A TIER 2 SUPPORT FOR ONLINE LEARNERS: IMPLEMENTING A

TECHNOLOGY-AIDED CHECK-IN/CHECK-OUT FOR HIGH SCHOOL STUDENTS

WITH AUTISM

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DEDICATION

I dedicate this dissertation to my niece and nephew, Catherine and Sebastian.

Thank you for your smiles and laughter that helped me get through these past few years.

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ABSTRACT

Online education is an increasingly popular format of schooling used around the world (Digital Learning Collaborative, 2019). For students with Autism Spectrum Disorders (ASDs), challenges with executive functioning skills like self-management can have a significant impact on their ability to successfully participate in online learning. With a growing number of students with disabilities like ASD participating in online education, there is a need to explore support strategies that promote self-management in virtual environments that take into consideration the unique barriers of these students and their families. However, there is very limited research on providing behavioral support for students with ASD in online learning environments.

This study used a mixed-method research design to determine the effectiveness of a technology-aided, modified Check-In/Check-Out (CICO) intervention package to improve the on-task behavior of three high school students with ASD enrolled in full-time online school. Additionally, this study sought to determine if there were changes in the self-efficacy of students and their parents throughout the duration of the study. The intervention package included a technology-aided CICO intervention, initial parent training of the intervention, and ongoing parent coaching.

A multiple baseline across participants design was used to measure the percentage of on-task behavior for each student. Visual analysis was used to determine changes in trend and level across baseline and intervention phases of the intervention. Qualitative data was collected in two ways: students completed a self-efficacy questionnaire at the

end of each observation, and parents described changes in their self-efficacy to support

their students by participating in multiple semi-structured interviews throughout the

study. The interviews were coded to identify common themes. A mixed-methods analysis

was used to determine how the qualitative data informed the quantitative data.

Results suggest the implementation of the CICO intervention increased on-task

behavior of all three students. However, the intervention did not appear to have any

influence on student self-efficacy. The parent interviews centered around four main

themes: student learning challenges, parent engagement with the students, parent self-

confidence, and support for the parent. Each parent viewed the intervention favorably and

felt more capable of supporting their students after using the intervention.

This study highlights areas that must be considered when developing and

implementing individualized interventions in an online learning environment. For

students to gain the skills necessary to self-manage in these settings, steps need to be

made to ensure students and parents are active participants in intervention development

and decision-making processes. Limitations of the study are addressed and suggestions

for future research are provided.

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CHAPTER ONE: INTRODUCTION

Online education is an increasingly popular format of schooling used around the world (Digital Learning Collaborative, 2019). Rather than attending traditional brick and mortar schools, students from kindergarten through high school can access learning materials online from their own homes, often engaging in a combination of synchronous class lessons and asynchronous learning activities in which they can work at their own pace and on their own schedules. Online learning offers several opportunities for students who may otherwise have difficulty learning in a classroom with others. However, some students struggle with learning in a virtual class setting. This can be explained by a multitude of factors, including a lack of technical proficiency, trouble with time management, and little or no motivation to engage in learning (Gillett-Swan, 2017). These factors can present barriers to any student regardless of age or learning characteristics, although students with disabilities are especially challenged in these settings. For students with Autism Spectrum Disorders (ASDs) in particular, obstacles like these can have a significant impact on their ability to participate in online learning.

Students with ASD often have difficulties with executive functioning and self-management skills (Demetriou et al., 2019), requiring greater levels of support to perform satisfactorily in school. Unlike traditional classrooms, online learning environments often lack the structure and support for students with ASD to develop social emotional and self-management skills. Many teachers in traditional classrooms can rely on strategies like prompting (Cruz-Torres et al., 2020), visual supports (Lora et al., 2020), and

reinforcement of positive behaviors (Johnson et al., 2017) to support students' ability to develop skills that promote learning and independence; however, many students in online schools do not have easy access to these supports. Due to the lack of a teacher's physical presence, a student's parents are often tasked with providing support for their child despite not always having the resources or skill set. With a growing number of students with disabilities, including ASD, participating in online education (DLC, 2019), there is a need to explore support strategies that promote self-management in virtual environments that take into consideration the unique barriers of these students and their families. However, there is very limited research on providing this type of behavioral support for students with ASD in online learning environments.

This dissertation sought to address this gap in the literature by examining the effects of a technology-aided behavior intervention on problem behavior of high-school students with ASD enrolled in online schooling. The remainder of this chapter provides more context for the exploration of this topic, as well as introduces the research design used for this study.

Background of the Problem

The past decade has seen a considerable increase in the number of students enrolled in online education, with over 310,000 students enrolled in a full-time online program in the 2018-2019 academic year (DLC, 2019). Of these students, an estimated 1 in 10 online learners has a disability and receives special education services (Molnar et al., 2015). According to the United States Department of Education, Office of Special Education Programs, 11% of the 7.3 million students receiving special education services in the United States have an ASD classification (Digest of Education Statistics, 2021).

Unfortunately, the number of students with ASD enrolled in online schooling is largely untracked, so it is difficult to determine an approximate statistic.

Despite the limited information on how many students with ASD are enrolled in online schooling, what is known is that virtual environments may not be easily accessible for students with ASD, especially those with limited skill repertoires (Stenhoff et al., 2020). Logistically, students need a convenient environment at home to learn. This includes a place for the student to work, a computer device, and good internet connection. Behaviorally, students are expected to sit in front of a computer for extended periods of time, follow written and verbal directions, and effectively communicate with their teachers and classmates. Online instructional delivery may limit students' opportunities to meet these expectations as teachers are unable to effectively deliver physical prompts from a distance that would guide students to correctly respond (Stenhoff et al., 2020). Further, it is often the case that instruction is delivered with a "one size fits all" approach, in that instruction is not differentiated for students with varying levels of support needs (Gillett-Swan, 2017, p.21). To overcome these challenges, students can be taught self-management skills that promote greater participation and success in online learning.

Self-management is the ability for an individual to apply behavior change strategies to their own behaviors (Cooper et al., 2020). Students who use self-management strategies are taught to observe, assess, and modify their own behavior; these strategies can include processes such as self-identifying a target behavior, setting a goal to change their target behavior, observing and evaluating their progress toward their goals, and self-administering reinforcement when their goal is met. Self-management procedures have been used effectively with students with ASD to improve academic,

social, and other classroom behaviors (Carr, 2016). Teaching students with ASD to self-manage may provide the structure needed for these students to more fully participate in online classes.

Many of the difficulties students with ASD face in online learning environments are related to challenges with self-management. For example, students may not have the organizational skills to complete assignments or the ability to focus on the lesson being taught for more than a few minutes at a time. The lack of structure or predictability can create higher states of anxiety for students with ASD, often resulting in problem behaviors (Hume et al., 2014). Many difficulties students with ASD encounter in their learning can lead to a reliance on external agents such as teachers and caregivers to provide direction and supervision in daily living and academic activities. This in turn can lead to an overdependence on others to prompt desired skills or behaviors (Chia et al., 2018). The lack of independent functioning and personal autonomy contributes to poorer overall outcomes for these students. For some students with ASD who are enrolled in online education, the amount of support they need to successfully participate in virtual learning environments is not provided. One possible solution is to implement a Positive Behavior Interventions and Supports (PBIS; Sugai & Horner, 2002) framework into online learning environments.

PBIS consists of a continuum of support across three tiers of increasing intensity (Lewis & Sugai, 1999). The primary tier of support emphasizes prevention of problem behavior by teaching and acknowledging appropriate behavior. The secondary tier consists of targeted interventions offered to groups of students who need additional support beyond the primary supports. Common secondary tier practices include increased

individual or small group instruction on specific skills, increased adult attention and supervision, and a greater focus on promoting self-management of behaviors. The tertiary tier targets the small percentage of students with intensive, individualized support needs who have not responded to the primary or secondary supports set in place. Supports at this level rely on function-based assessments, highly individualized instruction, and continuous progress monitoring by an intervention team. Students with ASD often receive support at the second and third tiers, with one of the most common secondary supports being Check-In/Check-Out (CICO; Crone et al., 2010).

CICO is one of the most widely used and extensively researched secondary interventions for students who do not respond to universal support (Drevon et al., 2019). CICO is designed to provide students with consistent prompts and feedback throughout the day, paired with high quality adult attention for engaging in appropriate target behaviors. CICO has been shown to be an effective intervention at the elementary, middle, and high school levels (e.g., Kittelman et al., 2018) as well as for targeting various functions of behavior when used in tandem with a function-based reinforcement system (Turtura et al., 2014). CICO has also been used in non-school environments such as residential and juvenile correction settings (Swoszowski et al., 2012). Despite the abundance of evidence supporting the effectiveness of CICO, there is no research that explores the use of CICO to support students with ASD. In addition, there is also a lack of research that investigates the effects of implementing CICO with students engaged in online learning.

There are several potential reasons CICO has not been explored in online learning environments. CICO works because it adds increased positive interactions with adults

throughout the day (Weber et al., 2019); these interactions provide instruction and practice in self-monitoring of behavior. The lack of a physically present teacher in the home environment shifts the role of the teacher to another person, such as a parent or other caregiver. However, it is often the case that a parent is simply too busy to learn to implement an intervention that requires increased interaction with their student. They may have to work away from home or may have other children that require their attention. In addition to limited time, parents often lack the skills or resources to effectively support their students in online learning environments (Efstratopoulou et al., 2021). As a result, parents may be either unaware of or inadequately trained to implement common support strategies employed by teachers in physical classrooms. As with any evidence-based practice, for CICO to be successfully adapted for online education, educators and researchers need to consider student and family needs, capacity to assist the student, and the ease of the intervention to be implemented in a dynamic learning and living environment (IRIS Center, 2014).

One adaptation to assist in implementing CICO for students in online learning environments is the use of technology-aided interventions and instruction (TAII; Odom et al., 2015). TAII are those interventions in which technology is the central feature of an intervention. TAII incorporates a broad range of devices, such as speech-generating devices, smart phones, tablets, and computer-assisted instructional programs. In recent years, many studies have shown that TAII used in the classroom can help improve students' academic and behavioral outcomes (Chia et al., 2018; Hong et al., 2017; Odom et al., 2015). During learning and instruction, electronic devices such as smartphones,

tablets, and computers provide ample use of visual cues and present clearly defined tasks, which can benefit students with ASD (Grynszpan et al., 2014).

In addition to having a strong evidence base supporting its effectiveness (Hong et al., 2017), TAII tends to demonstrate high levels of social validity among students using the support. For example, when given the choice, students prefer using iPad assisted delivery of interventions over traditional therapist-delivered interventions (Lee et al., 2015). In this particular study, Lee and colleagues found that participants consistently selected the iPad-assisted condition over the therapist-only condition when given the choice. Also, research has demonstrated that using TAII often yields high levels of implementation fidelity (e.g., Bruhn et al., 2015a). Considering these findings that TAII strategies can be implemented with fidelity and are preferred by students, it is possible that using TAII with students enrolled in online education may be beneficial for both the students and parents.

Problem Statement

In early March 2020, the extremely contagious COVID-19 virus had become a global pandemic, and by April 2020, every state across the United States had mandated the closure of public school campuses. Many schools began operating remotely, and a nation-wide transition to the online delivery of instruction was initiated. For children and adolescents with ASD and other developmental disabilities, this transition to online schooling meant classroom supports and intervention programs either disappeared or were restructured to meet the requirements of social distancing, often taking the form of telehealth services. Parents of children with ASD across the world have reported that this sudden change in structure and routine resulted in increased problem behaviors for which

they could not adequately remedy (e.g., Efstratopoulou et al., 2021; Majoko & Dudu, 2020; Yazcayir & Gurgur, 2021).

Based on a review of the literature base, there is no formal research on the implementation of behavior support services for students with ASD engaged in online education. There is also a lack of evidence-based practices (EBPs) for parents to implement with their children with ASD who are in online school. Furthermore, there is a gap in the literature that examines the use of TAII with students engaged in online learning. With the rising number of students with ASD participating in online learning there is an increasing need to explore behavior interventions and supports that can promote the success of these students. The COVID-19 pandemic amplified these issues and made it much more pressing for the field to find solutions.

While there are EBPs and supports available for students with ASD in a traditional classroom setting, few interventions have been researched in virtual classroom settings. Identifying those interventions that are effective in online environments are essential for students with ASD to access support necessary for their success. These interventions have to take into consideration the uniqueness of online learning, in that interventions are not taking place in a physical classroom setting; most of these students are learning in their own homes without a teacher or aid to support them. The students' main support are their parents or other caregivers who often have little experience or training to implement common behavior interventions used in brick-and-mortar classrooms.

Purpose of the Study

The purpose of this study was to examine the effectiveness of a technology-aided, modified CICO intervention to improve the on-task behavior of high school students with ASD enrolled in full-time online school. Additionally, this study sought to determine if there were changes in the self-efficacy of students and parents throughout the duration of the study. For the purposes of this study, on-task behavior was defined as engagement in any behavior for a specified period of time that matches the ongoing classroom instruction. This included orientation toward the task at hand, compliance with all directions, and working with appropriate materials for the task. Self-efficacy is defined as a person's particular set of beliefs that determine how well they can execute a plan of action in prospective situations (Bandura, 1986).

Research Questions and Hypotheses

The following research questions guided the study:

1. Will the implementation of a technology-aided CICO intervention package increase on-task behavior for high school students with ASD enrolled in online high school programs?

2. Will the students report an increase in their ability to stay on-task while completing schoolwork throughout the study, as measured by a standardized self-efficacy rating scale?

3. Will the implementation of a technology-aided CICO intervention package positively influence parental self-efficacy to support their students engaged in online schooling?

4. Given structured parent coaching sessions, will the parents implement the intervention package as intended, as measured by a standardized implementation fidelity checklist?

5. To what extent and in what ways will the student and parent self-efficacy measures help to explain any observed changes in student on-task behavior?

Nature of the Study

This study utilized a mixed methods research design in which a combination of quantitative and qualitative data was collected and analyzed to answer the research questions listed above (Creswell & Plano Clark, 2017). Quantitative data was collected using a multiple baseline across participants design (Riley-Tillman et al., 2020). Three high school students with ASD enrolled in online high school programs and at least one of their parents participated in the intervention, which consisted of a technology-aided CICO intervention, the administration of a student self-efficacy measure, parent coaching sessions, and regular implementation fidelity checks. Students participated in the intervention in a staggered timeframe, and the percentage of on-task behavior was recorded for each student. Visual analysis (Kazdin, 2020) was used to determine changes in trend and level across baseline and intervention phases of the intervention.

The qualitative research method utilized a phenomenological approach (Creswell & Poth, 2018) to understand the perceptions and changes experienced by the students and parents throughout the study. Phenomenology is concerned with the study of experience from the perspective of the individual; it is based on a paradigm of personal knowledge and subjectivity and emphasizes the importance of personal perspective and interpretation

(Moustakas, 1994). Qualitative data was collected in two ways: students described changes in their self-efficacy to perform the targeted behavior during the study using a self-report scale, and parents described changes in their self-efficacy to support their students by participating in multiple semi-structured interviews throughout the study. These interviews were transcribed and coded to identify common themes, experiences, and attitudes surrounding the intervention.

A mixed-methods analysis was used to determine how the qualitative data informed the quantitative data. This analysis used a complementarity approach (Bryman, 2006) in which qualitative and quantitative methods were used to measure overlapping and different facets of a phenomenon, yielding an enriched, elaborated understanding of that phenomenon (Greene et al., 1989). The single-subject methods were used to understand if the intervention was effective, and the qualitative methods were used to understand why or how it was effective. In order to make claims about the data, it is essential that both the "how" and "why" are addressed.

Theoretical Frameworks

Social Cognitive Theory

Social Cognitive Theory (SCT) was first posed by Albert Bandura (1986) to explain how cognitive and environmental factors influence the ways in which individuals learn and behave. According to this theory, learning occurs in a social context with a dynamic and reciprocal interaction of a person, their environment, and their behavior (See Figure 1). SCT explores the ways in which individuals acquire and maintain behavior, while also considering the social environment in which individuals perform the behavior. The theory takes into account a person's past experiences, which factor into

whether behavioral action occurs. These past experiences influence reinforcements, expectations, and expectancies, all of which shape whether a person engages in a specific behavior and the reasons why a person engages in that behavior.
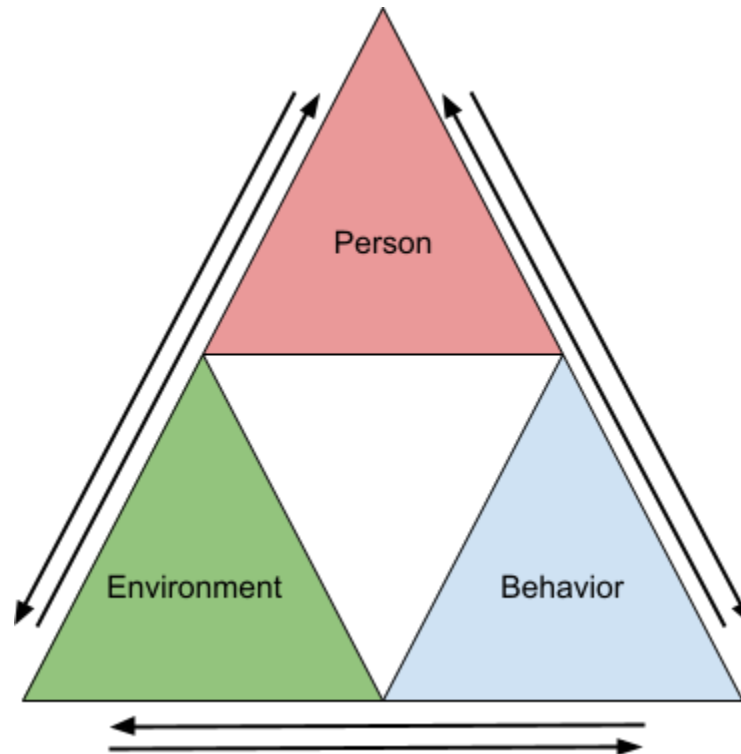
Figure 1.   **A visual representation of the reciprocal relations posited in SCT.**

Another concept originating from SCT is the idea of self-efficacy. Self-efficacy refers to an individual's belief in their capacity to execute behaviors necessary to produce specific performance attainments (Bandura, 1977). Self-efficacy is based on one's personal history, observation, and physiological state. Self-efficacy, according to Bandura and others, provides the foundation for human motivation, well-being, and personal accomplishment. This is because unless people believe that their actions can produce the outcomes they desire, they have little incentive to act or to persevere in the face of difficulties.

In addition, researchers have found that students' perceptions of self-efficacy are positively related to such learning outcomes as task persistence (Zimmerman & Ringle, 1981), skill acquisition (Schunk, 1984), and academic achievement (Thomas et al., 1987). Based on the SCT model of learning, students' behavioral performance is assumed to influence their perceptions of self-efficacy, as well as the reverse. It can be argued that establishing a positive and supportive environment for students to learn in, such as one employing the PBIS framework, can help students develop self-efficacy in addition to promoting positive behavior change.

<u>Positive Behavioral Interventions and Supports (PBIS)</u>

PBIS is an integration of inclusive systems for improvement among all stakeholders across all school contexts (Carr et al., 2002). According to Carr and colleagues, PBIS's uniqueness lies in the fact that it integrates the several critical features into a cohesive whole, including comprehensive lifestyle change, a lifespan perspective, ecological validity, stakeholder participation, social validity, systems change and multicomponent intervention, emphasis on prevention, flexibility in scientific practices, and multiple theoretical perspectives. McIntosh and colleagues (2010) state that school-wide positive behavior supports (SWPBS) integrates practices, data, and systems to achieve valued outcomes, addresses the many environments within schools, and offers a continuum of behavior support. SWPBS identifies the whole school population, as opposed to select groups or those who require identification before support can be provided, as the target for service delivery.

PBIS originates from three major sources: Applied Behavior Analysis (ABA), the normalization/inclusion movement, and person-centered values (Carr et al., 2002). ABA

has a foundation in behaviorism based upon the work of behavior theorists such as Albert Bandura, Edward C. Tolman, and B. F. Skinner. Modern behavioral psychology can be described as the systematic extension of Skinner's (1974) theory of operant conditioning to problems and issues of social significance (Baer et al., 1968; Baer et al., 1987). ABA contributes to the theory of positive behavior support by allowing the theoretical framework for changes in behavior. This leads to the foundation of PBIS where positive behavior supports elicit favorable responses through academic or social performance, serving as the basis of responsive behaviors to a controlled stimulus.

The principle of normalization rests on the idea that people who are in danger of being devalued are helped to assume valued social roles, thereby increasing the likelihood that they will be accorded respect from others and will receive an equitable share of existing resources (Wolfensberger, 1983). Person-centered values are vital to the implementation of PBIS because support strategies are judged not only with respect to technological efficacy, but also with respect to their ability to enhance personal dignity and opportunities for choice (Carr et al., 2002). Thus, the approach forgoes the use of interventions that members of the community judge to be dehumanizing or degrading (Horner et al., 1990).

Definition of Terms

- **Check-In/Check-Out (CICO):** CICO is an intervention that incorporates clearly defined behavioral expectations; explicit instruction for prosocial behavior; frequent adult check-ins; and high rates of positive, specific feedback (Crone et al. 2010).

- **Evidence-Based Practice (EBP):** EBP is a model of professional decision-making in which practitioners integrate the best available evidence with client values/context and clinical expertise in order to provide services for their clients (American Psychological Association, 2005).

- **Parent Coaching:** Parent coaching, also referred to as parent training, is an intervention approach in which providers train parents to serve as agents of behavior change, with the child as the direct beneficiary of treatment (Bearss et al. 2015).

- **Phenomenology:** Phenomenology is a qualitative research approach that seeks to describe the common meaning for several individuals of their lived experiences of a concept or a phenomenon (Creswell & Poth, 2018).

- **Self-Efficacy:** Self-efficacy refers to perceptions about one's capabilities to organize and implement actions necessary to attain designated performance of skill for specific tasks (Bandura, 1986).

- **Self-Management:** Self-management is a practice that can be used to increase desired behaviors and/or decrease interfering behaviors of individuals with ASDs by teaching them how to: (a) monitor their own behavior, (b) record their performance, and (c) obtain reinforcement when their performance meets a pre-established behavior criterion. (Busick & Neitzel, 2009).

- **Technology-Aided Instruction and Intervention (TAII):** TAII are those interventions and supports in which technology is the central feature of an intervention that supports the goal or outcome for the student. The common features of these interventions are the technology itself (as noted) and

instructional procedures for learning to use the technology or supporting its use in appropriate contexts. (Odom, 2013).

- **Visual Analysis:** Visual analysis includes the interpretation of the level of change across conditions, trends in the data, variability of the data, and immediacy of change across phases of the single-subject design study (Kazdin, 2020).

