjects. As in previous I-Connect studies (Beckman et al., 2019; Clemons et al., 2016; Romans et al., 2020), participants were taught to use the I-Connect application for only one academic subject. It would be beneficial to implement the I-Connect intervention across multiple academic subjects.

As stated previously, the I-Connect application has only been known to be implemented in a school environment (Beckman et al., 2019; Clemons et al., 2016; Crutchfield et al., 2015; Romans et al., 2020; Rosenbloom et al., 2016; Wills & Mason, 2014) and this is the first study to conduct research in the home setting with I-Connect, known to the researchers. Generalization

probes were conducted in the current study, but future research should aim to implement the I-Connect intervention with caregivers as the teachers.

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APPENDICES

Appendix A. Institutional Review Board Acceptance

To:
Linda Garrison-Kane
Counseling Ldrshp & Special Ed

RE: Notice of IRB Approval
Submission Type: Initial
Study #: IRB-FY2021-247
Study Title: Increasing On-Task Behavior Implementing the I-Connect Application at Home
Decision: Approved

Approval Date: November 14, 2020

This submission has been approved by the Missouri State University Institutional Review Board (IRB). You are required to obtain IRB approval for any changes to any aspect of this study before they can be implemented. Should any adverse event or unanticipated problem involving risks to subjects or others occur it must be reported immediately to the IRB.

This study was reviewed in accordance with federal regulations governing human subjects research, including those found at 45 CFR 46 (Common Rule), 45 CFR 164 (HIPAA), 21 CFR 50 & 56 (FDA), and 40 CFR 26 (EPA), where applicable.

Researchers Associated with this Project:
PI: Linda Garrison-Kane
Co-PI:
Primary Contact: John Augustine
Other Investigators: Megan Boyle, Taylor Janota, John Augustine

Appendix B. Parent Consent Form

CONSENT FOR PARTICIPATION
COLLEGE OF EDUCATION
MISSOURI STATE UNIVERSITY

PARENT CONSENT

Title: I-Connect Self-Monitoring Application in Home

October 19, 2020

Dear Parent,

Your child has been selected to participate in a project conducted by Missouri State University, supervised by Dr. L. Garrison-Kane.

What is the purpose of this project?
The purpose of this project is to develop and implement educational interventions for individual students. The goals of this study is to show the effectiveness of the I-Connect 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 educational interventions?
Educational interventions are based on best practices and includes one or several of these options: 1) student self-monitoring with goal setting and rewards for performance, 2) schedules (checkpoints) for students to receive feedback on behavior, and 3) individual lessons on behavior/rules. Together, these procedures are described as the "I-Connect Self-Monitoring Application." Strategies are implemented for the individual child as selected by the researcher with assistance from university employees and graduate students.

What are the benefits of your child participating in the project?
All students may benefit from participation in the strategy programs. We expect to see improved learning, behavioral and social interactions with peers and adults. We do not foresee any educational or psychological risks for your child by participating. Your child's participation is voluntary and you are free to withdraw at any time without penalty. If you agree, Missouri State University staff will (a) assist with training in behavioral interventions, (b) monitor academic performance, (c) observe behavior of your child and use the information to help researchers improve the behavior of the student, and (d) videotape in the session room.

Video Recording:

We will videotape data sessions of the instruction and intervention for data collection and fidelity of treatment measures by John Augustine, graduate student researcher, and Dr. Garrison-Kane, Professor from Missouri State University. These recordings may **only** be accessed by members of the project to assist in collecting data and ensuring fidelity of treatment of instructional procedure.

Missouri State University supports the practice of protection for human participants taking part in our instructional programs. Your child is participating in an educational intervention program to teach on-task behavior for the fall and spring with potential follow-up in upcoming school years. 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.