Summary

This chapter provides the background and rationale for exploring the research questions posed for this dissertation. Online schooling is a rapidly growing area of research in education, yet there are significant gaps in the research of providing behavioral support for students in online learning environments. For students with disabilities, particularly ASD, online learning poses challenges that interfere with their ability to learn in these settings. This dissertation seeks to explore the effects of one Tier 2 behavior intervention for students with ASD enrolled in online schooling. In addition, the study aims to explore how positive behavior interventions can lead to changes in students' self-efficacy to engage in positive behaviors as well as parents' self-efficacy in supporting their students to engage in these behaviors. A review of relevant research on topics of CICO, TAII, self-management, and parent coaching is presented in Chapter 2. The specific methods used in the study are presented in Chapter 3. The main findings from the study are summarized in Chapter 4. Lastly, a discussion of the findings, including implications for practice and research, are presented in Chapter 5.

CHAPTER TWO: REVIEW OF LITERATURE

Chapter 1 provided a brief introduction to the purpose and rationale of the intervention package tested in this study. There are several EBPs available for students with ASD in a traditional classroom setting, but few interventions have been researched in online learning environments. The COVID-19 pandemic initiated a rapid shift from in-person to online learning for students across most of the world and this shift highlighted the importance of developing and implementing EBPs to support students in online learning environments. As mentioned in Chapter 1, the purpose of this study was to examine the effectiveness of a technology-aided, modified CICO intervention to improve the on-task behavior of high school students with ASD enrolled in full-time online school. In addition, this study sought to determine if there were changes in the self-efficacy of students and parents throughout the duration of the study.

Chapter 2 is broken into several sections that provide a thorough review of the literature that serve as the basis for this study. The chapter begins with an introduction to challenges faced by students with ASD, their parents, and educators and how these challenges are evidenced in online special education settings. Second, self-management interventions to support students with ASD are identified and described, with specific attention given to technology-aided self-management strategies. Third, an overview of one widely used self-management intervention, CICO, is provided. Fourth, literature pertaining to technology-aided interventions and instruction (TAII) is discussed. Last, an

examination of parent-implemented interventions and parent coaching practices are reviewed.

Students with ASD in Online Learning

ASD is a neurodevelopmental disorder characterized by "persistent deficits in social communication and social interaction" and by "restricted, repetitive patterns of behavior, interests, or activities" (American Psychiatric Association, 2013, p. 50). ASD is a complex, lifelong neurodevelopmental condition with a current prevalence rate of 1 in 44 individuals (Maenner et al., 2021). Children with ASD are much more likely than other children to have an accompanying anxiety disorder, affecting up to 40% of children with ASD (van Steensel et al., 2011). Heightened anxiety appears early in life for children with ASD, with children as young as 5 to 6 years of age showing elevated anxiety symptoms at home (Keen et al., 2019) and in the school setting (Adams et al., 2019).

Although there is limited research exploring anxiety related to the school setting in children with ASD (Adams et al., 2019; Perihan et al., 2021), it is widely accepted that the combination profile of autism with that of anxiety is likely to have a significant impact on the individual's educational experience and engagement (Simpson et al., 2020). Further, parents report that their children's anxiety had an impact on school attendance, participation, and academic performance (Simpson et al., 2020). This finding is not unique; for example, a large-scale educational needs analysis placed anxiety within the top three factors affecting school participation and the top two factors influencing classroom support needs for children with ASD (Saggers et al., 2016). Despite the lack of research directly examining K-12 students with ASD in online learning, it can be argued

that the same factors that present obstacles for these students in brick-and-mortar classrooms are also present in online learning environments.

Special Education in Online Learning Environments

In the United States, special education is governed primarily by federal laws, most notably the Individuals with Disabilities Education Act (IDEA, 2004) which requires all public schools to provide a free and appropriate public education (FAPE) to all of their students. As such, public online schools are bound by the same laws and rules as their public brick-and-mortar district and charter school counterparts. This means online schools must incorporate EBPs for effective instruction, ensure that educators and parents have the necessary tools to improve educational growth of students with disabilities, and develop and implement individualized education programs (IEPs) for students requiring special education services.

Online schools are positioned to be a viable option for an increasing number of at-risk students and students with disabilities, including those with ASD (Liu & Cavanaugh, 2011). In some ways, online schools may be better suited than traditional schools to meet the needs of students with disabilities (Basham et al., 2016; Beck et al., 2014). When instructional content is delivered online, teachers can adapt learning materials to meet diverse needs, differentiate instruction, and align instruction with content standards (de los Arcos et al., 2016). Also, the flexible scheduling of online learning can provide students with disabilities with extra time they might need to master course content. Furthermore, online learning offers students the potential for more self-directed learning opportunities and multiple levels of engagement, which can increase levels of autonomy, emotional independence and self-direction (Marteney & Bernadowski, 2016). These

practices are useful for all students but may be especially helpful for students with disabilities.

Many virtual schools and other K–12 online programs have expanded efforts to serve students with special needs, however an issue regarding teachers' skill sets to teach online students has emerged. The number of teachers who have specific expertise in online programs for students with disabilities is very limited (Smith et al., 2016). This has shown to be an even more significant issue in light of the COVID-19 pandemic in which almost every teacher had to restructure their classes to be delivered online. This is because most teachers, including full-time online teachers, receive little to no training to teach students with disabilities in an online setting (Crouse et al., 2018). Some research (e.g., Meyer et al., 2014) suggests that many online learning systems lack a basic level of physical or sensory accessibility compliance or align with the Universal Design for Learning (UDL) framework to support all online learners.

Given that online students with disabilities are not physically with their teachers, they require an especially strong support system at home (Carnahan & Fulton, 2013; Schuck & Lambert, 2020). Regardless of a student's ability, online schooling requires parents and families to invest significant time into helping their students with schooling, with some parents spending up to seven hours per day helping their child with online school (Carnahan & Fulton, 2013). In some cases, parents may even act as the primary instructor while the teacher takes on more of a support role (Barbour, 2009; Carnahan & Fulton, 2013; Rice & Carter, 2015). Although parents have the advantage of knowing their child better than the child's teacher, most parents lack the training and resources to provide the support and instruction that their children may require (Sorensen, 2012).

Additionally, parents serving in the role of teacher can be problematic in that individuals with ASD often experience weak central coherence: the ability to generalize stimuli across different contexts (Skoyles, 2011). Students may not understand or are unwilling to accept parent delivery of academic instruction because parents are not typically their teachers; teachers provide school instruction, not parents. It may also be the case that some students do not see their home as their academic learning environment because they may under generalize learning taking place only at a physical school.

The unique learning profile of students with ASD may also make it difficult to learn in online environments. There are six aspects of ASD that help to make up a child's unique profile of abilities and behavior, and each aspect can be seen as a spectrum (Buron & Wolfberg, 2014): social reasoning, language abilities, cognition, special interests, sensory sensitivity, and expression and management of emotions. Where a student falls on each of these spectrums can influence their overall learning abilities. For example, students who are easily distracted by visual stimuli may struggle to focus on content presented on a computer screen that is too bright or has too many pictures. Conversely, a student who is under stimulated by the material presented may become bored and inattentive. A student who lacks receptive language skills could have challenges with following directions on assignments, requiring assistance to understand what they are supposed to do. On the other hand, a student with limited expressive language abilities may not be able to fully participate in class discussions or activities requiring active participation without support. A student who demonstrates difficulties with emotion regulation may lack the ability to ask for help from a parent or teacher and may rely instead on using problem behaviors to express their frustration. Each of the elements of a

student's learning profile falls on a spectrum that may indicate greater or lesser support. Furthermore, just as a student with ASD may encounter obstacles related to these learning characteristics in a physical classroom, these barriers may occur in online learning environments. In light of these challenges, much of the research on special education in online settings has focused on the experiences of individuals involved in online schooling — educators, parents, and students — in an attempt to better understand what challenges are encountered and what strategies are used to address them.

Educator Perspectives

Many studies on teacher perspectives of online special education report more challenges than positives for online instruction. For example, Carter and Rice (2016) interviewed members of an interdisciplinary team in a large virtual school program regarding accommodations and modifications in student IEP documents. The findings of this study indicated that providing technologically grounded accommodations and modifications required intensive collaboration with parents, and other special education support staff at the virtual school. They also noted that online teachers struggled to keep up with all of the possible methods of enhancing the learning experience and providing accommodations that were stipulated in the IEP while also remaining sensitive to supports they could provide. Further, technology used as an accommodation was most often relegated to what naturally exists in an online learning environment and is available to all students.

In another survey of educators' experiences with special education in online learning, Burdette et al. (2013) surveyed 46 state and non-state jurisdiction directors of special education to investigate the influences driving online learning in their

jurisdictions, the participation of students with disabilities in online learning, and the issues concerning the provision of FAPE in an online learning environment. A common theme in the responses was the flexibility of and alternatives to traditional scheduling as driving the move to more online learning. However, several respondents mentioned that providing accommodations for students with disabilities in online learning environments was an issue. Respondents noted that monitoring the quality of special education services was particularly difficult and sometimes disconcerting, with one director noting in an evaluation of a local school district with a relatively large virtual school population that almost no students with disabilities were receiving all the necessary supports specified on their IEPs.

In contrast to the before mentioned studies, Marteney and Bernadowski (2016) surveyed 80 general and special education online teachers and found that 69% of teachers agreed that online education has made it easier for students with visual limitations, 83% agreed that online education has made it easier for students with auditory limitations, and 92% agreed that online education has made it easier for students with physical limitations to achieve their academic goals. In addition, 72% of teachers agreed that they had seen an improvement in student academic performance, and 86% of teachers had seen positive results regarding the asynchronous learning environment specifically. According to survey results, 53% of respondents felt that it is easier to implement accommodations, while 36% did not. Approximately 28% of teachers somewhat disagreed they were able to adequately meet students' needs according to either an IEP or a 504 Plan.

In sum, the perspective of educators demonstrates that there are some positives to providing special education online, such as increased flexibility and an opportunity for

more individualized educational and support options for students. Online schooling may also be a beneficial alternative to in-person schooling for students with physical, auditory, and visual disabilities. However, much of the results are concerning. A consistent finding across studies indicates that implementing supports for students with cognitive or developmental disabilities in online environments is difficult and teachers are often unable to implement accommodations sufficiently. These findings are disappointing and highlight the importance of exploring EBPs that teachers can implement in online classrooms. The next section moves away from the educator perspective to the perspective of the next group of individuals heavily researched in this area of research: the parents of students with disabilities.

Parent Perspectives

Parents of students with disabilities enrolled in online learning have been studied extensively over the past decade. Burdette and Greer (2014) surveyed 119 parents in the United States who had a child with a disability enrolled in an online setting. Parents were generally pleased with the outcomes that their children were experiencing in online learning, but some issues still existed. Approximately 25% of the respondents believed that a special educator was not managing their child's IEP or had not been notified of who was overseeing their child's program. Another area of concern was that approximately 40% of students taking English or math online were taking the course below grade level. Further analysis indicated that most parents described their role as helping their child with learning the content, behavioral skills, and organizing work time, roles that are typically performed by teachers and related services providers. 27% of all parents reported that they spent more than three hours per day helping their child with

schoolwork. As discussed earlier, this dual role of "teacher" and "parent" can be highly problematic for students with ASD who struggle to differentiate expectations between settings. Last, and maybe most shocking, is that 27% of parents reported that their child did not receive special education and related services online.

In a similar study, Borup and colleagues (2019) interviewed parents of students with varying levels of engagement and support needs. Reports from the parents demonstrated students' lack of self-regulation made it difficult to maintain the level of consistent engagement that is required to be successful in an online school. While parents were often reactive to students' behavior, their close relationships with their children and understanding their children's attributes and skills allowed them to be more proactive in their engagement. However, parents were unprepared to provide the levels and types of supports that their children required, even when they recognized their needs.

A growing number of studies of parent perspectives were conducted during the COVID-19 pandemic, which resulted in schools across the world hastily transitioning from in-person to online instruction. Many of these studies have taken place outside of the United States, yet many share common findings (e.g., Efstratopoulou et al., 2021; Majoko & Dudu, 2020; Yazcayir & Gurgur, 2021). Efstratopoulou et al. (2021) explored the experience of parents of children with ASD and other developmental disabilities in Greece participating in online learning. Parents reported behavioral difficulties with their children, such as difficulty with convincing their child to stay on the chair and following the instructions from a computer rather than the teacher directly. The parents also indicated the time conflict between their work and their children's classes as another challenge. In addition, many parents expressed a perceived conflict between their role as

the child's parent and their role as a parent for their other children since all of their children needed their support at the same time. Many parents also reported feeling ill equipped to deal with the communication issues they faced during online classes. In one study done in Turkey, Yazcayir and Gurgur (2021) found similar results. Several issues of concern were noted: students with special needs could not follow the lessons regularly, many of them did not attend online lessons, and their teachers did not give feedback about their activities. Further, none of the students with special needs received special education services. They reported there was no communication and cooperation among teachers, families, and students. Ultimately, the findings indicated that children were unwilling or unable to adapt to online education.

The information gathered from parents in these studies mirror those of teacher perspectives. Parents report that their children often lack the needed support to be successful in online education, and the brunt of the support the students receive comes from their parents. This is despite the fact that parents often report that they do not have the knowledge or skills to provide appropriate support. Another important finding from these studies points to challenging behaviors demonstrated by the children. Difficulty attending to schoolwork, resistance to parents directives, and issues with understanding expectations are repeated in parent reports in these studies. Just as online teachers are in need of EBPs to support students, parents also need access to practices they can use in their homes to support their students in online learning.

Student Perspectives

There is limited research examining the student perspective of online special education. The studies that exist primarily look at their motivation for enrolling in online

schooling. For example, Tonks et al. (2021) surveyed a group of 30 students receiving special education services in a public online school in the U.S. to better understand their motivations for attending the school. 73% of students reported they transferred from traditional schools to online schooling because they had experienced bullying, struggled academically, lacked adequate support, and did not receive accommodations. Students noted the flexibility, teacher availability, and support as motivations for attending online school. 93% of respondents indicated that a change in the learning environment was a major driver for them, in terms of the flexibility when the student was learning, where the learning was taking place, and how the instruction was delivered to the student online. Given these negative experiences in traditional schools, an online school represented a more positive alternative to families trying to provide for their children's needs.

Similarly, Beck et al. (2014) surveyed 269 students and 232 parents at an online charter school where students receiving special education account for 26% of the student body. Students were more likely to rate teaching and learning issues in traditional schools as important reasons for choosing online schooling. They were also more likely to rate bullying and behavioral problems as important drivers to attend an online school. Finally, students in special education and parents were more likely than their general education peers to give lower ratings to their prior schools and higher ratings to the online school, particularly on teaching, learning, and behavioral concerns. In short, the students were more satisfied in an online charter environment than in a traditional school setting.

There is extremely limited research on student perspectives of online special education, especially in terms of their experiences enrolled in it. In sum, students often choose online schooling because they do not feel sufficiently supported in traditional

school settings. In addition, students with disabilities do not always get the needed support in online learning environments either. Teachers cannot see if a student is confused, unorganized, or simply inattentive on their work, placing the responsibility on the student to reach out for help if they are struggling. This can be difficult for some students with disabilities such as ASD who cannot always regulate their feelings or identify when they need help (Mazefsky et al., 2013). Unfortunately, there is a significant lack of research on EBPs for students with ASD in online learning environments to develop these skills; therefore, serious examination into support for students with ASD in this environment needs to be performed.

Summary

Research on special education in online learning environments is rapidly growing. Most research conducted has focused on qualitative research methods like surveys and interviews to identify experiences and perspectives of different groups of people involved in online education. An area of research that is beginning to grow examines the impact of COVID-19 on the education of students with ASD, with nearly every study on the topic indicating that students had a difficult time with the sudden change in routine, an increase in maladaptive behaviors occurred, and parents experienced increased stress and difficulty supporting the student (Shorey et al., 2021). Although online learning may have the flexibility and the potential for greater individualized learning for students with disabilities, these students do not often receive the support they need to succeed. In addition to the external factors that present challenges to online learning, students with ASD often present challenges with executive functioning, which can lead to challenging behaviors and negative academic outcomes. The next section explores how to improve

executive functioning skills for students with ASD in online learning environments through the introduction of self-management interventions.

Self-Management Interventions

Self-management is a common EBP used with students with ASD in the school and home settings. The research base for self-management for students with ASD is extensive (Carr et al., 2014; Carr, 2016). Self-management procedures have been used to address several skills including academic (Asaro-Saddler & Saddler, 2010; Smith et al., 2013), daily living (Munsell & Coster, 2018), social and communication (Koegel et al., 2014), task compliance (Lui et al., 2014), and on-task behavior (Stasolla et al., 2014). Several literature reviews and meta-analyses have reported on the general effectiveness of self-management interventions for students with ASD. Carr (2016), for example, specifically looked at published studies focusing on using self-management interventions to address challenging behaviors. The review indicated that several studies demonstrated self-management to be effective at reducing such behaviors as aggression, tantrums, elopement, inappropriate vocalizations, and self-injury. In another meta-analysis of 54 peer-reviewed articles between the years 1970 and 2015, Aljadeff-Abergel and colleagues (2015) reported that 70% of the studies conducted in the natural setting had significant treatment effects. In the clinical setting, 57% of the studies were evaluated as effective and 43% were evaluated as unknown. Of the studies conducted in mixed settings, 77% were evaluated as having effective treatment effects while 23% were found to have unknown treatment effects; no studies were found to be ineffective.

Self-management encompasses a range of procedures to promote behavior change; these include self-monitoring, goal setting, self-evaluation, and self-

reinforcement (Howard et al., 2020). Self-monitoring typically includes two components: self-observation and self-recording (Bruhn et al., 2015a). Goal setting allows the student to set a target for behavior change. Being a part of setting a target goal helps motivate students and structures progress toward achieving the goal (Mallory et al., 2021). Self-evaluation is the process in which students compare their self-ratings to a criterion in order to determine whether the goal was met (Howard et al., 2020). For example, students with ASD may be taught to verbalize planning or coping statements to promote task completion and support task persistence (Asaro-Saddler & Saddler, 2010). With self-reinforcement, the target student is responsible for recruiting and delivering reinforcers based on the student's performance relative to the goal (Howard et al., 2020). These strategies can be used in isolation but are often used in conjunction with at least one other self-management strategy.

Self-Monitoring

Self-monitoring is the most commonly researched component of self-management (Briesch et al., 2019). At its core, self-monitoring involves an individual observing and recording the presence or absence of a target behavior. Self-monitoring creates an opportunity to shift stimulus control from an outside agent such as an adult mediator to an alternative stimulus (e.g., timer, buzzer, checklist). The alternative stimulus cues the individual and provides information regarding expectations related to the targeted behavior or skill. By using an alternative stimulus to prompt students to monitor their behavior, they become less reliant on adults, thereby increasing their capacity for independence.

Much of the research on self-monitoring utilizes low-tech strategies which typically require the individual to use a writing utensil (e.g., pen or pencil) to record the presence or absence of the target behavior on a self-monitoring sheet upon the presentation of a cue (e.g., timer or buzzer; Rosenbloom et al., 2019). High-tech self-monitoring procedures incorporate technology, such as a computer or tablet device, as a way to prompt the individual and have been demonstrated effective for individuals with ASD (Legge et al., 2010; Xin et al., 2017). For example, Legge et al. (2010) used MotivAiders to improve the on-task behavior of three middle school students with ASD. The MotivAider provided vibrating cues at two-minute intervals, and students recorded a plus (+) or a minus (-), which represented "yes" or "no," to different on-task behaviors on a recording sheet. A clear relation between the use of the intervention and on-task behavior was demonstrated for all three students. Using electronic handheld devices, Crutchfield and colleagues (2015) evaluated the use of the (I-Connect) self-monitoring application to decrease stereotypic behaviors in two students with ASD. Both students demonstrated a marked decrease in stereotypy when using the I-Connect intervention. Clemons and colleagues (2016) also employed the I-Connect application to explore student engagement for three high school students with disabilities, including one student with ASD. A functional relation was found between the I-Connect self-monitoring application and an increase in on-task behavior.

Goal Setting

Studies using goal setting with students who have ASD is limited, but the literature base is growing. For example, Delano (2007) included the use of student-directed goal setting in self-monitoring with added video self-modeling to improve

writing skills for adolescent students with ASD. The student-directed goal setting involved self-recording the number of written words, evaluation of goal attainment, and determination of a new goal when the previous goal was achieved. In a study by Asaro-Saddler and Saddler (2010), effects of a planning and self-regulation strategy on the story writing ability of three elementary-aged students with ASD was evaluated. The students were taught a strategy for planning and drafting a story using a self-regulated strategy development approach. After the intervention, all students improved their story writing ability in terms of length, number of story elements, and holistic quality. In a more recent study, Xu and colleagues (2017) used guided goal setting in conjunction with self-monitoring with a nine-year-old boy with ASD in an inclusive classroom and reported an increase in academic engagement which the student maintained during 1-week follow-up sessions without self-monitoring.

In studies of students with disabilities other than ASD, researchers have incorporated guided goal setting with self-monitoring and teacher feedback in a self-management intervention package designed to improve homework completion and accuracy for high school students with ADHD (Merriman & Codding, 2008) and academic engagement for elementary students who engage in disruptive behaviors (Moore et al., 2001). In Merriman and Codding's (2008) study, an individual goal-setting meeting was conducted with each student prior to the intervention. Each student was guided to set up an attainable long-term goal with short-term objectives based on their baseline data of math homework completion and accuracy. During intervention, the instructor provided student performance feedback as a basis for the next goal setting. Similarly, Moore et al. (2001) included guided goal setting with data-based teacher

feedback into a self-management intervention package designed to improve student on-task behaviors in the regular classroom setting. Students maintained the target behaviors when the self-management package was faded and during one-week follow-up sessions in both studies.

<u>Self-Evaluation</u>

Self-evaluation, though similar to self-monitoring, differs in that students compare their self-ratings to a criterion, often a teacher rating, in order to determine whether the goal was met (Aljadeff-Abergel et al., 2015). In their systematic review of the self-management research, Briesch and Chafouleas (2009) found that half of the self-management studies published between 1988 and 2008 included a self-evaluation component. In a more recent review of self-management in schools, Briesch and colleagues (2019) noted that self-evaluation is often implemented as part of a multifaceted intervention that also includes self-monitoring and self-reinforcement components. Self-evaluation has demonstrated effectiveness with a variety of populations, including students with ASD (Deitchman et al., 2010), learning disabilities (Sweeney et al., 1993), ADHD (Ardoin & Martens, 2004), and other behavioral concerns (Kern et al., 1995).

Deitchman et al. (2010) evaluated the effects of self-evaluating appropriate social interactions during video feedback on the frequency of social initiating for three students with ASD. Students were video recorded and then watched the recording with the researchers. While watching the recording, the students were told to indicate appropriate or inappropriate social interactions. Normative data regarding both frequency and socially valid topographies of social initiations were used as a reference. The results of

the study demonstrated that daily video feedback sessions increased the frequency of social initiating for the participants. Increases in social initiations also generalized across general education settings and to peers not previously associated with video feedback recordings.

Many studies examining self-evaluation, much like studies looking at other self-management components, examine the impact of the strategy on on-task behavior. For example, Vogelgesang et al. (2016) examined the effects of one self-management iPad application, SCORE IT, for self-monitoring on the behavior of three fifth-grade students with or at risk for ADHD who were exhibiting low rates of academic engagement in a general education environment. Students would be cued in 10-minute intervals to rate their behavior on a Likert scale on the app, which was then compared to the teacher's ratings of the students' behavior. Overall, results indicated substantial improvements in academic engagement for each student. In a study by Dalton et al. (1999), two adolescents with learning disabilities were taught to use a self-management program to decrease off-task behavior in three separate classes. The self-management program included three components: a checklist, a behavior rating scale, and a self-monitoring form. The findings indicated that the self-management program was successful in all three settings in decreasing off-task behaviors. Additionally, the teacher ratings of student positive behaviors were found to increase during self-monitoring, suggesting the overall behavior of the students improved during the self-management program.

Self-Reinforcement

Studies that have looked at self-reinforcement for students with ASD have often included other self-management components, such as self-monitoring and self-evaluation

(Aljadeff-Abergel et al., 2015). When examining self-management of social skills, Koegel and colleagues (1992) delivered an intervention package including self-monitoring, reinforcement, and visual prompting to four students with ASD. The students were taught to utilize a wrist counter to record appropriate responses and prompts to take a reinforcer were faded over time. The intervention package resulted in increased appropriate responses to questions and decreased rates of disruptive behaviors for all four students. Newman et al. (1996) studied the use of self-reinforcement to increase appropriate conversations of three adolescents with ASD. The students were verbally prompted to take a token following an appropriate response during a conversation for the first few sessions, then the verbal prompt was removed in subsequent sessions and the students only received tokens if they took one on their own, with accuracy of correct responding calculated. Results demonstrated that all three students increased their use of appropriate conversational skills. Interestingly, the accuracy of self-reinforcement was not found to correlate with improved performance; in fact, the students tended to under-reinforce, rather than over-reinforce, their behavior.

Other skills taught to students with ASD using self-reinforcement include daily living skills (Pierce & Schreibman, 1994) and on-task behavior (Finn et al., 2015). In the Pierce and Schreibman (1994) study, the researchers taught three children with ASD to self-administer antecedents using picture prompts and to self-reinforce their performance in order to improve their daily living skills. Results of the study suggest that when taught to use these strategies, the children could successfully manage their behavior even without the presence of the treatment provider. In the Finn et al. (2015) study, the researchers taught four elementary school students with ASD to complete self-

management procedures independently by rating their on-task behavior after receiving an electronic prompt, compared their own behavior to an established goal, and then self-administered rewards based on their level of performance. Results showed an immediate increase in on-task for all students when the intervention was introduced, and high levels of on-task behavior were maintained during the follow-up phase.

Self-management interventions can take on a number of different formats and designs. For example, Carlile et al. (2013) taught four children with ASD to use an activity schedule to promote engagement in independent leisure. Hampshire et al. (2016) implemented a self-monitoring checklist in addition to parent prompting with five middle school students with ASD to improve independence in their homework completion. Stasolla et al. (2014) used a token economy with a response cost system in addition to a self-monitoring form with two adolescents with ASD to increase on-task behavior and decrease stereotyped behaviors. One particular category of self-management interventions that has been expanding in recent years are those interventions that make use of technology.

Technology-Aided Self-Management Interventions

Over the past two decades, there has been growing attention to using technology in conjunction with self-management interventions (Chia et al., 2018). One reason for this may be partially due to the typical mechanisms of self-management procedures that can hinder its use. Prompts to monitor behaviors are usually given by external agents, such as parents or teachers, which influence the degree of independence of the individual. Also, the classic use of paper, pencil, and checklists can sometimes be tedious, obtrusive, and pose an inconvenience in terms of manageability and portability. During the COVID-

19 pandemic in which nearly all instruction was delivered online, using pencil and paper self-management strategies was impractical and often unfeasible. Instructional time was significantly reduced, so most teachers often had very limited time to teach self-management skills on top of course content. Throughout the pandemic, the importance of technology could not have been clearer. Every assignment, test, and paper was modified to be exchanged between students and teachers electronically as doing so manually was inconvenient, not to mention that it carried the risk of spreading the virus. For families of students with ASD, the difficulties associated with the transition to online schooling during the pandemic were often significant, suggesting that any intervention or support that could be used to aid in this transition would need to take into consideration not only the student with ASD, but the emotional and functional state of the family and the home environment. Therefore, increasing the manageability and portability of self-management procedures through the use of technology may be especially beneficial in less controlled settings (Chia et al., 2018).

Researchers have looked at different technologies to mediate self-management interventions for students with ASD for decades. Koegel et al. (1992) used a wrist counter to improve social communication skills of an elementary school student with ASD. Deitchman et al. (2010) utilized a video recorder to deliver video feedback for self-observations with three elementary school students with ASD, leading to increases in the frequency of social interactions. Another low-tech device used for self-management interventions includes digital watches, which was the tool used in Mancina et al.'s (2000) study. In this study, the researchers examined the effects of a self-management program used to reduce high rates of inappropriate vocalizations of a 12-year-old girl with ASD in

a self-contained classroom. Self-management materials included a Timex digital watch with a repeat alarm to signal 10-second intervals, self-recording sheets, visual prompts, and reinforcers. Results showed that the student reduced inappropriate vocalizations across all three separate activities observed in the study.

Many of the current studies utilize more high-tech devices such as smartphones and tablets (e.g., Clemons et al., 2016; Hampshire & Allred, 2018; Rosenbloom et al., 2019). Hong et al. (2017) conducted a meta-analysis on 36 single-case research articles on the use of tablet-mediated interventions for individuals with ASD, finding that a) tablet-mediated interventions for individuals with ASD have moderate to large effect sizes across the behaviors and skill sets evaluated, and b) the majority of research used tablets for video modeling and augmentative and alternative communication. They also noted that most research settings were not natural environments such as the participant's home or employment settings, but rather school or clinical settings. None of the studies in the review that took place in school settings were in an online learning environment, however one participant in Hampshire and colleagues' (2016) study was enrolled in an online school. Chia et al.'s (2018) review of technology used to support self-management in individuals with ASD from 1992–2017 also showed that most studies take place in the school or clinical setting, and most current studies use tablet or cellphone technology to deliver the self-management intervention.

Research has also shown that technology-aided self-management interventions have been used in reducing stereotypy (Crutchfield et al., 2015) and self-injurious behavior (Soares et al., 2009), increasing daily living and vocational independence (Bereznak et al., 2012), and improving task engagement and independence (Bouck et al.,

2014; Xin et al., 2017) of individuals with ASD. One reason why these interventions produce positive results is that developing innovative and technological ways to keep students engaged is important for students with disabilities, as they may display low motivation and task persistence (Bruhn et al., 2016). Motivation drives the students to engage and achieve their goals, which is a significant component of the student's self-efficacy.

<u>Self-Management and Student Self-Efficacy</u>

Few studies have examined the relation between self-management and self-efficacy. Morris and Messer (1978) conducted a large-scale investigation to determine if a student's locus of control, views of failures and successes being contingent on their own efforts or external influences, determined when self-reinforcement or external reinforcement were more motivating for the students' academic performance. 153 fourth and fifth grade students completed the Intellectual Achievement Responsibility Questionnaire, and students with extreme scores on either an internal or external locus of control in academic tasks were assigned to self-reinforcement or external reinforcement conditions. Results indicated that when locus of control was defined by subscales of the questionnaire, students with an external locus of control performed better under the external reinforcement condition while students with internal locus of control performed equally well under both conditions.

Barling and Patz (1980) also assessed whether a student's age and locus of control attribution would mediate the differential efficacy of students' self-reinforcement and external reinforcement on the children's academic task persistence as well as task accuracy. 120 elementary school students were administered the Intellectual

Achievement Responsibility Questionnaire, and 56 of the students were then selected to participate in the second part of the study based on their scores on the questionnaire. A 2 x 2 x 2 (grade x LOC x reinforcement) factorial design was employed. Results indicated that self-reinforcement was more effective for sixth-grade students with an internal locus of control attribution, while their counterparts who were externally oriented benefited more from external reinforcement. However, no such phenomenon characterized the behavior of second grade children.

Though there is a lack of research examining the relation between self-efficacy and self-management, these two concepts can be logically connected when examining behavior interventions. A student's self-efficacy beliefs can be an important predictor of achievement within a content area (Jungert & Andersson, 2013) as well as behavioral change (Bandura & Adams, 1977). In addition, motivation is a large component of success (Zimmerman, 2000), and both self-efficacy and self-management are influenced by a student's motivation. Dogan (2015) explored the correlations among academic performance, student engagement, academic self-efficacy, and academic motivation. The results for this study suggested that cognitive engagement, a sense of academic self-efficacy, and academic motivation were positively correlated with academic performance. Moreover, the sense of self-capability and related motivations of students, as well as the sense of the purpose for their learning, were significant variables affecting their academic success.

Allowing students to set goals may enhance goal commitment. Schunk (1985) found that self-set goals promoted the self-efficacy of sixth-grade students with learning disabilities. Students who set their own performance goals and those who had goals

assigned demonstrated greater motivation than students who had no goals, but self-set goals led to the highest self-efficacy and skill. In fact, an individual's initial self-efficacy has been shown to fluctuate as a function of ability and earlier experience and is confirmed when they observe goal progress or are given feedback that communicates skillfulness (Elliot & Dweck, 1988). Academic self-efficacy, according to Zimmerman (1989), is profoundly affected by students' earlier encounters with identical or similar tasks. Motivation and efficacy are enhanced when individuals perceive learning progress and increased comprehension. High self-efficacy perceptions are also believed to make individuals engage in tasks that develop their skills and capabilities, while low-efficacy perceptions make students choose tasks that will not need development of new skills (Schunk, 1991).

Research has employed various instruments to measure individuals' self-efficacy, although Lee and Bobko (1994) reported that most self-efficacy studies use measures of self-efficacy strength, self-efficacy magnitude, or a composite measure of strength and magnitude. Often these variables are measured by asking respondents to rate their self-efficacy using Likert-type measures (Lee & Bobko, 1994). Dogan (2015) used two such measures: the Academic Motivation Scale (Bozanoglu, 2004) and the Expectancy of Self-efficacy for Adolescents Scale (Muris, 2001). Jungert and Anderson (2013) also used multiple Likert-type scales to measure students' self-efficacy in mathematics, foreign language, and native language. Other studies have employed questionnaires, such as Morris and Messer (1978) as well as Barling and Patz (1980), which both used the Intellectual Achievement Responsibility Questionnaire to assess the extent to which students believe that they are responsible for academic and intellectual successes and

failures. Bandura and Adams (1977), using yet another measure, had subjects list which performance tasks they judged themselves capable of completing, and rated the strength of their efficacy expectations.

<u>Summary</u>

Research on the use of self-management interventions for students with ASD has been explored extensively for several decades. These interventions have been used to address a variety of skills and behavioral challenges by teaching students to observe, assess, and modify their own behavior. The use of technology to facilitate self-management can be very effective at not only addressing the target behaviors or skills, but also promoting greater independence on the part of the student, which in turn provides greater motivation for the student to achieve their goals. Self-management interventions have been used in schools, homes, clinics, and places of employment; however, no research has examined the use of self-management intervention with students engaged in online learning. With evidence supporting their effectiveness in both the home and school settings, self-management interventions may help provide some structure for students with ASD to succeed in online schooling. In the following section, one of the most widely used self-management strategies in schools for students with support needs, CICO, is discussed as an option to address the needs of online learners.

Check-In/Check-Out (CICO)

CICO, also referred to as the Behavior Education Program (Crone et al., 2010), is one the most widely and extensively examined Tier 2 behavioral interventions within the educational literature and is arguably the most commonly used Tier 2 behavior intervention in schools (Park & Blair, 2020). Although implementation of CICO may

vary among schools and students, CICO is typically composed of the following elements (Maggin et al., 2015; Wolfe et al., 2015). First, the student participating in CICO meets with a mentor each morning to check in. The mentor reviews behavioral expectations for the student, sets an attainable goal, and provides the student with a daily progress report (DPR). Second, the student solicits feedback from their teachers throughout the day using the DPR. The teacher records the student's progress and may give corrective feedback or verbal praise depending on how the student performed. Third, the student checks out with the mentor at the end of the day. During the end-of-day check-out, the mentor reviews the DPR, recognizes the student's accomplishments, and delivers reinforcements if the student met their goal. Last, the student takes the DPR home for their caregivers to review and sign. The student brings the signed DPR back to the mentor the next day and the process starts again for the new day.

Previous research has shown that CICO has been effectively implemented in both elementary and middle schools. For example, Miller and colleagues (2015) showed that CICO was effective for reducing problem behavior as well as increasing academic engagement for three elementary students. In another study, Mitchell and colleagues (2021) examined the effects of CICO on the academic engagement of three elementary students identified with risk for internalizing behavior problems. Results indicated a positive effect for one student, a moderate effect for a second student, and limited effect on academic engagement time for the third student. However, teacher ratings of student behavior suggested decreases in several problem areas including anxiety, depression, and overall internalizing problems for all students. Similar multiple baseline design studies demonstrated successful implementation of CICO for middle school students have

resulted in decreased task avoidance (Turtura et al., 2014) and attention-maintained behaviors (Lane et al., 2012).

Unlike elementary and middle school levels, the research pertaining to using CICO in a high school setting is extremely minimal. There may be a few reasons for this. First, secondary schooling typically involves students rotating among classrooms and teachers throughout the day, which can make it difficult to ensure the intervention is implemented consistently throughout the entire day (Ruiz et al., 2014). Also, it is not uncommon that high school teachers are less likely to view teaching and reinforcing appropriate social behavior as their responsibility, as students are typically expected to have learned these skills and the ability to self-manage prior to arriving in high school (Flannery et al., 2013). At the student level, high school students differ developmentally from younger students in that they are more autonomous and place greater value on being actively involved in decision-making (Flannery et al., 2013). This indicates that there is a greater need for student buy-in to be a part of the intervention, and also greater buy-in from teachers who may not see CICO as being important for a student's success.

A review of the literature on CICO yielded one pilot study (Kittelman et al., 2019) that used only high school students. In this report, sponsored by the Institute of Education Sciences, the researchers used a single-case multiple baseline design across five 9th grade students to evaluate the effects of CICO on student academic engagement and disruption/non-compliance. The results indicated that although social validity was mostly positive, implementation fidelity was highly variable throughout the study. The findings did not demonstrate clear effects of the intervention, likely due to the poor implementation fidelity. In a different study, Ennis et al. (2012) explored the use of CICO

with middle and high school students in a residential facility, however only two of the six students were high school aged. Both of those students demonstrated declines in challenging behaviors, though both students were discharged/transferred during the intervention, forcing the discontinuation of data collection and intervention.

CICO has been studied in settings outside of school, often demonstrating positive outcomes for students. For example, Swoszowski and colleagues (2012) examined the use of CICO with six students with emotional and behavioral disorders in a residential facility whose behaviors were maintained by either attention or escape. Results indicated that problem behavior improved for two of three students with attention-maintained behavior as well as two of three students with escape-maintained behavior. Another environment where CICO has been implemented is in juvenile correctional facilities. A study by Alonzo-Vaughn et al. (2015) examined the cases of three youth in Arizona juvenile correction centers, all of whom used CICO support. They observed that one student made progress in school with regard to both his grades and his behavior, a second student's behavior fluctuated day-to-day depending on his willingness to participate, and the third student succeeded in passing six classes while using CICO. Results of this study indicated that there were substantially fewer rule violations and incident reports, twice the number of positive behaviors reported, and no admissions to the separation housing unit after the implementation of CICO. The literature reveals that environments in which CICO has not been explored are in online environments or in the home setting. Due to the increasing number of students with special needs enrolling in online learning environments, it is important that strategies that have already been implemented in several settings, such as CICO, are also explored in the online learning environment.

CICO is an effective Tier 2 intervention for students with a variety of disabilities. Campbell and Anderson (2011) implemented a reversal design and component analysis to assess the effects of CICO for four students with learning disabilities, finding that problem behaviors decreased while academic engagement increased. Several studies have implemented CICO with students with emotional behavioral disorders (EBDs; Ennis et al., 2012; Swoszowski et al., 2012; Swoszowski et al., 2013), demonstrating positive results in reducing problem behavior in classroom settings. Finally, CICO has been used to reduce problem behaviors of students with social skills deficiencies, such as the study done by Ross and Sabey (2015), who used a modified CICO system in conjunction with social skill training. Results indicated that implementation was functionally related to increased positive social engagement and decreased negative social engagement for four of the five participating students. To date, there is a lack of literature exploring the use of CICO with students with ASD, though some literature on Tier 2 interventions have indicated some participants in those studies had an ASD diagnosis (e.g., Lane et al., 2011; Ness et al., 2011).

Summary

In summary, CICO has shown itself to be an effective secondary intervention in multiple settings, with a variety of students of different ages and disabilities. However, a few gaps in the literature do exist. One of these gaps is the lack of literature surrounding CICO with high school students. Another unexplored area is the use of CICO with students with ASD. The previous section of this review highlighted several self-management strategies commonly used by students with ASD, and CICO shares several commonalities with many of them. With CICO, the student has a predetermined point

goal that they are trying to obtain, and the DPR can serve as a visual prompt for the student with ASD to observe their engagement in the targeted behaviors. Frequent check-ins with teachers allow the student to compare their perception of their behavioral performance to those of the teachers. Like most self-management strategies, CICO creates structure and routine that support the student. Despite the lack of research, it would be logical to hypothesize that CICO would be a useful intervention to support students with ASD as well.

In addition, there is a lack of research that investigates the effects of implementing CICO with students engaged in online learning. This is not surprising since these students are not physically present to check in and out with their teachers or a mentor. This barrier could be removed by utilizing a technology-aided CICO, which has been suggested by many but empirically tested by none (e.g., Crone et al., 2010; Kittelman et al., 2018). The following section takes a further look at the use of technology-aided interventions and instruction (TAII) and provides some background and justification for the use of technology-aided CICO interventions. The use of technology in the implementation of self-management interventions was explored earlier in this chapter, but technology-aided interventions encompass much more than self-management and requires further discussion.

Technology-Aided Interventions and Instruction (TAII)

Behavioral interventions that use technological programming or devices have been explored extensively over the past few decades (Odom et al., 2015). This interest has been exacerbated by the COVID-19 pandemic in that electronic devices were essential to ensure students still receive academic instruction, have opportunities for

social interaction with peers, and provide a means for families and schools to maintain communication. The evolution of technology has brought about increased accessibility, social acceptance, and integration of technological devices with human lives (Chia et al., 2018). Devices such as smartphones and tablets are easily portable and have the ability to contain various types of applications for the purposes of learning, communication, collaboration, and organization. Devices involving high technology, such as computers and tablets, also have the ability to produce stimuli that are multisensory, which could be motivating and reinforcing for individuals with ASD (Grynszpan et al., 2014). As such, it is not surprising that there has been a growing interest in the use of technology with individuals with ASD.

TAIIs have been shown to be effective in developing numerous skills for students with ASD (Chia et al., 2018). These include TAIIs targeting emotional skills (Ramdoss et al., 2012), social and communication skills (Gal et al., 2016; Whitehouse et al., 2017), functional and vocational skills (Allen et al., 2010; Bereznak et al., 2012), recognizing facial expressions (Chen et al., 2015; Hopkins et al., 2011), and play and leisure skills (Fragale, 2014; Yanardag et al., 2013). TAIIs have also been used to help students in different academic subjects, such as science (Smith et al., 2013), word identification (Whitcomb et al., 2011), reading comprehension (El Zein et al., 2016), and numeracy skills (Jowett et al., 2012).

A variety of different technological devices have appeared in the TAII literature. Specialized speech generating devices have been developed for students with limited verbal abilities or who need augmentative assistance for communication (Ganz et al., 2012). Researchers have used personal digital assistants (PDAs) to support independent

performance of individuals with ASD (Gentry et al., 2011), and in the early studies of video modeling, traditional video cassette recorders (VCRs; Gelbar et al., 2012) were commonly used. Researchers now use tablets and smartphones in place of PDAs and VCRs for designing and delivering these types of interventions (Plavnick, 2012). Computer-assisted instruction was an early application of TAII to support the learning of individuals with ASD and other disabilities (Hofmeister & Friedman, 1986), and it continues to support a variety of learner outcomes such as academic (Ramdoss et al., 2012) and social communication skills (Reed et al., 2011). In recent years, researchers have explored virtual reality systems in which youth with ASD may participate in social or other activities with an avatar (Hopkins et al., 2011) as well as the use of robotics to simulate facial expressions and interactive engagement (Kim et al., 2013).

Technological devices like those discussed above have proven to be effective mediators in delivering different types of interventions. It is important to keep in mind that technology, though a central component of TAIIs (Odom, 2013), is the modality of an intervention and not the intervention in and of itself. That is, TAII is almost always used in conjunction with another EBP or intervention. For example, TAII is often used in conjunction with video modeling of oneself or others, such as Drysdale and colleagues' (2015) study using animated video modeling to teach toileting routines to two young children with ASD, and Hart and Whalon's (2012) study which used video self-modeling with an adolescent with ASD to increase academic responding. In their meta-analysis of 23 single-case studies of tablet-mediated interventions for individuals with ASD, Hong et al. (2017) reported that video modeling interventions have been found to have moderate effects on improving functional living skills of individuals with ASD.

Video modeling is not the only method of incorporating TAII with other interventions. Ganz et al. (2013, 2015) implemented a tablet-aided PECS system with preschool children with ASD, resulting in an increased frequency of making correct requests. Gevarter et al. (2014) compared three augmentative and alternative communication (AAC) applications using a tablet with three preschool-aged children and also found increased request making for each child. Flores et al. (2014) and Kagohara et al. (2012) both utilized iPads to present Social Stories™ to teach social and behavioral skills to students with ASD. Recently, the use of robotic technology has been used to provide social skills training to children with ASD (Thomeer et al., 2015; Yun et al., 2017), demonstrating positive outcomes for these children.