What are confidentiality procedures?
Your permission allows a copy of all information obtained from educational interventions to be provided to Missouri State University. This information will be kept confidential in closed files at Missouri State University. Information from observations by Missouri State University staff will be shared in verbal or written reports only to members who assist your child. These persons will have the information available for parents to review. If you agree to allow your child to participate, please sign this form, and return it to John Augustine. Should you desire any additional information or have questions, please call 573-747-5066, or contact John Augustine (Augustine010@live.missouristate.edu) or Dr. Garrison-Kane (LGKane@missouristate.edu), 417-836-6960

Sincerely,

John Augustine
Graduate Student Researcher

Dr. Garrison-Kane
Missouri State University, Professor, Ph.D.
417-836-6960

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 John Augustine. 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 disclosure 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 student. Assistance with educational and behavior support will be developed by John Augustine and with supervision from Dr. Garrison-Kane.

On a scale from 1-5, 1 being the lowest and 5 being the highest, how would you rate how interested you are on implementing the I-Connect application as a generalization phase? Circle one.

1	2	3	4	5
Not at all	Kind of	I don't know	Possibly	Absolutely

CONSENT FOR PARTICIPATION
COLLEGE OF EDUCATION
MISSOURI STATE UNIVERSITY

PARENT CONSENT

Title: I-Connect Self-Monitoring Application in Home

_____ _____

Child's first and last name Child's School

_____

Print Parent's name

_____ _____

Parent's signature Date

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

Appendix C. Permanent Product Data Sheet

	2	1	0
Read and Write	Participant utilized Read and Write program for questions and answers	Participant only utilized Read and Write for question or to answer.	Participant did not utilize Read and Write.
Video	Participant viewed the entirety of the video for the assignment	Participant partially viewed video corresponding to the assignment	Participant did not view the content video.
Correct Answer	Participant provided all correct answers to relevant questions	Participant provided some correct answers to relevant questions	Participant provided no correct answers to the questions.
On-Topic	All answers are on-topic	Some answers are on-topic	No answers are on-topic
Grammar and Punctuation	0-1 errors with grammar and punctuation	2-5 errors with grammar and punctuation	6+ errors, or unable to understand answer.

Student: _____

Date: _____

Score: _____/ 10

Appendix D. Momentary Time Sampling Data Sheet

Observer: _____ Student: _____

Activity: _____ Inter-Observer Agreement: Yes No

Date: _____ Time: _____ Phase: A B

Codes: On-Task: +			Off-Task: -		Occurrence: /		
Min	**:15**	**:30**	**:45**	**:60**	Caregiver Prompts Verbal	Gestural	Notes
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

Momentary Time Sampling IOA: Interval-by-interval (point-by-point)

$$\frac{\text{Number of intervals agreed}}{\text{Number of intervals agree + number of intervals disagreed}}$$

X 100 = interval-by-interval IOA %

Prompts: Exact count-per-interval

$$\frac{\text{Number of Intervals of 100\% IOA}}{\textit{n} \text{ intervals (15)}} \text{ X } 100$$

Permanent Product: Total Count

$$\frac{\text{Smaller count}}{\text{Larger count}} \text{ X } 100$$

Off-Task: Student is considered off-task when he:

Gazing: Gazing is defined as eyes focused on stimuli other than materials for the activity, instructed by the parent/teacher (e.g., looking at certain environmental stimuli in the environment) for 3 seconds or more.
Out of Seat: Out of seat is defined as standing or moving more than 1 step away from their chair when instructed not to, eyes are not on the activity.
Disturbances: Disturbances are defined as any occurrence of fidgeting with table, fidgeting with belongings (banging computer keys, throwing, picking nose), speaking to themselves while eyes are not on the activity, or any objects on the chair and table that are not permitted.
Inappropriate Vocalizations: Inappropriate vocalizations are defined as talking about topics/subjects that are unrelated to the activity and/or disrupting to other members of the home, without receiving permission from the caregiver or researcher.
Refusal to comply: Refusal to comply is defined as not following caregiver/researcher instructions, or one step instructions, after 3 seconds has passed and not seeking assistance, or browsing websites that were unrelated to the task.