In addition to having a strong evidence base supporting its effectiveness as an EBP for individuals with ASD (Chia et al., 2018; Hong et al., 2017; Odom et al., 2015), TAIIs often demonstrate high levels of social validity among those receiving the intervention. For example, when given the choice, students consistently selected the iPad assisted delivery of interventions over traditional therapist-delivered interventions (Lee et al., 2015). Neely and colleagues (2013) have found similar results: participants demonstrated lower levels of challenging behavior and higher levels of academic engagement in the iPad condition and higher levels of challenging behavior with lower levels of academic engagement during the traditional materials condition. The use of technology to deliver an intervention, therefore, may serve as a motivating operation as well as a reinforcing stimulus for engaging in a targeted behavior (Hampshire & Allred, 2018; Mallory & Hampshire, 2022). Many students with ASD need increased visual stimulation to remain engaged or focused, and electronic devices such as computers or

smartphones allow for greater visual representation of elements that play into these students' strengths (Hellendoorn et al., 2014). Technology can also mitigate some challenges for students with co-occurring fine motor or communication challenges that can make some tasks more frustrating for the students (Licari et al., 2020); for example, a student can simply swipe or check a box as opposed to writing with a pencil that is difficult to hold. In addition, technology-based interventions provide immediate, predictable, and repeatable responses which satisfies the need for structure and routine often sought after by individuals with ASD (Perihan et al., 2021). For these reasons, it would make sense that implementing a TAII may be beneficial for students with ASD in online learning environments as these environments are typically lacking in structure and stimulation for some students.

<u>Summary</u>

The review of TAIIs for individuals with ASD shows that incorporating technology generally appears to add to or maintain the effectiveness of interventions. In addition, several studies show that TAIIs are favorable to and equally as effective to traditional materials such as paper and a pencil. Individuals with ASD may display more engagement with high-tech resources to positively affect other behavioral outcomes such as skill acquisition or challenging behavior reduction. Along with this, the use of technology in place of traditional materials alleviates the issues associated with traditional intervention methods in terms of portability and manageability. This may be especially important for parents who implement interventions with their children with ASD.

Parent-Implemented Interventions

The importance of having parents taking on the role of interventionists for children with ASD was discussed as early as the 1970s by Lovaas et al. (1973) who noted that large differences between groups of children could be observed related to the post-treatment environment. One group of parents were trained to carry out behavior therapy and their children demonstrated continued improvement while there was marked regression from the children in the group whose parents received no training. Parent-implemented intervention can be used in the home or community to teach a number of skills and to reduce interfering behaviors. Once parents learn the practices and procedures for implementing an intervention, nearly any skill can be targeted for change. Therefore, once parents learn to effectively implement an intervention with their child with ASD, they can continue to use this practice throughout their child's development.

It is important to note that the dual role that parents must play as interventionists can be difficult for several reasons. Parents of children with ASD often have other children they must attend to as well, which may interfere with structured interventions. Single-parent families may also have difficulty with designating time to implement interventions when the parent has to work outside of the home. In addition, the parent-child relationship may present a challenge to the parent implementing an intervention, as it has been documented that parents of children with ASD experience higher levels of stress, anxiety, and depression than other parents (Del Bianco et al., 2018).

Children with ASD may also have a difficult time with parent-implemented interventions due to characteristics associated with ASD. Social and communication deficits for children with ASD negatively impact parental sensitivity and joint attention

which are a core component of many parent-implemented interventions (Crowell et al.,

2019). Challenges with generalization can also be particularly difficult considering many

individuals with ASD work with a variety of professionals. Individuals with ASD often

struggle to generalize skills across settings or with different people, which has been

reported as early as the 1970's (e.g., Rincover & Loegel, 1975). Intervention packages in

which parents serve as the primary interventionists are likely to increase the probability

that treatment gains are maintained and generalized because parents have more

opportunities to facilitate skill acquisition, and frequently accompany their children to

settings where generalization of the skill can be practiced (Dogan et al., 2017). However,

the extent to which positive outcomes are demonstrated depends on the parents'

adherence to implementing the intervention with fidelity, which can be challenging for

parents for reasons stated previously in this section. In some cases, children may engage

in higher rates of challenging behavior during parent-implemented sessions (Gerow et al.,

2018), which can negatively impact implementation fidelity. In addition, parents may be

less likely than professionals to implement certain intervention components due to

differences in training, time constraints, and views on the importance of components of

the intervention (Gerow et al., 2018).

Despite these challenges, parent participation remains an important component for

positive child and family outcomes (Granger et al., 2012). Research shows that the

inclusion of caregivers and other family members in a child's intervention seems to

benefit marital, caregiver–child, and sibling relationships (Factor et al., 2019; Karst &

Van Hecke, 2012). Research has also suggests parents of children with ASD can be

effective in delivering a variety of interventions aimed at functional communication skills

(Raulston et al., 2021), social skills (Dogan et al., 2017), decreasing challenging behavior (Bearss et al., 2013; Hanley et al., 2014), and reducing stereotypical behaviors (Lanovaz et al., 2016) which contributes to a family's overall functioning.

For parent-implemented intervention to be successful, collaboration between the provider and parents in the form of parent training is critical. Within the field of support services for individuals with disabilities, the term ''parent training'' is attached to a variety of treatments that may or may not share common features (Bearss et al., 2015). This broad application of the term ''parent training'' may be due to the complexity of ASD and the multiple targets of intervention such as skill communication, socialization, imitation, play, and adaptive skills as well as disruptive behavior. Bearss et al. (2015) proposed a classification system with two broad categories to delineate parent training programs for individuals with ASD. First are parent support programs, which are parent education programs intended to provide an indirect benefit to the child by providing support to the parent and increasing parental knowledge about ASD. Second are parent-mediated interventions, or interventions in which the parent is the agent of change and the child is the direct beneficiary of treatment.

Parent Support Programs

Common outcomes of support programs for parents of individuals with ASD (i.e., psychoeducation programs) include increased parental knowledge, enhanced competence in advocating for the child, decreased parental stress, and a reduced sense of isolation (Bearss et al., 2015; Farmer & Reupert, 2013; Smith et al., 2014). Psychoeducation may also include a few sessions on behavioral management strategies or techniques to enhance communication. Given the brief coverage of these topics within a broader

psychoeducation program (Farmer & Reupert, 2013; Smith et al., 2014), these few sessions may increase parental knowledge on behavioral techniques but are unlikely to provide adequate guidance on management of moderate or greater behavioral problems. Other parent training programs are implemented over several weeks, such as the Research Units in Behavioral Intervention (RUBI) Autism Network Parent Training program (Bearss et al., 2018) which includes 11 core sessions, 7 supplemental sessions, a home visit, and follow-up telephone booster sessions.

To date, only a few studies have examined psychoeducation as a stand-alone intervention for ASD (Farmer & Reupert, 2013; Smith et al., 2014) or as a ''control'' condition (Hardan et al., 2014; Tonge et al., 2014). In a more recent study, Smith et al. (2014) describe a structured parent psychoeducational program, entitled Transitioning Together, in their pilot study of parents of 10 adolescents with ASD. The 10-session program included two individual family sessions focused on goal setting for the adolescent. These sessions were followed by eight multifamily group sessions that covered a range of topics including the developmental course of ASD, negotiation of service systems, exploration of behavioral management strategies, advocacy, parental well-being, and long-term planning for the adolescent. The study provided positive results on parental understanding of the child's disability and service system as well as improvements in the parent–child relationship (Smith et al., 2014).

Several studies from the Research Units on Pediatric Psychopharmacology (RUPP) Autism Network have examined the effectiveness of the medication risperidone with parent training for children with pervasive developmental disorders (PDDs). Aman et al. (2009) showed that the combination of medication and parent training was superior

to medication alone in reducing serious maladaptive behavior in children with PDDs. This finding was extended further by Scahill et al. (2012) in a randomized controlled study of 124 children ages 4–13 with ASD and serious behavioral problems. They found that both medication alone and medication plus parent training resulted in decreased serious maladaptive behaviors, as well as increasing adaptive skills as measured by the Vineland Adaptive Behavior Scales. There was more growth in adaptive skills in the combination group, though this was not significant. Following these studies, Bearss et al. (2013) tested the feasibility and initial efficacy of a modified extension of the RUPP Autism Network parent training manual as a stand-alone treatment for 16 children aged 3–6 with ASD accompanied by disruptive and noncompliant behavior. The 6-month intervention included 11 core sessions and up to two optional sessions. The program was acceptable to parents as evidenced by an attendance rate of 84 % for the core sessions. Fourteen of 16 families completed the treatment. An independent clinician rated 14 of 16 children as much improved or very much improved at Week 24.

<u>Parent-Mediated Interventions</u>

Currently, most parenting interventions in ASD focus on having parents in the role of interventionist with their children. In addition, the skill that is targeted most in these studies is communication. In Schultz et al. (2011) review of parent-mediated interventions, nearly half of the 30 parent training studies identified focused on communication as the primary target for intervention. In Beaudoin et al.'s (2014) review on parenting interventions for toddlers with ASD, communication was a main goal in all 15 included studies. Finally, in their review on parent-mediated interventions for young children with ASD, over 75 % of the identified studies targeted core symptoms of ASD,

specifically social-communication skills (Oono et al., 2013). These findings are not surprising as deficits in communication and social skills are a defining characteristic of ASD (APA, 2013).

In addition to core features of ASD, significant disruptive behavior problems are commonly targeted for intervention using parent-mediated interventions. In their review of literature, Kaat and Lecavalier (2013) reported several studies that have shown parents capable of implementing interventions that reduced behaviors such as tantrums, aggression, noncompliance with routine demands, self-injury, property destruction, and hyperactivity. Other studies have demonstrated effectiveness of parent-implemented interventions focused on functional life skills such as food refusal (Muldoon & Cosbey, 2018), sleep disturbance (Sanberg et al., 2018), and toileting problems (Unlu, 2019). To date, there is a lack of research on parent-implemented interventions in online education settings. As more and more students with ASD enroll in online education, it is becoming increasingly important that parents are given the skills to support their students, such as implementing self-management strategies like CICO.

In sum, parent-implemented interventions have been used with families of children with ASD to address a number of different skill deficits and challenging behaviors. But for these interventions to be effective, parents and professionals must work together to determine how to best facilitate the development of the child and address the concerns and priorities of families. For this reason, it is essential that on-going parent coaching is provided as part of any parent-implemented intervention plan.

Parent Coaching

       Parent coaching is important for two main reasons: first, it is used to promote the application of intervention techniques from the therapist or professional to the parents (Bearss et al., 2015). Second, it ensures fidelity of the intervention is maintained by the parents (Billingsley et al., 1980; Wolery, 2011). Intervention fidelity emphasizes the importance of treatment procedures being implemented as designed (Billingsley et al., 1980). Fidelity is important to measure for several reasons, a significant reason being that high treatment fidelity is positively correlated with better outcomes for the individual receiving the intervention (Wainer and Ingersoll, 2013). Research shows that an individual's own perception of their ability to implement an intervention with fidelity often differs from reality, in which the teacher or interventionist reports higher fidelity than what is actually the case (Billingsley et al., 1980). Therefore, fidelity measures can provide more accurate accounts of parents' ability to implement an intervention.

       Parent coaching is often done in-person with the trainer physically present with the parent and child. An increasingly more common approach to delivering parent coaching is through telecommunication, such as telehealth (Tomlinson et al., 2018). For example, clinicians have used telehealth technology to teach parents to implement functional behavioral assessments and treatment procedures to address problem behavior (e.g. Lindgren et al., 2016) as well as programs aimed at increasing social and communication behaviors (e.g., Simacek et al., 2021; Wainer & Ingersoll, 2015), self-care skills (Boutain et al., 2020), and reducing self-injurious behavior (Benson et al., 2017), all with positive outcomes for the students and parents. Telehealth can be beneficial for some families and providers due to the amount of time needed and

difficulties providing training or behavioral consultation to clients in rural areas or those who are on a waiting list to receive intervention services, suggesting that telehealth may be a useful alternative method of providing such support (Rivard et al., 2017; Tomlinson et al., 2018). Telehealth has also been shown to be a necessary means of coaching parents during the COVID-19 pandemic, as many individuals with ASD could not receive intervention services and service providers could not provide in-person coaching (Gerow et al., 2021).

Whether in-person or through telehealth, coaching provides parents with ongoing support to implement interventions effectively. Also, parents tend to view coaching as beneficial (e.g., Chung et al., 2020; Rivard et al., 2017). Chung and colleagues (2020) noted that the goals, procedures, and outcomes of the intervention tested in their study were socially important for the caregivers receiving the coaching. In addition, data from the observations and pre/post training quizzes demonstrated an increase in the caregiver's knowledge and accurate use of the targeted strategies. Rivard et al. (2017) assessed the social validity of a training and coaching program for parents whose children put on a waiting list for intervention services. Social validity was assessed through parental satisfaction with the program and their perception of its effects on themselves, the family, the child, and parental stress. They reported that the program had positive effects on their psychological well-being, their family's quality of life, and their child's behavior. However, parental stress levels were found to have increased over the 12-month period. As mentioned previously, socially valid interventions are important for parents to implement the intervention with fidelity, but they are also important for parent self-efficacy to support their child with ASD (Schertz et al., 2020).

Parental Self-Efficacy

The relation between parental self-efficacy and parent outcomes has been explored for decades. Hastings and Brown (2002) reported that self-efficacy beliefs mediate effects of child behavior problems on mothers' anxiety and depression. Coleman and Karraker (2003) also found that parents' understanding of their own competence, in combination with child variables, predicted their overall parenting satisfaction. A number of other studies found associations between parents' self-efficacy and their well-being, agency, and feelings of guilt (e.g., Kuhn & Carter, 2006; Meirsschaut et al., 2010). These reported associations of parent self-efficacy with child and parent outcomes suggest that self-efficacy may play a pivotal role in maximizing an intervention's effects on a child's behavior.

In light of these findings, individuals providing parent coaching must take parent self-efficacy into consideration. Parents with higher levels of reported self-efficacy have been shown to experience larger benefits from a parent coaching intervention targeting their ability to effectively advocate on behalf of their children, compared to parents with lower levels of self-efficacy (Siller et al., 2014). Parents of younger children with ASD are especially vulnerable for lower levels of self-efficacy when their child first begins receiving intervention services. Schertz et al. (2020) conducted a qualitative study with 11 mothers of toddlers with ASD who had experience with both professionally directed and parent-mediated early intervention. In the early stages, parents experienced challenges to their self-efficacy as they adjusted to their children's diagnosis and reached to connect with their child when social challenges emerged. Their self-efficacy increased when they were provided with background knowledge enabling them to take the lead in

guiding their children's learning than when professionals modeled intervention strategies for them to copy.

As children with ASD age and new skills are identified for development, parents will face more challenges regarding self-efficacy. Russell and Ingersoll (2021) explored factors that relate to parents' therapeutic self-efficacy, or feelings of self-efficacy regarding their implementation of an intervention, within parent-mediated interventions. The authors suggested that a parent's perceptions of their child's functioning are more influential than their child's actual abilities on therapeutic self-efficacy. Global parental self-efficacy, the belief in their ability to successfully parent their child, was significantly related to therapeutic self-efficacy. In addition, parents with lower therapeutic self-efficacy were more likely to view their child's lack of skills as negatively impacting their ability to use the intervention. Finally, a parent's perception of the fit between the intervention, their child's skills, their own interaction style, and their child's response to the intervention influenced parents' experience with implementing the intervention and their therapeutic self-efficacy.

In another study examining factors related to parent's therapeutic self-efficacy, Weiss et al. (2016) examined the role of demographics (e.g. child age, gender, maternal education, maternal immigrant status, family median income), systemic factors (e.g. affordability and barriers to services), caregiver burden, and child clinical needs (e.g. severity of ASD symptoms, presence of child's psychiatric or medical comorbidity) as predictors of parent self-efficacy. Participants included 324 parents of individuals diagnosed with ASD aged 12–25. Several variables correlated significantly with parent self-efficacy: child age, maternal immigrant status, parents' experience of the service

system, parent-reported levels of burden, and caring for a child with more severe ASD symptomatology. The results in this study in addition to the Russell and Ingersoll (2021) study indicate that parent self-efficacy is complex. Therefore, parent-implemented interventions need to support parents as well as the students by considering personal factors that may present barriers to success. This is especially important because parents often report significant challenges to supporting their children in online school, especially when the child has ASD.

Summary

Parent-implemented interventions are a common method of implementing behavior interventions for children with ASD. Parents are uniquely situated to know their children better than outside professionals, however they often need on-going training and support to effectively deliver an intervention. Due to recent world events like COVID-19, the importance of having parents that are knowledgeable and skilled in supporting their students with ASD is essential for these students to succeed academically and behaviorally. Several factors can contribute to how successfully a parent can implement interventions, one of which is their self-efficacy. Therefore, trainers must take parental self-efficacy into consideration when coaching parents by being responsive to the parents' challenges and successes as well as the child's.

Summary and Conclusion

Implementing any behavior intervention for a student engaged in an online learning setting must take into account both the student and their family. Parents of students with ASD play a significant role in online learning; however, they often lack the skills, training, or even resources to support the student. Despite the benefits associated

with online learning, students with ASD encounter deficits in self-management skills that impact their academic success. Self-management strategies such as CICO can provide structure and motivation that is often lacking in online education. Furthermore, researchers have noted the benefits and effectiveness of TAII to teach numerous skills, including self-management skills, to students with ASD. Incorporating technology could be effective in supporting self-management as well as addressing the challenges of typical self-management mechanisms such as manageability and portability. For the parents of these students, facilitating a technology-aided self-management intervention may be more socially valid than other methods, which can contribute to greater outcomes from the intervention, not only for the child, but the parent as well.

This chapter identified several pieces of literature that support the current study, however there are also significant gaps in the literature this study attempts to address. First, there is extremely limited research pertaining to behavioral interventions for students enrolled in online learning. Second, the literature surrounding CICO reveals that there is a lack of research on implementing a CICO intervention with students with ASD. Third, the number of empirical studies that have tested the effectiveness of a technology-aided CICO intervention is virtually nonexistent.

In the only study to address all these limitations, Mallory and Hampshire (2022) piloted a technology-aided CICO intervention with a high school student with ASD enrolled in online schooling during the COVID-19 pandemic. The intervention consisted of a mobile app to facilitate CICO, initial parent training on implementing the intervention, and on-going parent coaching. Results showed that student engagement increased after the intervention was implemented; however, the AB single-case design of

the study prevented a causal effect from being determined. Implementation fidelity was

acceptable throughout the study, and social validity measures indicated that both the

student and his mother viewed the intervention favorably. The current study builds off of

this pilot study to determine a causal relation between the CICO intervention package and

changes in student behavior, student self-efficacy, and parent self-efficacy. Chapter 3

provides more detail on the design and methodology used in this study.

CHAPTER THREE: METHODOLOGY

This chapter provides an outline of the research methods used in this study. First, the research questions that guided this dissertation are reintroduced. Next, a summary of findings from the pilot study is provided. The following section then describes information on the students and how they were recruited for participation. Next, the research design, including the procedures and data collection measures used, are provided. Finally, the methods that were used to analyze the data are discussed.

Research Questions

1. Will the implementation of a technology-aided CICO intervention package increase on-task behavior for high school students with ASD enrolled in online high school programs?

2. Will the students report an increase in their ability to stay on-task while completing schoolwork throughout the study, as measured by a standardized self-efficacy rating scale?

3. Will the implementation of a technology-aided CICO intervention package positively influence parental self-efficacy to support their students engaged in online schooling?

4. Given structured parent coaching sessions, will the parents implement the intervention package as intended, as measured by a standardized implementation fidelity checklist?

5. To what extent and in what ways will the student and parent self-efficacy

   measures help to explain any observed changes in student on-task behavior?

Pilot Study

Prior to this dissertation, a pilot study was conducted to test the methods and procedures that would be used for the current study (Mallory & Hampshire, 2022). The study tested the technology-aided CICO intervention to improve student engagement for one high school student with ASD participating in online schooling. The intervention consisted of a mobile app to facilitate CICO, initial parent training on implementing the intervention, and on-going parent coaching. The student's mother received training to implement the intervention with the student prior to data collection. Using a single-case, AB design, data were collected on student engagement prior to and during the implementation of the intervention package. Social validity interviews were also conducted at the end of the study with both the student and his mother.

Results showed that during the baseline phase, the student's average engagement in class was 0 occurrences. Following the introduction of the intervention, an immediate increase in the level of engagement was observed, along with a moderate degree of variability. During the intervention phase, the student averaged 11 occurrences of student engagement. Social validity reports from both the student and his mother indicated overall positive perceptions of the intervention. In particular, the student's mother felt that the app was simple to use, and that the intervention was easy to understand and implement despite the family's chaotic and changing schedules. She felt that frequent check-ins helped her to be more aware of Anthony's needs so she could better support him.

This pilot study highlighted several modifications that needed to be made for the present study. First, a more rigorous research design using more students was needed to demonstrate experimental control of the intervention on student behavior. Second, ongoing parent coaching was needed to be included in the intervention package to ensure the parents implement the intervention with high levels of fidelity. Third, there was a need to develop an intervention manual to ensure consistency and fidelity of training across families on the part of the researcher.

Recruitment

After the study's proposal was cleared through the university Institutional Review Board (IRB), the researcher contacted appropriate school personnel (e.g., special education directors, special education teachers, or school principals) from area virtual high schools and asked for nominations of students who would be eligible to participate in the study. The researcher provided school contacts the following set of qualifying criteria for the student to participate in the study: (a) currently enrolled in an online high school program, (b) receives special education services, (c) has either a medical diagnosis or educational classification of ASD, (d) demonstrates a need for behavioral or social emotional support, and (e) the contact believes the student would benefit from participating in the study. Once a student met these criteria, the researcher contacted the family to explain the study and obtain consent for their participation.

Participants and Setting

The participants for this study included three students who met the following criteria: (a) currently enrolled in an online high school program, (b) receives special education services under the classification of ASD, (c) demonstrates challenges with

staying on task, (d) has access to an electronic device (i.e. phone, tablet, or laptop) to access the app used to deliver the intervention, and (e) must be able to demonstrate basic technology skills that include downloading and installing a mobile app, sending and receiving text messages, and navigating between pages on a mobile app or website (See Appendix A).

In addition to the students, one parent or caregiver for each student was asked to participate and agree to be the interventionist for the study. The parents/caregivers met the following criteria: (a) must be able to participate in an initial training with the researcher to learn to implement the intervention being tested, (b) be open to on-going coaching sessions with the researcher as needed for the duration of the study, (c) participate in three to five interviews with the researcher throughout the study, (d) has access to electronic device (i.e. phone, tablet, or laptop) to access app used to deliver the intervention, and (e) must be able to demonstrate basic technology skills that include downloading and installing a mobile app, sending and receiving text messages, and navigating between pages on a mobile app or website.

This study took place in each students' home. During the study, the researcher conducted remote observations of the students, administered self-efficacy questionnaires to the students, provided training and coaching sessions for the parents, and interviewed the parents throughout the study via phone call or Zoom video conferencing. Observations were only collected during the times in which the students were engaging in math coursework to control for the extraneous variable of coursework influencing on-task behavior.

<u>Jose</u>

Jose is a 15-year-old 9th grade student in an online public school. Jose is a single child who lives with his mother. Jose enjoys playing video games and riding his skateboard around his neighborhood. Jose is indifferent to school; like most students, there are subjects he likes and those he does not. His favorite subject is science, especially when it relates to computers or electronics. He wants to develop video games when he gets older, and has a notebook filled with game ideas he hopes to make reality someday.

Academically, Jose does well with school. His mother describes him as being very smart, but he struggles with turning in his assignments on time. He often receives low grades in his classes because he forgets to turn in assignments or gets distracted and leaves his work area to do other things, often to play video games. His mother usually takes away his video games in these situations, which leads to him yelling at her or locking himself in his room until he calms down. When he has a chance to calm down, he is usually able to return to his work as if nothing had happened.

<u>Brandon</u>

Brandon is a 17-year-old 12th grade student enrolled in an online charter school. Brandon lives with his two parents and his sister, who is a grade younger than him and does schooling through the same online school. Brandon's mother and father both work from home, and everyone in the family has a work area set up in their basement; his father says they all have "their own cubicle." Bradon is in the process of getting his first job at the McDonald's down the street from the family's home. He wants to save up money to buy an expensive gaming computer.

Brandon does well with school for the most part, getting mostly A's and B's in his classes. He does not have a favorite subject, but he is vocal about not liking reading and language arts. He is usually good about attending to his work, but he gets distracted often. He likes to watch videos on YouTube and Twitch and play the videos while doing his work. This leads to arguments between Brandon and his parents as he takes a much longer time to complete most assignments than when he does not watch videos.

Rachel

Rachel is a 16-year-old 10th grade student in an online charter school. She lives with her parents and younger sister, who is two grades below Rachel and attends a different online school. Rachel describes herself as being "quirky"; she is very interested in history, especially medieval history. She switches up how she talks to sound like a "Medieval Lady" and will even curtsy to her parents and say "as you wish" when they ask her to do something. Rachel also really enjoys astronomy. Her mom reports that during the summer when the sky is clear at night, Rachel likes to camp under the stars so she can look at the constellations late into the night.

Rachel is successful academically, getting high grades in all her classes. She emails back and forth with her teacher frequently when she needs help with schoolwork, sometimes several times a day. Rachel's biggest obstacle with her schoolwork is her anxiety. Her mother reports that Rachel often overthinks directions on assignments and will panic when she gets too confused, causing her to "shut down." When she does not overthink her work, she can remain on task for long periods of time and complete her assignments without issue.

Research Design

<u>Single-Case Design</u>

This study utilized a mixed-methods research design in which a combination of quantitative and qualitative data was collected and analyzed to answer the research questions listed above (Creswell & Plano Clark, 2017). A multiple baseline design across participants was used to evaluate a functional relation (Kazdin, 2020; Riley-Tillman et al., 2020) between the intervention package (i.e., CICO, self-efficacy measures and parents as interventionists) and the percentage of on-task behavior for the students. The experimental conditions consisted of a baseline phase and an intervention phase. A significant advantage of a multiple baseline design is that it is not necessary to withdraw an effective intervention to demonstrate experimental control (Kazdin, 2020). Baseline procedures continued until an observed pattern of responding was sufficiently consistent to allow for prediction of future responding (Kazdin, 2020). Students participated in the intervention in a staggered timeframe, so as to demonstrate experimental control over the conditions.

<u>Qualitative Design</u>

The qualitative research component utilized a phenomenological approach (Creswell & Poth, 2018) to understanding the perceptions and changes of self-efficacy experienced by the parents throughout the study. Phenomenology is concerned with the study of experience from the perspective of the individual; it is based on a paradigm of personal knowledge and subjectivity and emphasizes the importance of personal perspective and interpretation (Moustakas, 1994). Parents were asked to describe changes in their self-efficacy to support their students by participating in multiple semi-structured

interviews throughout the study. These interviews were then transcribed and coded to identify common themes, experiences, and attitudes surrounding the intervention.

Dependent Variables

Percent Time On-Task

The primary dependent variable was the percentage of time the students were on-task. On-task behavior was defined as the student attending to assigned tasks as directed. Examples of on-task behavior included following the teacher's or parent's instructions and directions, working on the assigned task as expected, using materials appropriately, asking for assistance as needed, and staying focused on the academic content (Bruhn et al., 2015b; Vogelgesang et al., 2016). Non-examples of on-task behavior included: wandering eyes, moving around the room without purpose or permission, and engaging in tasks other than the one assigned (Bruhn et al., 2015b; Vogelgesang et al., 2016). The percentage of time spent on-task was calculated by using whole-interval data recording (Cooper et al., 2020) which involved observing whether a behavior occurred or did not occur during specified time periods. Whole-interval recording was used to measure continuous behaviors or behaviors that do not have clear beginning and end points (Cooper et al., 2020). For this study, a 20-minute observational session was separated into 10-second intervals. For each 10-second interval, a "+" was marked when the student engaged in on-task behavior for the entire interval and a "-" was marked if any off-task behavior occurred. Once the recording was completed, the number of "+" intervals were totaled and the percentage of "+" intervals to total intervals were calculated. See Appendix B for the interval recording form that was used to record the percentage of time on-task.

Student Self-Efficacy

The second dependent variable for this study was student self-efficacy, which is defined as the "belief in one's capabilities to organize and execute courses of action required to produce desired attainments" (Bandura, 1986, p. 391). For this study, student-self efficacy more specifically referred to the students' beliefs in their ability to engage in their online schooling. Student self-efficacy was measured using a self-efficacy questionnaire developed by the researcher that shared similar items used in previously tested self-efficacy questionnaires (i.e., Bandura, 1989). Students marked down their agreement on 5 items using a Likert-scale in which 1 meant "strongly disagree" and 5 meant "strongly agree." A percentage was calculated by adding the points from the items and dividing the points scored by the number of points possible. See Appendix C.

Parent Self-Efficacy

The third dependent variable for this study was parent self-efficacy, which was defined as the parents' feelings or beliefs about their ability to effectively implement the intervention (Russell & Ingersoll, 2021). Parent self-efficacy was measured using a semi-structured interview protocol that was administered multiple times throughout the study. The protocol included questions that pertain to parents' involvement in their student's schooling, their confidence in supporting their student in their learning, and challenges encountered during the intervention. See Appendix D.

Independent Variables

Modified CICO Intervention

The primary independent variable for this study was the implementation of the modified CICO intervention using cellphones. The mobile app that was used in this study

was Bloomz, which is a free mobile app that focuses on enabling parent-teacher-student communication and coordination (Bloomz, 2021). A behavior management option within the app allows teachers and parents to assign specific behaviors to students to be tracked. The app allows teachers to award points for engaging in positive behaviors, as well as an additional option to take away points for engaging in interfering or problem behavior (See Figure 2). In this study, points were only awarded for engaging in positive behaviors; no points were deducted for any demonstration of interfering behavior. With each point awarded, the teacher can add specific notes about the student's performance. These notes can then be read by the teacher, parent, and student. The messaging feature of the app allows teachers to send private messages to students and parents, with additional options to limit or extend the student's ability to respond or to read-only.

Parent Coaching

Parents who were identified as the interventionists were asked to participate in two 1-hour coaching sessions. These sessions were done with the researcher remotely over Zoom. The content covered in these sessions included identifying target behaviors, using the Bloomz app, implementing a CICO intervention, and collecting data. See Appendix E for the complete parent education manual used with each family.

Figure 2.　　**Example Bloomz Point Management Page**

Intervention Procedures

Pre-coaching on the technology-aided CICO

Prior to implementing the CICO intervention, the researcher provided training to each parent on how to use the Bloomz application and deliver the CICO intervention as outlined in the parent education manual (Appendix E). Intervention manuals like the one that was used in this study have been shown to establish higher levels of treatment integrity by explicitly specifying a protocol of treatment implementation, providing careful training of those implementing the intervention, and monitoring adherence to prescribed procedures and competence of intervention delivery (Perepletchikova & Kazdin, 2005). Further, the manualization of coaching interventions allows for systematic

replication of the intervention across researchers and facilitators (Bearss et al., 2015; Bears et al., 2018; Rogers et al., 2019).

The first coaching session was used to familiarize the parents with the rationale for the intervention and having parents implement the intervention with their students. The researcher also provided an overview of basic behavioral concepts such as reinforcement and functions of behavior. Parents were asked to complete the Functional Assessment Checklist for Teachers & Staff (FACTS) questionnaire and to help the student with developing a reinforcement menu. In the second coaching session the researcher assisted parents and students with installing and setting up the Bloomz app on their phones. The parents were taught about the CICO intervention, how to enter points and notes on Bloomz, and how to provide feedback and reinforcement when their students met their goals. The researcher also showed students how they could view their goals and points, as well as how they could send and receive messages through the Bloomz app. The researcher then provided opportunities for the parents to practice these skills and the researcher provided feedback and correction. The training consisted of a standardized set of items including how to enter data, providing feedback to the student via the app, and explaining check-in and check-out with the students. All coaching sessions were video recorded and reviewed by the researcher and a second rater to ensure the researcher covered each item on the standardized protocol. Interrater reliability on these coaching sessions was 100%, with the researcher addressing all items to each family.

Baseline

A baseline interview with each parent and the completion of the Functional

Assessment Checklist for Teachers and Staff (FACTS; March et al., 2000) took place to

determine the function of the students' off-task behaviors as well as to determine

appropriate reinforcers for each student to earn upon meeting the mastery criteria for

meeting their goals. Baseline data on each student's current level of on-task behavior

were collected before implementing the intervention. The researcher observed the

students remotely 1–2 times per week for 20-minutes each observation. Parents were

asked to record additional 20-minute sessions 1–3 times per week and upload the videos

to a secure drive for the researcher to review and collect observational data. Parents were

asked to support their students as they typically would while the student engaged in

schoolwork. Baselines were considered stable when the data demonstrated a flat pattern

with little to no variability and no trend over 3 consecutive sessions (Riley-Tillman et al.,

2020). At the end of each observation, the researcher had the student complete the self-

efficacy questionnaire.

Intervention Implementation

Once baseline data stabilized, the modified CICO intervention was implemented.

Figure 3 demonstrates the steps that were used to implement the CICO component of the

intervention. First, the student would check in with the parent at the beginning of class.

The parent reviewed behavioral expectations for the student and ensured the student had

access to the Bloomz app. Second, the parent provided feedback to the student via the

Bloomz app during the class session. Messages could include affirmative statements such

as "Great job staying on task!" or prompts to redirect the student if they are not meeting

expectations such as "Are you working on your assignment?" Third, the student checked out with the parent at the end of class. The parent and student discussed successes or areas of improvement for next time. If the student earned any points for the class session, the parent recorded those points on the Bloomz app. If the student did not earn any points, the parent would reassure the student that they can still earn points in their other classes. The student and parent repeated these steps each day while using the intervention. Finally, when the student reached their point goal, they were given access to an agreed-upon reinforcer, and their points were reset. The parents received ongoing coaching from the researcher as needed during the study. Ongoing coaching and support were guided by the parameters outlined in the implementation fidelity checklist. See Appendix F.

The same data collection procedures were used for the baseline and intervention phases: Observations were performed during the same class period each session. Each observation was recorded for data collection purposes. The researcher observed each student remotely 1–2 times a week for 20-minutes each observation. Parents were asked to record 20-minute sessions 1–3 times per week and upload the videos to a secure drive for the researcher to review and collect observational data. The intervention phase was considered stable when the data demonstrated a flat pattern with little to no variability and no trend over 3 consecutive sessions. At the end of each observation, the researcher had the students independently complete the self-efficacy questionnaire. If a student needed any assistance reading or understanding an item on the questionnaire, the researcher provided assistance.

Figure 3. **Technology-aided, modified CICO intervention procedure.**

<u>Parent Interviews</u>

Throughout the course of the study, parents/caregivers were asked to participate in a series of three interviews with the researcher. All interviews were conducted over phone or Zoom conferencing and recorded using a digital recording device. Access to the recorded interviews were limited to the researcher unless permission was given by the parent to share any information. Each participant was de-identified so as to protect their confidentiality and anonymity. The interviews consisted of a semi-structured interview protocol (Denzin, 1989). The protocol included five predetermined questions regarding various aspects of parent self-efficacy including (a) overall involvement in their students' learning, (b) ability to implement the intervention package as intended, and (c) their confidence in supporting their student in their learning. See Appendix D for a complete list of interview questions. Follow-up questions were then asked based on the

participants' responses to gain clarification. Each interview lasted between 10 to 20 minutes.

Data Analysis

<u>Visual Analysis</u>

Data were analyzed using visual analysis within and across conditions. One of the most commonly employed strategies for analyzing data in single subject research (Kazdin, 2020), visual analysis of data allows for in-depth evaluation of data within and across all conditions in a study. A participant's performance was measured under a pre-intervention condition and was compared to their performance during the intervention condition. Visual analysis allows for ongoing assessment of behaviors across conditions, detection of potential threats to internal validity, and determining the existence of a functional relation.

Visual analysis includes the interpretation of the level of change across conditions, trends in the data, variability of the data, and immediacy of change across phases of the study. Level of change was measured by comparing mean scores on the dependent variables across baseline and intervention phases. Trends were measured via a best-fit straight line that can be placed over the data within a phase (Kazdin, 2020). Variability was defined as the degree to which individual data points deviate from the overall trend (Kazdin, 2020). Variability was rated as high, medium, or low, depending on the amount of deviation present in the data. Immediacy of change was defined by how quickly a change in the data pattern was produced after the phase change (Kazdin, 2020).

Changes in variability across phases were also determined by calculating the percentage of nonoverlapping data (PND). PND is one of the first and most widely used

approaches for quantitatively synthesizing single-subject data (Scruggs et al., 1987; Wolery et al., 2010). PND is defined as the percentage of measurements in the treatment phase that exceed the highest measurement from the baseline phase (Scruggs et al., 1987). Scruggs and Mastropieri (1998) offered general guidelines for the interpretation of PND, suggesting that a PND value of 90% or greater could be interpreted as indicating a very effective intervention; a PND between 70% and 90% as indicating an effective intervention; a PND between 50% and 70% as indicating a questionable effective intervention; and a PND of less than 50% as indicating an ineffective intervention (p. 224).

Transcription and Coding Procedures

After the interviews were completed, they were transcribed. The transcripts and observation notes were coded using a general inductive approach for coding (Thomas, 2006). The purposes for using an inductive approach are to a) condense raw textual data into a brief, summary format; b) establish clear links between the evaluation or research objectives and the summary findings derived from the raw data; and c) develop a framework of the underlying structure of experiences or processes that are evident in the raw data. The following procedures were used for the inductive analysis of qualitative data (Thomas, 2006): first, raw data files were prepared and cleaned. Second, the raw text was read in detail until the evaluator was familiar with its content and gained an understanding of the themes and events covered in the text. Third, the evaluator identified and defined categories or themes. Fourth, overlapping coded and uncoded text were identified. This means that one segment of text may be coded into more than one category, and a considerable amount of the text may not be assigned to any category

because much of the text may not be relevant to the evaluation objectives. Fifth, the categories were continued to be revised and refined.

Two other coders, the researcher's faculty advisor and a doctoral student who was unfamiliar with the goals of this study, analyzed the transcripts to provide intercoder agreement. After all of the parent interviews were transcribed and coded independently by each coder, the coders met to examine the codes and develop a codebook that included the code, a definition of the code, and the passage segments associated with each code. These codes were then further revised as determined by the information gathered from the interviews. With each phase of the intercoder agreement process, a two-thirds agreement of passage coding was used as the minimum acceptable level of agreement before moving on to the next phase of coding.

Once interviews were transcribed, brief summaries of the key points were put together and provided to the parents to provide a member check. Member checks enhance the credibility of findings by allowing participants and other people who may have specific interests in the evaluation to comment on or assess the research findings, interpretations, and conclusions (Thomas, 2006). The parents reviewed the summaries and provided feedback and clarification of the captured themes. This ensured that the parents' own meanings and perspectives are represented and not curtailed by the researchers' own assumptions and biases. Member checking was conducted on one half of all interviews.

Mixed-Methods Analysis

A mixed-methods analysis combines elements of qualitative and quantitative research approaches for the broad purposes of breadth and depth of understanding and

corroboration (Johnson et al., 2007b). For the purpose of this study, a complementarity approach was used. This approach is the most prominent approach to the integration of quantitative and qualitative research (Bryman, 2006). In a complementarity mixed-method study, qualitative and quantitative methods are used to measure overlapping and different facets of a phenomenon, yielding an enriched, elaborated understanding of that phenomenon (Greene et al., 1989). The single-subject methods were used to understand if the intervention was effective, and the qualitative methods were used to understand why or how it was effective.

The single-subject and qualitative data were analyzed together using a data transformation strategy (Tashakkori & Teddlie, 2010). This strategy is used to convert qualitative data into data that can be analyzed quantitatively, or vice versa. The student self-efficacy questionnaires were completed concurrently with the observations, allowing for the two variables to be examined beside each other. This was done by taking the ratings of the students' self-efficacy and converting these into total points possible.

The data gathered from the parent interviews were also represented numerically. After transcribing and coding the data as described previously in this chapter, frequency counts were calculated for each code. The code frequencies from the interviews allowed for a better understanding of the extent that the parents discussed each theme or idea. This data was also presented qualitatively by analyzing specific passages or codes that are gathered from the interviews.

Interrater Reliability

Interrater reliability was documented across all phases of the study (i.e., baseline, intervention). Interrater reliability on the direct observation data scales was assessed by

comparing the researcher's scores to those of a second rater. The second rater, a master's

level graduate student pursuing behavior analyst certification, was trained in data

collection procedures prior to the start of the study using video recordings taken by the

researcher of students engaging in online schooling. One-third of the recorded

observations were assessed for interrater reliability. The frequency ratio method of

determining inter rater reliability was used to determine the reliability of the

observational data (Kazdin, 2020). The reliability across all observations was 91% with a

range of 84% to 96% agreement.

<u>Implementation Fidelity</u>

Fidelity is the degree to which an intervention is implemented as intended

(Moncher & Prinz, 1991). To measure fidelity of implementation, a modified CICO

Implementation Fidelity Checklist was utilized (See Appendix F). The checklist was

based on similar CICO fidelity checklists used by Horner et al. (2004), Hawken and

Horner (2003), and March and Horner (2002). The checklists outlined the key

components of CICO that could be scored according to whether or not that component

had been carried out completely. To verify implementation fidelity of the intervention,

the researcher and the parent collected fidelity data using the CICO Implementation

Fidelity Checklist once per week. A parent coaching booster session pertaining to the

items of concern was provided if the parent fell below 88% for two consecutive sessions

or if the parent requested a booster session. Booster sessions included identifying areas

that are going well, the steps of the routine that the parent was not consistently

demonstrating, the researcher modeling the routine, and the parent practicing the routine.

Implementation fidelity for Jose's mother, averaged 88% accuracy throughout the intervention condition, with a range of 75% to 100%. Reliability between the researcher and Jose's mother across cases averaged 97% with a range of 88% to 100%. Brandon's father averaged 93% accuracy throughout the intervention condition, with a range of 78% to 100%. Reliability between the researcher and Brandon's father for all cases was 100%. Rachel's mother averaged 86% accuracy throughout the intervention condition, with a range of 78% to 100%. Reliability between the researcher and Rachel's mother for all cases was 89%. Jose's mother received two booster sessions during the intervention phase, and both Rachel's mother and Brandon's father received one booster session.

Social Validity

Behavioral research aims to study behaviors that are considered socially significant to the participant and those invested in the participant's behaviors (Baer et al., 1968). To address social validity in this study, each student and parent were asked to participate in a concluding survey at the end of the study. The survey contained questions which pertained to their satisfaction with the intervention, the ease and effectiveness of the Bloomz app in facilitating the CICO intervention, and general comments about the intervention. See Appendix G.

Researcher Positionality

The researcher for this study is currently a doctoral student at Boise State University in the College of Education. As a graduate student, I have completed coursework in both single-subject and qualitative methodology. Within this coursework I completed several class projects in which I was given the opportunity to practice many of the strategies used to conduct research within the methodology. Prior to this proposal, I

conducted a pilot study in which I designed, implemented, and analyzed a single-subject research study, allowing me to test and make modifications to this intervention package. Conducting the pilot study provided hands-on experience that built the foundation for developing the current study and helped to offer insight into design components I believed were effective.

At the time of the writing of this dissertation, the COVID-19 pandemic continues to present challenges for some schools and families across the country and the world. Although most schools have reopened for in-person learning, many families have instead chosen to enroll their children in full-time online schools. As a behavior analyst, I work with several children and adolescents with ASD and their families as they attempt to navigate the online learning environment. I have witnessed firsthand the struggles many of these students and their families face with constantly changing routines and the lack of a structured learning environment. I came into this study with the experience of having seen in students' challenging behaviors and the sense of helplessness from parents. It is because of these experiences that I am motivated to develop and test interventions that provide support for both the students and their families. My professional experiences have taught me the importance of working with families in order to design interventions that are not only effective, but also easy for families to implement.

CHAPTER FOUR: RESULTS

Single-Case Data Analysis

<u>Visual Analysis</u>

The students' on-task behavior and self-efficacy data were analyzed using visual analysis within and across conditions. Visual analysis allows for ongoing assessment of behaviors across conditions, detection of potential threats to internal validity, and determining the existence of a functional relation (Kazdin, 2020). Visual analysis includes the interpretation of the level of change across phases, immediacy of change across phases of the study, variability of the data, and trends in the data. Level of change was measured by comparing mean scores of the dependent variables across baseline and intervention phases. Immediacy of change was determined by examining how quickly a change in the data pattern was produced after the phase change (Kazdin, 2020).

Variability is the degree to which individual data points deviate from the overall trend (Kazdin, 2020). Variability was rated as high, medium, or low, depending on the amount of deviation present in the data for a particular phase. Changes in variability across phases were also determined by calculating the percentage of nonoverlapping data (PND). PND is defined as the percentage of measurements in the treatment phase that exceed the highest measurement from the baseline phase (Scruggs et al., 1987). General guidelines for the interpretation of PND suggest that a PND value of 90% or greater could be interpreted as indicating a very effective intervention; a PND between 70% and 90% as indicating an effective intervention; a PND between 50% and 70% as indicating a

questionable effective intervention; and a PND of less than 50% as indicating an ineffective intervention (Scruggs & Mastropieri, 1998).