On-Task: Student is considered on-task when he:

Writing: Writing is defined as holding a writing utensil appropriately (with appropriate materials) while eyes are focused on the activity.
Reading: Reading is defined as looking at an object (i.e., books, iPad text, Chromebook) and making an attempt of typing or completing an activity to be completed.
Appropriate Vocalizations: Appropriate vocalizations are defined as appropriate requests for immediate needs (i.e., help), or on-topic relevant conversational exchanges as directed by the caregiver or researcher.
Typing: Typing is defined as hands on the laptop in an appropriate manner, making an attempt of typing or completing an activity to be completed.
Listening: Listening is defined as eyes on the activity (i.e., Chromebook) and actively participating the assignment.

Appendix E. Rationale of I-Connect

Teaching Student How to Use I-Connect Lesson Plan

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

Objective:

- Student will be able to correctly self-monitor their on-task task and off-task behavior using the I-Connect application with 85% accuracy or higher.

Mastery Criterion:

- 85% accuracy or higher for 5 consecutive trials

Materials:

- Apple iPad Pro (or other Apple device with I-Connect application installed)
- I-Connect application
- Apple iPad Pro to video record sessions

Preparation:

- Before lesson, type up what on-task and off-task behavior looks like for the student and print a copy for the student. There should be space on the document for the 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, the student will review videos that were recorded before the introduction of the intervention.

Procedure:

1. Gather materials
2. Instruct student to have a seat at the designated work area.
3. To better achieve motivation from the 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 are really proud of?"*
    c. *"What's your favorite think to do? Why?"*
    d. *"What are you looking forward to for the rest of the year?"*
    e. *"Can you think of anything that can be hard to do homework at home?"*
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 has a hard time 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 during the day.
5. Before introducing I-Connect, review operational definitions of on-task and off-task behavior. Say:

a. *"For the rest of the year, I am going to help you try out a new tool that will help you focus better during the day so you can get the most out of it. What do you like about school?*
b. Wait for student response, then build on his answer. *"That is something great about school! I'm glad you like that and have something to look forward to at school. Is there anything that you wish you could do better at in school or with school work?*
c. Wait for student response, then build on his answer. *"Good! A big part of being successful in school is to be on-task. To be on-task 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 the year with understanding how to communicate with other individuals. 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. Here is 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 the list to ensure student understands and is following along, such as, *"What message might this positive behavior send to other people?"* or *"Why is it important to do this when we communicate with people?"*
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 idea to his personal list of on-task behavior.
h. Say, *"Now that we've talked about what it looks like to be on-task, 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 during the day. Are you ready?"*
i. Place Apple device (or any device that has I-Connect downloaded on it) between you and the student and say, "*This is a really cool device that you will get to use at home for the rest of the school year. On this device is an application called I-Connect. This is going to help you keep track of your on-task behavior while you are working. Are you ready to check it out?"*
j. Login for the student(s) the first few times and pull up the screen that has the 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 behavior looks like.
k. Say, "*Every 15 s, 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 15 minutes. At the end of the 15 minutes, you and I will compare our responses. I will also be keeping track, but. I will keep track on a 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 to the next step.

l. Say, "*When the question appears it can either vibrate or make a sound. You get to decide which one you would rather it be. You can choose for it to vibrate, or you can choose a sound. Which would you prefer as we practice together how to use I-Connect?"* Select option that student decides.
m. Say, "*While you are talking and communicating with others, 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 to the next step.
n. Say, "*Click Start."*
o. Give verbal or gestural cues as necessary as student learns how to use the application. Fade verbal prompts so the student gets used to answering visual prompts on his own. Discuss as necessary to explain behavior specifically to student.
p. After 15 minutes have passed, stop video and let the student look at the percentage of on-task behavior graph provided by the I-Connect application.
q. If the student meets the goal, give the student the reinforcement menu. Allow him to choose reinforcer, then start a 5-minute timer for the break. If the data does not meet the goal, conduct a booster session by following the same procedure in a 5-minute session.
r. After the break is over, say, "*We are going to go practice again. Is there anything you would like to go over again before we start?"*
s. Repeat steps n-q.
t. Repeat procedures until student achieves their accuracy goal for 5 consecutive trials.