Trends were measured via a best-fit line placed over the data within a phase (Kazdin, 2020). To determine the trend of data where the variability obscures clear trends, a split-middle technique was employed (Riley-Tillman et al., 2020). This method divides the data in a phase in half chronologically, identifies the intersections of the vertical and horizontal medians of each half, and plots a line that intersects the two medians. This is a common technique used in the analysis of single-case data (Ledford et al., 2018).
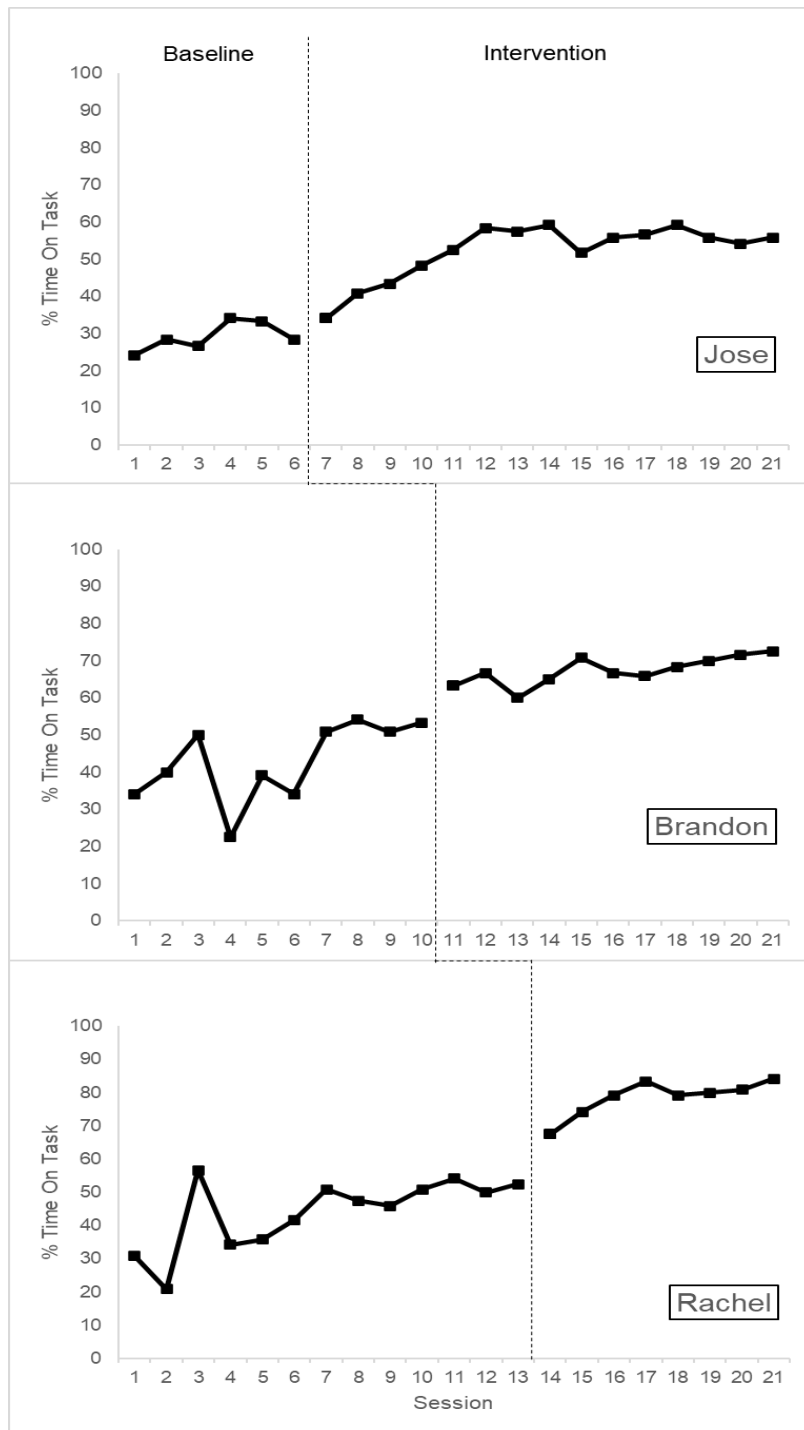
On-Task Behavior

Figure 4. **Percentage of time on task during baseline and intervention phases across students.**

<u>Jose</u>

During the baseline phase, which lasted 6 sessions, Jose's average percentage of intervals on-task was 29%, with a range of 24% to 34%. There was low variability in this phase, as the range in percentage was only 10% and both the highest and lowest data points were 5% points from the phase's mean. The trend was calculated using a split-middle technique (Riley-Tillman et al., 2020), which showed a positive ascending slope during baseline conditions. After the sixth session, baseline conditions were discontinued, and the intervention phase was implemented.

Following the introduction of the intervention, an immediate increase in the level of engagement was observed, increasing from 28% at the last session in the baseline phase to 34% in the first session of the intervention phase. Jose's average percentage of intervals on-task in this condition was 52%, with a range of 34% to 59%. The percentage of non-overlapping data was 93%, indicative of a large effect. Analysis of the trend using the split-middle technique indicated a positive ascending slope. The variability in this phase was low, as there was little deviation of the data from the overall trend in the phase.

<u>Brandon</u>

During the baseline phase, which lasted 10 sessions, Brandon's average percentage of intervals on-task was 43%, with a range of 23% to 54%. There was a high degree of variability at the beginning of the phase, then there was more stability during the last four sessions. Analysis of the trend showed a positive ascending slope during baseline conditions. After the fourth consecutive session in which there was minimal

variability, baseline conditions were discontinued, and the intervention phase was implemented.

Following the introduction of the intervention, an immediate increase in the level of engagement was observed, increasing from 53% at the last session in the baseline phase to 63% in the first session of the intervention phase. Brandon's average percentage of intervals on-task in this condition was 67%, with a range of 60% to 73%. There was no overlap in data observed between baseline and intervention conditions, suggesting a large effect of the intervention on the behavior. The data in this phase did not deviate greatly from the trend, indicating a low degree of variability. The data indicates a positive, ascending trend.

<u>Rachel</u>

During the baseline phase, which lasted 13 sessions, Rachel's average percentage of intervals on-task was 44%, with a range of 21% to 57%. The data were highly variable at the beginning of the phase, then became more stable after the third session. The trend in data indicated a positive ascending slope during baseline conditions. After the fourth consecutive session in which there was minimal variability, baseline conditions were discontinued, and the intervention phase was implemented.

Following the introduction of the intervention, an immediate increase in the level of engagement was observed, increasing from 53% at the last session in the baseline phase to 68% in the first session of the intervention phase. There was no overlap in data observed between baseline and intervention conditions, suggesting a large effect of the intervention on the behavior. Rachel's average percentage of intervals on-task in this condition was 79%, with a range of 68% to 84%. The data in this phase indicates a low

degree of variability. The trend in data indicated a positive ascending slope during the
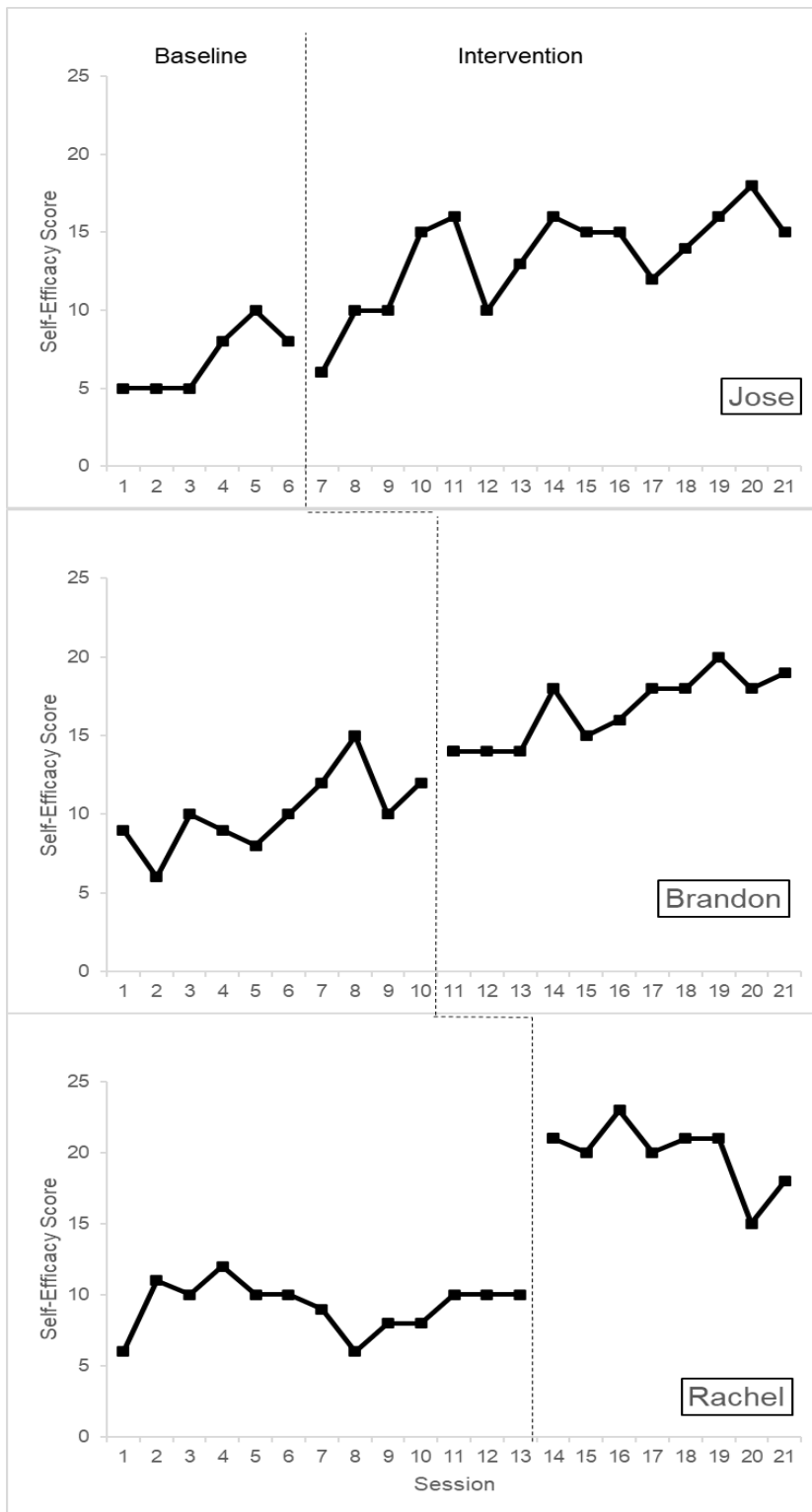
intervention.

Student Self-Efficacy

Figure 5.   **Self-efficacy scores during baseline and intervention phases across students.**

<u>Jose</u>

During the baseline phase, which lasted 6 sessions, Jose's average self-efficacy score was 6.8, with a range of 5 to 10. The variability was moderately stable during baseline conditions; the first three sessions all indicated a self-efficacy score of 5, then there was an increase during the last half of this phase. The trend showed a positive ascending slope during baseline conditions. After the sixth session, baseline conditions were discontinued, and the intervention phase was implemented.

Following the introduction of the intervention, an increase in the level of self-reported self-efficacy was not observed until the fourth session in this phase, indicating a long latency in change. The percentage of non-overlapping data was 73%, indicative of a moderate effect of the intervention on self-efficacy scores. Jose's average self-efficacy score in this condition was 13.4, with a range of 6 to 18. Data were moderately variable, however a clear positive ascending trend in data was observed.

<u>Brandon</u>

During the baseline phase, which lasted 10 sessions, Brandon's average self-efficacy score was 10.1, with a range of 6 to 15. This wide range of scores indicates high variability in this phase. The trend indicated a positive ascending slope during baseline conditions. After ten sessions, baseline conditions were discontinued, and the intervention phase was implemented.

Following the introduction of the intervention, there was a long latency in change of scores as an increase in the level of self-reported self-efficacy was not observed until the fourth session in this phase. The percentage of non-overlapping data was 64%, indicative of questionable effectiveness of the intervention on self-efficacy. Brandon's

average self-efficacy score in this condition was 16.7, with a range of 14 to 20. Data

showed low variability and analysis of the trend indicated a positive ascending slope.

Rachel

During the baseline phase, which lasted 13 sessions, Rachel's average self-

efficacy score was 9.2, with a range of 6 to 12. Variability in data during this condition

was low as the highest and lowest scores were about three points away from the mean.

The trend showed no slope, neither ascending nor descending, during baseline conditions.

After 13 sessions, baseline conditions were discontinued, and the intervention phase was

implemented.

Following the introduction of the intervention, an immediate increase in her

reported self-efficacy, increasing from 10 at the last session in the baseline phase to 21 in

the first session of the intervention phase. There was no overlap in data observed between

baseline and intervention conditions. Rachel's average self-efficacy score in this

condition was 19.9, with a range of 15 to 23. There was a low degree of variability during

this phase. Analysis of the trend using the split-middle technique indicated a negative

descending slope during this phase.

Analysis Across Students

Several common observations can be noted in the on-task behavior data. Overall,

all three students demonstrated increases in on-task behavior following the

implementation of the intervention. The change in level of on-task behavior was

immediate for all three students, with Jose having the smallest change in level of 6% and

Rachel having the largest change in level of 15%. During the baseline phase, all three

students' data demonstrated positive ascending trends, and both Jose's and Rachel's data

showed little variability while Brandon's data showed high variability. During the intervention phase, all three students' data demonstrated low variability and positive ascending trends. These data are indicative of the intervention effectively improving the on-task behavior of all three students.

The self-efficacy data also showed fewer commonalities across students. All three students showed an overall increase in self-efficacy scores across conditions. Variability in baseline data was different for each student: Brandon demonstrated high variability, Jose moderate variability, and Rachel low variability. Trends during baseline also showed stark differences. Jose's and Brandon's data both showed positive ascending slopes while Rachel's data showed no slope. The latency in change was immediate for Brandon and Rachel; in contrast, Jose's first self-efficacy score was lower than the last baseline session. Variability was lower during intervention phases for all three students, with both Brandon's and Rachel's showing low variability and Jose's data showing moderate variability. Trends during the intervention phase were mostly consistent with the rest of the data. Jose's and Brandon's data showed positive ascending slopes; however Rachel's data showed a negative descending trend. These mixed findings are indicative of the intervention having no effect on student self-efficacy.

In sum, the intervention influenced on-task behavior and student self-efficacy differently across students. The average percentage of on-task behavior and student self-efficacy scores of all three students increased after the intervention was implemented. In addition, with the exception of Rachel's self-efficacy data, the data showed positive ascending slopes for all three students in both phases and for both dependent variables. All three students demonstrated an immediate latency of change in the level of on-task

behavior with the implementation of the intervention. Rachel was the only student to have an immediate latency of change in level of self-efficacy scores; both Jose and Brandon demonstrated long latencies of change in level, with changes occurring after four intervention sessions for both students. Variability in the on-task behavior was also much lower for all three students compared to their self-efficacy scores during both phases of the study. The implications of these findings are discussed further in the next chapter.

Qualitative Analysis

<u>Working Hard or Hardly Working?</u>

All three parents reported off-task behaviors as being a significant learning challenge for students at the beginning of the study. For example, Brandon's father commented, "Brandon feels like he's a multitasker. And so he'll watch videos that aren't necessarily related to school or watch Twitch streams while he's trying to do schoolwork. So trying to help him to understand that he is not a multitasker, and that he needs to concentrate more on his homework has probably been one of our biggest difficulties and struggles that we've had." Some of the parents also noted other factors that created obstacles to their student's learning. For example, Rachel's mother noted that while off-task behaviors did interfere with Rachel completing her schoolwork, she also described high levels of anxiety and the need to be "perfect" as a challenge for Rachel. For example, "She spends so much time worried about not getting it perfect, whatever that looks like, that she ends up failing because she just doesn't do anything." Jose's mother stated that Jose's greatest challenge was completing his assignments despite understanding the material. For example, "I'm constantly nagging and trying to get him

to get his work done and to stay on task and get his assignments turned in because he really struggles with all of those different things. He's really smart which makes it frustrating because he knows a lot of what the schoolwork is asking him. So, the information, he understands that for the most part. It's just getting the work done, you know?"

As the study progressed, all three parents reported that they saw decreases in these challenges. Brandon's father mentioned that Brandon "still sometimes needs that nudge from us but he will do a lot more independent work without us being right there." Jose's mother made similar statements including, "I think that he's getting into the rhythm of me checking in and giving him, reminders and I think that's helped him to get to the point where maybe I just need to ask how he's doing or what he's doing. If he is off task, that usually helps him get back."

By the end of the study, all of the parents reflected on the growth of their student's independence in dealing with some of these challenges. Rachel's mother commented that Rachel's challenges were still very much present, but the intervention provided new ways to work on them. For example, "In terms of her anxiety, you know, we're still going through some of that, but I think how we talked in our last meeting about maybe allowing more breaks or even writing something like SOS on the app so I could respond has been helpful. I think that is different enough, that the novelty is kind of there and, you know, it lets her be on her phone, which she enjoys being on her phone because all teenagers do. But I think in this case it's really allowing her a few new outlets so that I can be more responsive if she does need help."

At the Students' Beck and Call

At the start of the study, parents described being highly engaged with their students, expressing concern that they may be too involved in their schooling. All of the parents shared that they saw their main role as keeping the students on task. This often resulted in the parents providing the students with planners and regular check-ins. For example, Brandon's father expressed his main involvement included doing "a lot of tracking and checking in with him and make sure that work is getting done in time and checking on status of work: identifying work that's due for the week and kind of trying to help him set up the routine as well as a planner in order to see what needs to get done and when." Jose's mother shared a similar experience, indicating that while she tried to help Jose use a planner in the past, it often became a hassle, so they stopped using it. Rachel's mother shared a similar experience, however she stated that she viewed her involvement as being "more of a cheerleader" for Rachel. In addition to checking in and helping Rachel plan what work needed to be done, she also checks to see how Rachel is feeling and what she needs to be successful.

As the study progressed, all of the parents indicated that they did not see much of a change in their engagement, at least in terms of the frequency of interactions they were having with the students. All three parents stated that they still helped with planning and performing regular check-ins with their students; however, Brandon's father and Jose's mother both indicated that by using the self-management app, they felt like they did not need to be physically close to the students, so the parents felt less engaged. When asked her feelings about using the app, Jose's mother excitedly stated, "I think it's been nice to have the app to help keep him on track because he likes to use his phone a lot and is

really into electronics. I think that being able to hear the ding sound with a notification, I can message with him even if I'm in the other room. I don't have to stand right over him and remind him to be on task or to finish work. I can just send him a message and see how things are going and I actually get better responses that way than when I actually talk to him!"

At the end of the study, a similar sentiment across parents was observed: each parent felt that they were less physically present with their students while at the same time highly attentive to the student by using the CICO intervention. Rachel's mother explained, "I would say that I've been a lot more involved than at the very beginning and probably about the same as the last time we met… So, I'm still Mom, I'm still the cheerleader, but also I'm more focused on preventing issues more than waiting for Rachel to really let me know if she becomes too overwhelmed. But I guess in some ways I almost feel less involved because I'm checking in through texting essentially, which is nice because I can get a quick update, so I'd know how things are going. But I'm not standing over her shoulder all the time."

I Don't Know How to Help My Student!

Throughout the study, the parents each talked about their confidence in their own abilities to support their student's learning. One parent, Brandon's father, reported high levels of self-confidence throughout the duration of the study. He related his confidence in being able to know when to help Brandon, stating "We have backed off a little bit to allow him to kind of flounder or flourish on his own. Because for, I mean, for the past year or two we've been kind of sitting behind and making sure that he's not doing other things than he's doing his schoolwork. And so, we're kind of allowing him some of that

freedom to adjust on his own or kind of work on his own as needed. But we were fairly confident that we can help him to finish." As the study progressed, he stated that he did not feel any change in his ability to support Brandon but did note that the intervention provided a different framework to continue supporting Brandon.

In contrast to Brandon's father, the other parents reported large changes in confidence from the beginning to the end of the study. Jose's mother, for example, was upfront about not having a concrete plan in place to support Jose, stating "I know how to get him back on track sometimes, but I don't think that I have any real strategies." Rachel's mother initially stated that playing the dual role of parent and teacher was difficult for her to navigate, and this was made more difficult by Rachel's resistance to her mother's advice and assistance.

At the end of the study, the parents all indicated an increase in confidence with the introduction of the intervention. Rachel's mother noted, "I definitely have a new strategy and it's nice to have a more thorough training on a support system that I can use with Rachel so in that sense I am confident that I can implement an intervention or a support system for her. I still think that there's a lot of things that I can work on, mainly just being consistent with everything, but I would definitely say that this is a step in the right direction, so I think maybe spending a little bit more time doing it it'll be easier." In fact, she revisited this statement later on and indicated that more time with the intervention did improve her confidence stating, "I think that this study is giving me a lot of new ideas to be able to support her, especially when I don't have that support from the school."

<u>Where is the Support for Parents?</u>

Each parent discussed the role of receiving support for themselves in addition to the students contributing to their past and present experiences of supporting their students in online schooling. At the beginning of the study, both Jose's and Rachel's mothers felt they had a lack of outside support from their children's schools. For example, Rachel's mother did not hide her frustration with a lack of support from Rachel's school sharing, "I just feel like there's nobody to support the kids that are struggling like this in schools. And I haven't figured out, like it's definitely not her counselor. It's definitely not a med manager. And then I've reached out to the schools, and they don't seem to know what to do either… So then as a parent, you're trying but there is a different relationship between you and your child." Jose's mother reported that the suggestions given to her from Jose's school have not been effective for Jose. For example, "I'm sure that a lot of the things like the planner are probably helpful for a lot of students. But it wasn't very effective for Jose. So, I've tried doing my own research in the past and trying to understand different ways that I can be more supportive of Jose but it's been really hard to find a way that's really helped him to be as successful as I know he can be."

As the study progressed, all of the parents discussed a greater sense of support with the introduction of the intervention. Brandon's father noted that the ongoing parent coaching helped him be consistent with expectations for Brandon. His father shared, "it's been helpful to kind of get a little bit of reassurance from you and everything so I think that having that confirmation that what we're doing is what we should be doing is nice." Rachel's mother expressed particular appreciation for the handouts provided during the initial meetings with the researcher sharing, "I do think that going through the different

handouts that you gave us and went over, you know reinforcements and explaining

checking in and reviewing feedback with her throughout the day, is giving me a strategy

that I haven't really thought about and gives me some guidelines to be more effective at

assisting her. I think that that's really important to help me to be able to provide better

support than what I was able to initially. I still think that I have a long way to go but I

think this is a good start." She expanded on the usefulness of the handouts in conjunction

with the ongoing coaching and feedback from the researcher, commenting that "I think

when we talked the other day about the feedback throughout the day where you talked

about the importance of that why we should keep doing that it was kind of nice to have

that reminder because in the past with different things that her school or teachers have

had us try to do to help they haven't really provided a lot of explanation or weren't clear

and really after just telling us you need to do this, they don't really check in with us at the

end so it makes me feel like I've got a little bit of support here from you which has been

really nice."

The self-management app was viewed as a useful support by all of the parents.