When student achieves mastery, provide directions and login information. Provide prompts (i.e., verbal and gestural) with directions on how to login to the application. 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 bottom middle button of iPad, then type in the password 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 following sessions.
    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 the 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 interacting with others 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 teachers.

Appendix F. Task Analysis to Teach I-Connect

Baseline (A1)

1. Gather materials for session (iPad)
2. Record the student so that he is visible, and easily observed later during videotaping.
3. Instruct the student what activities he will be doing that day.
4. Provide directions for the activity to the student (varied based on session). Provide modeling as necessary and instruct student to start their work.
5. End data collection following completion of 15-minute session.
6. 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
7. Following completion of 5-minute break, begin recording again.
8. Instruct the student on what will be next.
9. End data collection following completion of 15-minute session.
10. Collect on-task and off-task data from the videorecording following the completion of the session.
11. Continue 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 (iPads, data collection sheets, cell phones, pencils)
2. Open one iPad to record the student for the session.
3. Tell the student what work will be done on that day.
4. Provide directions for the task of the day to the student (varies based on session). Provide modeling as necessary and instruct to begin the work.
5. 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 each question. Allow student to decide if he wants the device to vibrate or if he wants to hear a sound.
6. End data collection following completion of a 15 min session.
7. 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.
8. Following completion of a 5-minute break, begin recording again.
9. Instruct student to continue working on task.
10. Repeat step 5.
11. End data collection following completion of 15-minute session.

Baseline (A2)

1. Gather materials for session (iPad)
2. Record the student so that he is visible, and easily observed later during videotaping.
3. Instruct the student what activities he will be doing that day.
4. Provide directions for the activity to the student (varied based on session). Provide modeling as necessary and instruct student to start their work.

5. End data collection following completion of 15-minute session.
6. 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
7. Following completion of 5-minute break, begin recording again.
8. Instruct the student on what will be next.
9. End data collection following completion of 15-minute session.
10. Collect on-task and off-task data from the videorecording following the completion of the session.

Return to Intervention (B2)

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

Appendix G. How to Access 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 the app.
13. Re-open app, and repeat steps 3-12.

Appendix H. Reinforcement Menu

YouTube

Appendix I. Consumer Satisfaction Questionnaires

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 think the I-Connect system helped you with school? Why or why not?

4. Would you like to use I-Connect next year? Why or why not?

5. Would you tell your friends about I-Connect?

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	I loved it

Other Comments:

I-Connect Caregiver 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 was it implemented in your home during anything other times?

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

4. Would you be interested in utilizing I-Connect for the future in your home?

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 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	I loved it

Other comments:

Appendix J. Fidelity of Treatment

Teacher I-Connect Form

Student ID: _____ Student Name: _____

Observer/Teacher: _____ Observer2/Reliability: _____

Date: _____ Start Time/End Time/Total Time: _____

I-CONNECT Procedures	Observed	Quality
1) Teacher handed student device	Y N	1 2 3
2) Teacher instructed student to:		
a) Log in	Y N	1 2 3
b) Start Monitoring	Y N	1 2 3
c) Prompt Student	N/A Y N	1 2 3
d) Pause/Resume Monitoring	N/A Y N	1 2 3
e) Stop Monitoring	Y N	1 2 3
3) Encouraged student	Y N	1 2 3
4) Retrieved Device at end of session	Y N	1 2 3

Total Fidelity Score _____ Total Quality Score ____

Total Score Possible _____ Total Score Possible ___

Percentage _____ Percentage _____

Booster Session = if fidelity did not reach 80%

Was a booster session indicated?

Appendix K. Interobserver Agreement Scores

Range of IOA scores per phase

IOA	A1				B1				A2				B2			
				M				*M*				*M*				*M*
On-Task	100	100	97	99	100	95	93	93	97	100	93	97	97	98	97	97
Accuracy	100	100	100	100	90	100	80	90	100	100	90	97	90	90	100	93
Fidelity	N/A	N/A	N/A	N/A	100	100	100	100	N/A	N/A	N/A	N/A	100	100	100	100