During the study, Rachel's mom talked at length about the self-management app, stating

at one point, "I actually think the app that we've been using has been pretty helpful at

helping me keep track on how she's doing, so whether I can check in with her in person

or check in on the app has been helpful to keep tabs on her." Brandon's father made a

similar comment during the study, stating "I think that the app is kind of an easy way to

help me and my wife stay on track and provide more consistent feedback."

Jose's and Rachel's mothers indicated that the intervention package as a whole

provided a structured support system for both the parents and the students. Jose's mother

explained, "I think that once you explained how the different parts of the intervention work and how it's more, I guess, structured helped me be more on top of things. Like I can remember 'okay, I need to make sure that Jose knows what he's doing before class and then remind him what he is working for.'" She made a similar statement later in the study, stating "I think that the most helpful thing to me has been having a plan in place to support Jose. I think in the past, things have been kind of thrown together to try to support Jose and maybe would last for a few days or a few weeks and then it becomes more trouble than if you keep doing it then to not do it. And I think that because you have been able to talk about the different parts and why we do each of the different things and how that helps Jose makes me feel a little bit better because I've never really had anyone explain something like this to me."

Mixed-Methods Analysis

A mixed-methods analysis combines elements of qualitative and quantitative research approaches for the broad purposes of breadth and depth of understanding and corroboration (Johnson et al., 2007b). Two mixed-method analyses were used to examine the data collected in this study. First, the qualitative data collected from the student self-efficacy questionnaires and parents' interviews were converted and analyzed together using a data transformation strategy (Tashakkori & Teddlie, 2010). This strategy is used to convert qualitative data into data that can be analyzed quantitatively, or vice versa. In addition to data transformation, a complementarity approach to analyzing data was used. A complementarity mixed-method approach searches for the ways in which qualitative and quantitative methods provide overlapping and different facets of a phenomenon, yielding an enriched, elaborated understanding of that phenomenon (Greene et al., 1989).

For the purposes of this study, the single-subject methods were used to understand if the intervention was effective, and the qualitative methods were used to understand why or how it was effective.

<u>Quantifying Student Self- Efficacy</u>

The student self-efficacy questionnaires were completed concurrently with the observations, allowing for the questionnaire data to be displayed similarly to the observation data. This was done by taking the responses of the students' self-efficacy questionnaires and converting them into points. Items were scored from 1 meaning "strongly disagree" to 5 meaning "strongly agree." For example, if a student gave themselves a rating of 3 on each of the five items, the score was calculated as 15 out of a possible 25 points. This information was graphically displayed and analyzed in the Single-Case Analysis section of this chapter (See Figure 5).

<u>Quantifying Parent Self-Efficacy</u>

The data gathered from the parent interviews were reported in the Qualitative Analysis section of this chapter. In addition to the qualitative analysis, the parent interviews were quantified by calculating frequency counts of the coded themes. After coding the interviews for common themes, the number of statements each parent made for each theme was calculated. Patterns in the occurrences of codes for each parent were determined which could then be explained within the qualitative data.

A comparison of the frequencies across themes indicates that the parents weighed each theme differently. Frequencies for Brandon's father showed much more discussion about his involvement in Brandon's schooling than any other theme. He made very few statements about support for the parents and talked a moderate amount about Brandon's

learning challenges and his self-confidence as a parent to support Brandon in his schooling. Jose's mother most commonly talked about her self-confidence, with a second major theme being her involvement in Joe's schooling. Both student learning challenges and support for parents were talked about moderately. The frequency count for Rachel's mother showed that statements regarding parent involvement and support for the parent were most common. Statements falling under the themes of parent self-confidence and student learning challenges were made a moderate amount.

Examining frequency counts across parents, there are also some noticeable differences. For example, Rachel's mother made the most statements of all the parents for each theme except parent self-confidence in which Jose's mother made the most statements. This could be due to Jose's mother's belief that she did not have the support or a plan in place to help Jose with his work. The theme that was coded most across parents was their involvement in their student's learning, which was each parent's first or second most coded theme. Not surprisingly, this finding could be indicative of the parents' overall lack of a plan to help their students. This led to the parents trying multiple strategies to assist their students with their self-management. The theme with the most variability was support for the parent, with Rachel's mother making a large number of statements falling under this theme, whereas Brandon's father made very few statements. This difference is likely due to the students attending different schools which provided different levels of support. It may also be due to the parents' self-confidence to support their students; the parents with more self-confidence may have needed less outside support than those with less self-confidence. The theme with the least variability across parents was student learning challenges, in which each parent made almost the

same number of comments coded for this theme. This is not entirely surprising as difficulty with self-management was one of the criteria for students to participate in this study, so it would be expected that parents would discuss this theme throughout the interviews.

Complementary Analysis of the Data

<u>Jose</u>

During baseline conditions, Jose's average percentage of intervals on-task was 29%, with a range of 24% to 34%. This data can be supported by the qualitative data collected during this phase. During observations, Jose regularly stopped working and sat at his work area for several seconds as if he was in a daze or deep in thought. His mother stated that she was "constantly nagging" him to get his work done despite him understanding the material he was working on. She expressed her frustration that she did not know how to establish a plan of support for Jose, which in turn resulted in her experiencing low self-confidence in her ability to effectively support Jose. Lacking a solid system of support for Jose not only limited his ability to successfully complete his schoolwork, but it also contributed to his mother's self-efficacy to support her son.

During the intervention phase, Jose made rapid progress in his ability to stay on-task, in which there was an immediate increase in the level of engagement observed from 28% at the last session in the baseline phase to 34% in the first session of the intervention phase. Interviews with Jose's mother provide support for these findings. In one interview, Jose's mother commented that her interactions with him during these times are more productive and less "nagging." The ongoing coaching sessions throughout the intervention was something that Jose's mother felt was especially impactful for both her

and Jose as it provided a routine that was easy to follow and implement. She also noted that Jose tended to respond better by using the messaging feature with her when she checked-in with him than when talking to him face-to-face. Jose expressed his satisfaction with the Bloomz app, saying he liked to see his points being awarded and earning a reinforcer of his choice when he reached his goal. The additional motivation that the Bloomz app provided can help explain Jose's increase in on-task behavior as well as his elevated self-efficacy scores, which increased from an average score of 6.8 during baselines to 13.4 during the intervention.

By the end of study, Jose was able to stay on-task and complete his work for a greater amount of time than he was able to during baseline conditions, increasing to an average of 52% of intervals on task from only 28% during baselines. Jose's mother expressed that having a plan they could stick to created rhythm that was helpful for both Jose and his mother. Jose reported increased self-efficacy up to the end of the study, again pointing to the Bloomz app and working toward a reward to help motivate him to stay on-task. Most important for Jose's mother was the ongoing parent coaching component of the intervention, often making statements like "I wish someone had explained this to me sooner," or "I would have never thought to do that" during coaching sessions. It is well-documented in the literature that collaborative partnerships between parents and trainers can lead to positive gains in parent-child teaching interactions in parent education programs (Walz et al., 2019). The current findings suggest the parent coaching component of the intervention package was a positive experience for Jose's mother as she was provided with knowledge and strategies that she could use with Jose to

promote his development of self-management behaviors that were reflected in the observations.

<u>Brandon</u>

During baseline conditions, both Brandon's on-task behavior and self-efficacy were highly variable. His percentage of intervals on-task ranged from 23% to 54% and his self-efficacy scores ranged from 6 to 15. Interviews with Brandon's father provide some context for this variable data. Brandon's father stated on several occasions that Brandon's biggest challenge is that he is a "multitasker," often trying to watch YouTube or Twitch videos while doing his work. This sentiment was supported in the observations, in which Brandon would regularly stop working as he became more focused on the videos he was playing. Brandon's belief in his ability to multitask may also explain his self-efficacy scores; with an average score of 10.1, Brandon reported the highest baseline self-efficacy of the students in the study. Brandon did not see his social media usage as an issue that interfered with his ability to complete his work. Even though he did struggle with staying on-task, Brandon believed he was able to stay on-task without much issue.

During the intervention phase, a moderate change in Brandon's level of on-task behavior was observed. Following the introduction of the intervention, an immediate increase in the level of engagement was observed, increasing from 53% at the last session in the baseline phase to 63% in the first session of the intervention phase. Conversations with Brandon's father helps to provide a better understanding of this moderate change in data. Brandon's father described that he felt his involvement did not change much with the introduction of the intervention, although he thought the Bloomz app was helpful to do check-ins with Brandon throughout the day. He also described experiencing "similar

involvement" with Brandon and did not see a lot of change in on-task behavior, stating it was "still a work in progress."

These feelings did not change much when the study concluded, which correlated with Brandon's on-task behavior as there was little variability in his percentage of on-task behavior, ranging from 66% to 73% during the last half of the intervention. Brandon's dad reported the intervention got easier to use as they became more familiar with it, but he did not feel like his involvement or confidence changed much from when the study began. This was reflected in the observational data as well. Brandon's percentage of on-task behavior did not increase substantially during the intervention phase, nor did his self-efficacy scores. However, what is noteworthy is that the data became more stable for both variables after the introduction of the intervention. His percentage of time on-task had a range of 30 percentage points during baseline and only a range of 13% during the intervention. His self-efficacy scores had a range of 9 points during baseline and only a range of 6 during the intervention. This finding suggests that providing a concrete plan that the family could implement effectively created greater structure and clearer expectations of behavior that allowed Brandon to self-manage in a much more consistent manner.

Rachel

During baseline conditions, Rachel's average percentage of intervals on-task was 44%, with a range of 21% to 57%. Some factors that may have contributed to this were shared by Rachel's mother. Rachel's mother reported several challenges that impacted Rachel's ability to complete her schoolwork. Rachel had a lot of anxiety about her schoolwork, often "shutting down" if she could not do an assignment perfectly. Her

mother explained that Rachel's anxiety with her schoolwork is not a recent development, but it grew into a much bigger issue over the past year. The intensity of her anxiety would fluctuate often during the study, which is reflected in her self-efficacy scores. For example, her lowest self-efficacy scores during baseline conditions were on Sessions 1 and 8 in which she had a score of 6. On both of these days, her mother indicated Rachel was having a "rough day." The literature on social cognitive theory can provide a rationale for this correlation. According to social cognitive theory, perceived self-efficacy to exercise control over potential threats plays a central role in anxiety arousal (Bandura, 1988). Although she never reported high levels of self-efficacy in this phase, Rachel's scores were highly variable throughout the baseline phase, which coincided closely with her state of anxiety.

Rachel's mother relayed several experiences that are consistent with some literature that suggests that the persistent stress experienced by mothers of children with ASD is exacerbated when given insufficient personal and social resources (Zaidman-Zait et al., 2017). Her mother talked at length about how she did not have an effective plan in place to support Rachel, and the school had not provided any options or strategies she could implement with Rachel at home. With no plan or support from the school, Rachel's mother felt lost and was focused on simply helping Rachel "get through her work." This was no small task as Rachel had always been resistant to her mother's advice when it comes to school, according to her mother. What may be an important underlying factor that could also help explain the observational data is Rachel's mother's attitude toward school. Rachel's mother did not mince her words when she talked about her own school experience. She stated that she never liked school and as an adult feels that a lot of it is a

waste of time. Rachel's difficulty with completing her schoolwork may then be inadvertently supported by her mother's attitude about school.

During the intervention phase, Rachel demonstrated immediate increases in both on-task behavior and self-efficacy. Her average percent of intervals on-task increased from 53% at the last session in the baseline phase to 68% in the first session of the intervention phase, while her self-efficacy scores increased from 10 at the last session in the baseline phase to 21 in the first session of the intervention phase. Data that can help to inform this trend were gathered in parent interviews. Rachel's mother described the benefits of the intervention for both Rachel and herself. Rachel was happy to use the Bloomz app and enjoyed getting to set her own goals to help her complete her work. Her mother also mentioned that the app helped herself stay on track with checking-in and providing assistance to Rachel as needed. She also commented on the usefulness of the handouts provided by the researcher during the initial coaching session as references in case she forgot something. In addition to the handouts, Rachel's mother emphasized the helpfulness that the on-going coaching provided as she was able to get reassurance from the researcher when she was unsure of what to do in specific situations. Other research has reported similar findings (e.g. Efstratopoulou et al., 2021; Russell & Ingersoll, 2021), suggesting that by providing Rachel's mother with ongoing support, whether this was through access to physical items (e.g. handouts) or social support (e.g. coaching, feedback, and reassurance from the trainer), promoted increased parent self-efficacy which in turn allowed her to provide Rachel with sufficient support to self-manage while doing school work.

By the end of the intervention, Rachel demonstrated a marked increase in her ability to stay on task as well as increased self-efficacy in her ability to self-manage herself. Rachel's average percentage of intervals on-task increased from 44% during baselines to 79% during the intervention, while her average self-efficacy score increased from 9.2 during baselines to 19.9 during the intervention. There was a noticeable decreasing trend in Rachel's self-efficacy scores during the last part of the intervention phase, during which time her mother explained Rachel was worried about a project for one of her classes. During one observation, Rachel told her mother "I'm never going to finish it on time. I can't do it!"; these feelings were captured in her self-efficacy scales in which she scored herself a 15, her lowest score during the entire phase. Despite this situation, Rachel's self-efficacy during the intervention phase was much higher than during baseline, and there were no overlapping data between the phases. Rachel's mother provided some information in her interviews to help explain this data. She explained that Rachel was very involved with developing her own goals and was motivated to reach her goals. Her increased self-efficacy could be influenced by learning new ways to self-manage, which is a finding that is supported in the literature base (Bandura & Schunk, 1981). In addition, her mother reported her own self-confidence in her ability to support Rachel as the on-going coaching provided her with new ways to offer support to Rachel when she needed it.

<u>Bringing It All Together</u>

The complementary analyses of the three cases in this study provide a deeper understanding of each family's experience with the intervention. As was noted in the Single-Case Data Analysis section of this chapter, all three students demonstrated higher

percentages of on-task behavior after the intervention was implemented than they did during baseline conditions. In addition to the noticeable change in level, data across all three students were much less variable in the intervention phase than during baseline conditions.

Reports from the students and their parents provided some information to help explain these changes. First, each parent mentioned significant learning challenges that interfered with their student's ability to stay on-task and self-manage, and two parents indicated that they did not know how to go about addressing these challenges. The introduction of the intervention provided structure and routine which helped the students engage in more on-task behavior, experience less learning challenges, and reduced the need for excessive direct involvement from their parents. This is also consistent with the literature that suggests parents of adolescents with ASD may benefit from parent training that incorporates specific strategies aimed at increasing parent empowerment and self-efficacy while teaching use of evidence-based strategies for behavior management (Singh et al., 2014).

Second, all of the parents expressed that the technology component of the intervention, the Bloomz app, was motivating for the students. They preferred to send and receive messages with their parents on the app and liked seeing their points displayed as they worked toward their individual goals. The use of technology, particularly the use of the messaging feature in the Bloomz app, allowed for the expansion of opportunities for social interactions that are far less intimidating for students with ASD who often struggle to engage in face-to-face social interactions (Mazurek & Wenstrup, 2013). The increases in the students' self-efficacy scores lend support to the claims of increased motivation; as

the students' motivation to reach their goals increased, and as they reached their goals, their self-efficacy increased (Bandura & Schunk, 1981).

Third, each parent embraced the parent coaching component of the intervention. Many previous studies have indicated the importance of effective parent training practices for parents of individuals with ASD (e.g., Weiss et al., 2016). In this study, the CICO component of the intervention provided the family with a plan and system of support for the students, and the coaching component provided the parents with their own system of support. In fact, two of the parents reported increased self-confidence as the researcher provided ongoing coaching throughout the intervention; this is supported by the literature base that shows effective parent coaching can facilitate parent self-efficacy growth (Russell & Ingersoll, 2021). All of these findings are expanded on in the next chapter.

Social Validity

At the conclusion of the study, all of the students and parents were asked to participate in a brief interview to assess their overall satisfaction with the intervention. The students all reported overall positive perceptions of the study. The aspects they liked the most were the use of the Bloomz app to communicate with their parents and earning reinforcers that they selected. Although none of the students reported any negative experiences of participating in the study, Brandon stated that at first it was "awkward" to have the researcher observing him. He did state this did not bother him as much as the study progressed. When asked to rate the usefulness of the intervention for supporting them in completing their schoolwork on a scale of 1 to 10 (1 meaning not at all useful and

10 meaning extremely useful), the responses were varied. Jose reported a 10, Brandon a 6, and Rachel an 8.5.

The parents provided more detail in their responses to the questions on this survey. All of the parents indicated that they thought the intervention was very helpful for themselves and their students. Jose's mother explained that the intervention was easy to use once she got the hang of it, but at the beginning she was nervous because there were many steps in the CICO component. Brandon's father thought the most useful aspect of the intervention was the regular check-ins with Brandon to provide feedback and redirection as needed. Rachel's mother expressed that she liked the regular feedback she received from the researcher throughout the intervention. Overall, the parents did not report any part of the study to be negative or unhelpful, however Jose's mother stated that she wished the study could continue for the whole school year as she was worried she could not keep up with the intervention without the researcher there to help out. Rachel's mother also said that she is interested to see if she can continue using the intervention with Rachel after the conclusion of the study. Finally, when asked the same question as the students to rate the usefulness of the intervention for supporting their students in completing their schoolwork, all three parents said 9.

CHAPTER FIVE: DISCUSSION

The purpose of this study was to determine if the implementation of a technology-aided CICO intervention would improve the on-task behavior of high school students with ASD enrolled in full-time online school. Additionally, this study sought to determine if there were changes in the self-efficacy of students and their parents throughout the duration of the study. The following research questions guided this study:

1. Will the implementation of a technology-aided CICO intervention package increase on-task behavior for high school students with ASD enrolled in online high school programs?

2. Will the students report an increase in their ability to stay on-task while completing schoolwork throughout the study, as measured by a standardized self-efficacy rating scale?

3. Will the implementation of a technology-aided CICO intervention package positively influence parental self-efficacy to support their students engaged in online schooling?

4. Given structured parent coaching sessions, will the parents implement the intervention package as intended, as measured by a standardized implementation fidelity checklist?

5. To what extent and in what ways will the student and parent self-efficacy measures help to explain any observed changes in student on-task behavior?

Each of these questions were answered in this study. First, the findings show that all three students demonstrated an immediate change in performance as well as decreased variability in the data with the introduction of the intervention. There was also nearly no overlap in data between intervention and baseline phases of the study for the students with the exception of Jose's on-task behavior which demonstrated 93% PND. These data suggest that the intervention was effective at improving the on-task behavior of all three students.

Second, the findings related to student self-efficacy during the intervention were mixed, with some students' data showing positive trends in self-efficacy scores during the intervention and one student's data, Rachel's, showing a negative trend. However, because each student developed their self-management skills and were provided with frequent adult interaction and feedback on performance, the average self-efficacy score for each student was higher during the intervention phase than during baseline. These findings suggest there was no effect of the intervention on student self-efficacy in their ability to stay on-task.

Third, interviews throughout the intervention showed that parents reported higher self-efficacy as the study progressed. The qualitative analysis of parent interviews revealed that the main themes that contributed to their self-efficacy were the students' learning challenges, their engagement with the students while doing schoolwork, their confidence in themselves to support the students in their school work, and access to resources or support for the parents. As the study progressed parents felt more confident in their abilities to support their children, that they themselves felt supported through on-going parent coaching, and that they had a plan for being proactive in supporting their

students rather than being reactive when the students demonstrated challenging behaviors.

Fourth, parents were able to implement the intervention with high levels of fidelity throughout the intervention phase of the study. Fidelity data was collected once per week for each family, and booster sessions were provided if the fidelity fell below 88%. Both Brandon's and Rachel's parents required one booster session due to low fidelity, and Jose's mother required two booster sessions, one due to low fidelity and one at her request because of the occurrence of an unexpected situation she did not know how to address. Jose's mother averaged 88% accuracy throughout the intervention condition, with a range of 75% to 100%. Brandon's father averaged 93% accuracy throughout the intervention condition, with a range of 78% to 100%. Rachel's mother averaged 86% accuracy throughout the intervention condition, with a range of 78% to 100%.

Fifth, the mixed-method analysis provided insight into how the student and parent self-efficacy contributed to the understanding of the students' changes in on-task behavior. The introduction of the intervention provided structure and routine which helped the students engage in more on-task behavior, experience less learning challenges, and reduced the need for excessive direct involvement from their parents. In addition, all of the parents expressed that the technology component of the intervention was motivating for the students who enjoyed being able to text and see their progress on their phones during the intervention. Finally, parents expressed increased self-confidence as the researcher provided ongoing coaching throughout the intervention. These findings are discussed further in the following sections of this chapter.

The rest of this chapter is organized into the following sections. First, major findings are identified and interpreted. Second, implications for the current research are discussed. Third, the limitations of the study are addressed. Finally, suggestions for future directions are provided.

Lessons Learned

CICO in Online Education

To date, no other studies have examined the use of CICO in online education with the exception of the pilot study that preceded this dissertation research (Mallory & Hampshire, 2022). The findings from that study found that the student demonstrated greater class engagement after the implementation of the CICO intervention, however a causal relation could not be determined due to the study's design being an AB single case design in which no replication or experimental control was present to lend evidence for the intervention causing the changes in behavior. This study builds on the previous study by employing a more rigorous research design that allows for a causal relation to be inferred. The data collected in this study suggests that implementing a CICO intervention in an online learning environment is not only feasible but is effective at improving on-task behavior for students with ASD.

Despite the lack of research on CICO in an online environment, the literature provides some insight that can help to explain why the CICO intervention used in this study was effective for the students in this study. Over the past decade, the research base on CICO has demonstrated its effectiveness in multiple settings, with a variety of students of different ages, disabilities, and functions of behavior (Klingbeil et al., 2019; Maggin et al., 2015). In addition, CICO is a highly adaptable intervention that has been

effectively used in conjunction with other interventions such as peer mentoring (Collins et al., 2016) and self-monitoring (Miller et al., 2015). Much of the flexibility in CICO comes from the individualized goals, frequent and consistent feedback on performance, and a choice of reinforcers that are motivating to the student. These areas of adaptation allowed for CICO to be an effective tool for the students in this study by ensuring contextual fit between the intervention and each student's learning environment (e.g., online school).

The uniqueness of online learning environments compared to traditional classroom settings cannot be overlooked. Traditional classrooms are arranged to provide structure, organization, and stability that promote student learning. A family's home often lacks this type of structure. There are often a lack of transition cues, unclear expectations for students' behavior, and more distractions that can interfere with the students' abilities to focus on their schoolwork (Ferri et al., 2020). Ultimately, the home environment does not provide the antecedent control that a school setting does. A common theme discussed by the parents throughout the study was that they felt like they did not have a plan or strategy to effectively support their students. In fact, research shows that many parents of students enrolled in online schooling lack the skills or resources to adequately support their students' learning (Borup et al., 2019). The CICO intervention used in this study provided greater antecedent control by providing a routine for the students and parents to follow, gave the students clear expectations for their behavior, set achievable goals for the students to reach, and scheduled frequent and routine times for feedback and the delivery of reinforcement to the students.

Online schools may be able to embed a CICO system into their framework in a few ways. One of the main benefits of CICO is that it takes relatively little time to check-in and out with students, often less than 5 minutes (Crone et al., 2010). Each day, the teacher or a CICO mentor can contact the students via phone, email, or other messaging platform, to check-in with students to determine daily goals while at the same time making sure the student has what they need to be able to have a successful day. Throughout the day, they can continue to check-in and provide feedback to students on their progress. Schools can also adapt the tools and documents used in a CICO intervention, such as the DPR, to be electronically accessible to students and teachers. Teachers can also meet virtually with students and parents routinely to discuss progress and barriers to success. This can allow for relationship building as well as self-reflection and accountability from the student. A final approach is that schools may choose to train parents to be the adult contact for the student using CICO, like the approach used in this study. For this approach to be successful, there are several considerations that need to be addressed, and these are outlined in the following section.

<u>The Complexities of Parent Coaching</u>

In addition to the lack of research on CICO in an online learning environment, there is also a lack of research on coaching parents to implement self-management interventions for their students enrolled in online schooling. Coaching parents to implement behavior support strategies is not a new concept; in fact, the efficacy of parent coaching or training programs have been researched for decades (Billingsley et al., 1980; Lovaas et al., 1973; Wolery, 2011). Online schooling is becoming more commonplace for high school students with disabilities, so there is a pressing need to explore interventions

to promote student success in these learning environments. This study adds to the literature base by exploring the impact of parent coaching in conjunction with the implementation of a modified CICO for online learners. Results from this study revealed two important findings related to parent coaching. First, the parents reported that on-going coaching helped improve their self-efficacy to support their students. Second, parent coaching helped the parents implement the CICO intervention with high levels of fidelity.

Parents and teachers working to support each other is vital to creating an inclusive learning environment for students with disabilities. The intervention used in this study highlighted this through the use of ongoing parent coaching in conjunction with the CICO intervention for the students. One of the main reasons for the successful implementation of the intervention is that a parent coaching manual was developed to ensure consistent teaching of the CICO intervention to the parents. Johnson and colleagues (2007a) suggest that "an essential prerequisite for a multisite study of a behavior therapy intervention is the development of a manual that can be delivered uniformly by competent therapists and is acceptable to parents" (p. 215). By creating a standardized manual to provide coaching to the parents in this study, consistent delivery of the CICO intervention across families was ensured while still allowing for flexibility to be responsive to individual needs of the parents.

The parent coaching manual included several components that contributed to the successful delivery of the intervention. At the beginning of the study, the researcher provided the parents with an overview of the intervention and the basics of behavior change using a behavior analytic approach (e.g., prompting, reinforcement). These

conversations with the parents helped them understand the rationale and importance of developing self-management skills. Parents were also given homework assignments which included the completion of a brief functional behavioral assessment and developing a reinforcement inventory with the student. These activities promoted their inclusion in the development of their students' interventions and facilitated the sense of ownership in the intervention. Before moving on to the intervention phase of the study, the parents practiced implementing the intervention with the researcher before implementing the intervention with their students. Through the use of role-play and modeling procedures, the researcher was able to demonstrate each step of the intervention and provide the parents with feedback on their performance (Gerow et al., 2021).

Although manualizing parent training procedures can aid in the consistent implementation of an intervention across families, parent coaching does not come without its challenges. For example, parent buy-in is essential for a parent-implemented intervention to produce positive results (Russell & Ingersoll, 2021). This buy-in can be difficult to obtain for several reasons, including negative parent perceptions of the intervention or trainer (Azad et al., 2018) and a lack of interest in participating in the intervention (Raulston et al., 2019). Other factors that can impact participation in parent coaching programs include the family's socioeconomic status (Carr et al, 2016), geographical limitations (Lindgren et al., 2016), and a lack of time due to competing life demands such as work schedules or attending to multiple children (McConnell et al., 2015). Additionally, some families may be resistant to parent coaching. Some parents may find coaching to be boring or unnecessary for their students' success. Other parents may have a hard time taking advice or suggestions from coaches, sometimes being quick

to criticize, object, or insult the coach who "doesn't know my child as well as I do." It is imperative that the field knows more about what families would benefit from coaching and which ones may not.

Furthermore, for many parents with a child with a developmental disability, there is a feeling of both physical and social isolation (Currie & Szaba, 2020). As many individuals with disabilities rely on their parents as their primary support system, parents themselves may have a minimal social life outside of the immediate family. In some cases, parents limit travel outside of the home due to the child's disability or challenging behaviors. Having a support system, whether formal or informal, is important for the well-being of parents of children with disabilities (White & Hastings, 2004). It can be difficult for parents to reach out for help with their children who have disabilities, so schools must be understanding and empathetic to families who may not have other outside support. For the families in this study, the researcher helped the parents feel less isolated by listening to their concerns, answering their questions, and taking an interest in their well-being in addition to the well-being of the students.

The parent coaching procedures used in this study alleviated many of these obstacles for the families who participated. During the interviews, parents reported feeling that the coaching provided them with a plan to support their students. In addition, the use of technology by teleconferencing and using the Bloomz app allowed coaching to be more doable for families. Meeting with the researcher virtually allowed for greater flexibility in scheduling meetings around the families' routines and eased the stress of some parents who were weary of in-person meetings during the ongoing pandemic. Prior to the start of the intervention, the parents discussed that they mainly relied on reactive

approaches to redirect their students when they got off-task rather than preventative approaches to encourage positive self-management behaviors from the start. On-going coaching sessions also provided opportunities for the parents to learn skills to effectively address new problems as they arose. Frequent coaching presented parents with emotional and practical support that contributed to the parents gaining both the confidence and competence needed to deliver the intervention effectively and efficiently even in the absence of the researcher (Raulston et al., 2019). As parents acquired strategies for helping the students with their self-management skills, parent involvement became less frequent and less intrusive, reducing the likelihood that parents were inadvertently contributing to students' prompt dependency (Hampshire & Allred, 2018).

While the findings of this study are promising, there are some considerations that must be addressed. Schools that may want to implement this intervention with their students need to consider who will provide coaching to the parents. Teachers, especially special education teachers, have highly demanding workloads, and many simply do not have time to add parent coaching to their list of responsibilities. On top of this, nationwide teacher shortages are already resulting in teachers taking on additional responsibilities which is contributing to greater teacher burnout (Wehby et al., 2012). Research shows that approximately 13% of special educators leave the field every year and another 20% switch to general education, resulting in an annual attrition rate of 33% (Brownell et al., 2018). Teachers are expected to be the agents of intervention, and if they are experiencing burnout, the effectiveness of the intervention is at risk. Teacher burnout is linked to low levels of fidelity which can result in minute, null, or harmful effects due to the intervention not being implemented as designed (Garwood, 2022).

In addition, the role of a teacher looks different in a virtual setting than it does in-person. Although teachers in both environments share many common responsibilities – such as assessing students' skills and learning requirements, designing Individualized Educational Programs (IEPs), and collaborating with parents and school staff to track students' progress – many special education teachers in online learning environments take on more of a case management role that involves greater care coordination and collaboration with families and other educators. Teachers in brick-and-mortar schools deliver instruction to the whole class throughout the day which limits the time they can engage in other responsibilities such as writing IEPs or meeting with parents. Online special education teachers often perform less whole-class instruction and more individual meetings with students and parents. This provides the online teacher with more flexibility to address individual student needs in a more responsive manner. Particular consideration needs to be given to responsibilities already placed on teachers to determine whether the addition of delivering ongoing parent coaching can be reasonably expected of them.

<u>The Role of Motivation</u>

A third major finding of this study was that motivation played a pivotal role in the success of the intervention package. Researchers have explored the role of motivation in learning for decades (Deci et al., 1991; Skinner, 1938), and evidence suggests that both self-efficacy and self-management are influenced by a student's motivation (Dogan, 2015; Schunk, 1985). This study contributes to the literature base by considering the mediating role of motivation on student behavior as well as the self-efficacy of both students and their parents. As more students with ASD are enrolling in online schooling,

there is a need to explore interventions that promote the development of self-management skills for students with ASD that are both effective AND motivating.

This study contributes to the literature base by demonstrating the importance of motivation in self-management interventions for high school students with ASD enrolled in online schooling. For the students, the findings indicated that being involved in the development of their own intervention was motivating. They reported that they enjoyed helping with setting their own goals and choosing their own reinforcers, both of which promoted the development of their self-management skills (Howard et al., 2020). The students were also motivated by the technological component of the intervention. They enjoyed using the Bloomz app to track their progress on their goals and to exchange messages with their parents. Also, both Brandon and Jose selected reinforcers that were technology-related: both of them often selected playing on the Xbox or watching YouTube videos when they reached their point goals. These findings add to the growing literature on the motivating nature of technology for students with ASD (Chien et al., 2015; Grynszpan et al., 2014; Vélez-Coto et al., 2017).

Additionally, the inclusion of students as collaborators in the design of the intervention promoted ownership of the intervention. Students are the main stakeholders in their interventions, and those students who are treated as valued individuals in developing their own interventions are more likely to buy-in to the intervention than students who are not actively involved (Mallory et al., 2021). The students in this study expressed high levels of satisfaction in this study partly because they were involved in setting goals and selecting their own reinforcers. Interventions designed to aid students in

online learning must be designed to not only support students' use of positive behaviors but must also be motivating for the students to want to participate.

Motivation was also a contributing factor for the parents' increased self-efficacy throughout the study. Parents reported that their students' response to the intervention strategies influenced their perceptions of the intervention and motivated them to want to continue implementing the intervention, even after the conclusion of the study. This finding is similar to findings in other studies that suggest that parent perceptions of student success with an intervention influences their motivation to use the intervention (e.g., Russell & Ingersoll, 2021). Additionally, the on-going coaching built motivation by allowing the parents to practice strategies and self-reflect on their performance. Performance-based feedback given to the parents also contributed to the parents feeling more comfortable with the strategies taught to them and more willing to continue using the intervention with their students (Raulston et al., 2019). While initial coaching was standardized across all families, the support provided by the ongoing coaching sessions focused on specific issues or concerns of the individual families. By addressing each family's unique circumstances during the study, parent attitudes toward the intervention remained positive, thereby motivating the parents to continue implementing the intervention with high levels of integrity (Sanders & Kirby, 2012).

The results of this study also showed that parents embraced the collaborative approach to the intervention. When the parents were given the tools and strategies to support their children, they had greater self-confidence and felt empowered to implement strategies even in the absence of the researcher. The ultimate goal of a parent-training intervention should be to assist parents to become independent problem solvers who can

acquire the skills and knowledge they require to resolve current problems or prevent future ones (Sanders & Kirby, 2012). Parents who develop a reliance on practitioners to solve all problems related to their student's behavior may inadvertently create a level of dependency on others that undermines the goals of self-direction and autonomy. The parents in this study generated self-confidence when they were empowered through coaching as well as seeing their student's progress while using the intervention.

The importance of motivation in learning new skills or behaviors cannot be overstated. In this study, motivation had a key role in promoting student on-task behavior, student self-efficacy, and parent-self efficacy (See Figure 6 for a visual representation of these interactions). However, determining what motivates students and parents is not always clear. An individual's motivation is strongly influenced by many factors including learning history (Koegel et al., 2016), internal and external incentives (Froiland & Worrell, 2016), expectations of success or failure (Zimmerman, 1989), and meaningfulness from the perspective of the individual (Davis et al., 2015).
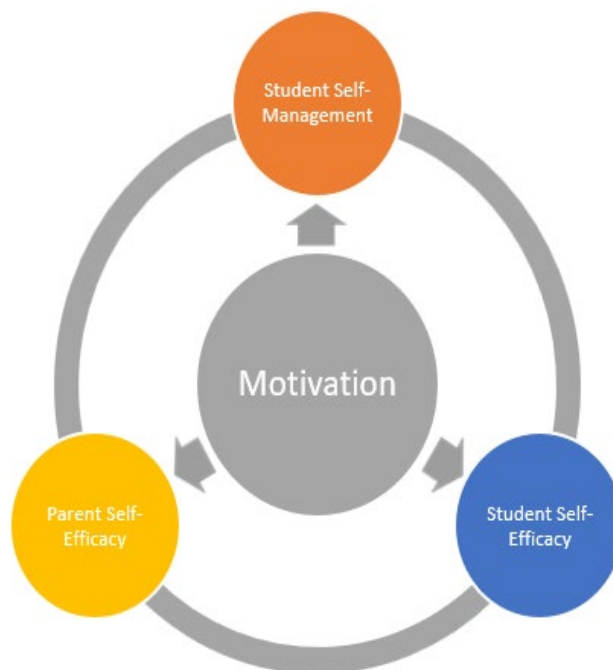
Figure 6. **Visual representation of the interaction among motivation, student self-management, student self-efficacy, and parent self-efficacy.**

Educators who provide training and coaching to families of students with disabilities must consider the motivations of both students and parents when implementing an intervention like the one used in this study. What motivates individuals is not universal and is not static; people are motivated by different internal and external factors to behave in certain ways. For this reason, it is important that interventions are developed that recognize the need for individualization and tailoring for specific contexts (Proctor et al., 2013). Allowing for flexibility in a manualized intervention can enhance the intervention by describing common adaptations or strategies in addition to specific techniques (Powell et al., 2015; Proctor et al., 2013). Ultimately, an intervention that fits the needs of the individual family will motivate everyone involved to participate more fully in the intervention.

Limitations

This study has several limitations that require mentioning. A significant limitation is a lack of generalizability of obtained effects. Interventions shown to be effective for a single individual may not be effective with other individuals, and these effects may not even replicate when readministered to the same individual at a later time (Kazdin, 2020). Using multiple participants helps to address limitations in that replicating an effect across multiple individuals at various points in time helps to reduce the plausibility of a claim that some external influence resulted in the change. Additionally, this study looks specifically at high school students with ASD enrolled in online school, which limits the generalizability of this study to this population of students. Therefore, to determine if the intervention package used in this study would be beneficial for other populations of students, additional studies would need to be conducted using students that belong to different populations.

A second limitation of this study surrounds the use of the self-efficacy questionnaire throughout the study. Interestingly, student on-task behavior and student self-efficacy did not appear to change in similar patterns, as demonstrated by the multiple-baselines graphs. It may be that the self-efficacy scale failed to capture student self-efficacy accurately due to the students' repeated exposure to the questionnaire as well as students misunderstanding some of the items on the questionnaire, leading to inaccurate scoring. Another explanation is that the students may have had difficulty with introspection and could not accurately express their self-efficacy through this measure. It is also possible that repeated exposure to the student self-efficacy measure led to socially desirable responding or reactive responding (Christ, 2007). Replicating the effect across

multiple individuals at various points in time also helps to reduce the plausibility of a claim that repeated assessment accounted for the intervention effect or that some external influence resulted in the change. Another limitation of the questionnaire is that it was not pilot tested before it was used in this study. The items used in this questionnaire were taken from previously tested self-efficacy questionnaires (i.e., Bandura, 1989), however modifications made to established questionnaires potentially weakens the validity of the questionnaire (Kistin & Silverstein, 2015).

A third limitation of this study was related to the questions asked during parent interviews. The structure of the questions may have led parents to answer a certain way. For example, asking parents how their confidence in their ability to support the students with their learning changed since the start of this study may have led the parents to report positive changes in their confidence even if it did not change. Another question asked parents how they supported their child when they were having difficulty with their schooling. This question led to the parents providing similar responses over the course of the study, and consequently the later interviews provided little new information. The questions in this interview should have changed over the course of the study to allow for greater clarity in the parents' growth or changes in behavior over the course of the study. The questions on the interview protocol should be re-examined in future uses to ensure all questions are free from unintentional bias that may sway the results.

A final limitation is the positionality of the researcher in the parent coaching process of this study. In their study examining the role of training experiences and manual use in promoting the use of parent training by community providers who serve children with ASD, Ingersoll and colleagues (2020) suggest that the amount of training

that ABA providers receive related to parent training influences their use of this approach with their clients with ASD. As a Board-Certified Behavior Analyst, I have provided a variety of parent training and coaching sessions to families of individuals with ASD and other developmental disabilities for many years. I have extensive experience and education in the use of behavior analytic strategies that allowed me to provide coaching in a standardized fashion across families while also considering the families' needs. Additionally, I believe that building positive relationships with the families from the start of the study contributed to the families' acceptance of both the CICO intervention and the content provided in the coaching sessions. Therefore, my experience and education may be a confounding factor in the findings of this study.

Implications and Future Directions

Online schooling is a growing part of the landscape of K-12 education (DLC, 2019). As such, there is a need to develop interventions that support students with disabilities in this learning environment. The purpose of this study was to examine the effectiveness of a technology-aided, modified CICO intervention to improve the on-task behavior of students with ASD enrolled in online high school. The results of the current study contribute to the literature on positive behavioral interventions and supports in online schooling in two ways. First, the findings in this study are consistent with the existing literature showing the effectiveness of CICO to support students' use of positive behaviors. This study extends what is known about CICO by demonstrating its effectiveness in supporting the development of self-management skills of students in online learning environments. Second, the findings in this study are consistent with the existing literature showing the effectiveness of parent coaching on promoting positive

student behavior and improving parent self-efficacy. This study extends what is known about parent coaching by demonstrating its effectiveness in helping parents support their students in online learning environments.

This study raises several implications for educators and researchers. First, this study highlights the need for school professionals to examine how to provide behavioral support to students with disabilities in a virtual setting. Students with disabilities enrolled in online schooling are entitled to the same rights and protections afforded to students with disabilities under IDEA as their peers being educated in traditional brick and mortar traditional schools (U.S. Department of Education, 2016), which includes access to positive behavioral interventions and supports (IDEA, 2004). This study provides an example of how one evidence-based practice, CICO, can be modified for implementation in a virtual setting. Results from the current study can help schools and parents understand how CICO is flexible and efficient enough to be successfully implemented in online learning environments. Teachers may consider CICO as a possible day-to-day support in virtual school settings as this is a commonly used Tier 2 intervention in traditional classroom settings. Considering many teachers are familiar with CICO, implementing an intervention like the one used in this study may be less confusing and difficult for schools to adapt for their students in an online environment than developing an entirely new intervention. Future research should explore how schools can modify other behaviorally based interventions commonly used in traditional classroom settings to support students enrolled in online learning.

Second, this study has implications for the role of technology in facilitating self-management interventions, particularly in online learning environments. Electronic

devices such as smartphones and tablets have intrinsic advantages over traditional pen-and-paper delivery of interventions as they are user-friendly, readily available, relatively inexpensive, and portable (Chia et al., 2018). Increasing the manageability and portability of self-management procedures through the use of technology may be especially beneficial in less controlled settings, such as the home and community (Odom et al., 2015). Utilizing technology to deliver interventions to individuals with disabilities is a growing area of study and research repeatedly shows that technology-aided interventions are more accessible for students, parents, and teachers than many traditional formats (Cheng & Lai, 2020; Olakanmi et al., 2020). For example, the use of mobile apps to deliver interventions is a growing area of research (e.g., Bruhn et al., 2016; Rosenbloom et al., 2016, 2019; Vélez-Coto et al., 2017). This study demonstrates that it is possible to adapt a well-established intervention, CICO, by introducing a technology element, the Bloomz app, to facilitate its delivery. The development of an app that could be used in place of the Bloomz app could more specifically meet required mechanisms for effectively delivering CICO in an online learning environment. Future research should explore how schools can use technology to modify or enhance other behavior interventions commonly used in traditional classroom settings to support students in different learning environments.

A third implication pertains to the use of manualized interventions in supporting students with disabilities in online learning. Intervention manuals have been seen as essential for the dissemination and replication of evidence-based practices for decades (Wilson, 1996). Manuals offer a potentially helpful way to bridge the gap between research and practice and deliver effective interventions in real-world settings. In

addition, manualized interventions address the issue of maintaining high levels of implementation fidelity across providers (Sipila-Thomas et al., 2021), which is particularly important for schools who rely on multiple teachers and staff to implement an intervention with students. One of the main benefits of using a manualized Tier 2 intervention such as CICO is that schools typically already have the systems in place needed to implement the intervention with relatively short turnaround. This study explored the effectiveness of a manualized CICO intervention adapted for students enrolled in online learning, but replication of this study is greatly needed to determine if its findings can be reproduced.

The fourth implication of this study is the need for a greater understanding of the complexities of providing parent coaching. Many parents are often unfamiliar with behavior interventions used in schools, so in order for parents to successfully implement an intervention, there must be a support system in place for the parents to implement any intervention. Parent coaching was essential for the successful implementation of the intervention used in this study. In this study, the researcher served as the coach for each family, so it is unknown at this time if similar results would exist if different interventionists provided coaching. To determine if the manual developed for this intervention can be effectively delivered by professionals with a variety of experiences and backgrounds, future research must be conducted that includes different interventionists as coaches. In terms of practicality pertaining to educators, schools must seriously consider who will be responsible for providing parent coaching. As mentioned earlier in this chapter, teachers have many responsibilities which can limit their ability to provide parent coaching on behavior interventions for online learners. It is important that

future research be conducted to determine how to make this intervention doable for teachers if they are expected to coach families. Some considerations would include the number of students on the teacher's caseload, the level of support needed by the student or family, and how the delivery of coaching will take place (e.g., format of delivery and frequency/duration of meetings). Teachers should also be given the opportunity to provide feedback and suggestions for improvement to make this intervention doable for both teachers and families.

Fifth, further information is needed that identifies what population of students and what types of families would be most successful with this intervention. No two families are the same, and this is particularly true for families of children with disabilities. A family's experience with previous interventions or coaching can play a significant factor in the success of the intervention. Cultural differences, perceived social significance, and the relation between the family and coach can all present challenges that either inhibit or enhance the family's ability or desire to participate in intervention (Chung et al., 2020; Parra-Cardona et al., 2017). The family is typically the main support system for an individual with a disability throughout most of their lives, so providing a family with the knowledge and resources to provide effective support to the individual extends far beyond the family's current context. Future research should seek to learn more about which families would benefit from coaching and which ones may not.

Suggestions for Future Research

There are several directions for research to explore this topic more thoroughly. This study used a multiple baseline across participants design to determine if the intervention would influence one behavior, on-task behavior, across participants. Future

research should employ different research designs to promote a greater understanding of this intervention's influence on student behavior. Some suggestions include using designs such as multiple baselines across behaviors, multiple baseline across settings, ABAB reversal design, and changing criterion designs. Another area to consider is conducting a component analysis to determine if there are aspects of this intervention that are more impactful on student behavior or that can be removed or modified without jeopardizing student success.

Another area of research that can be expanded on is exploring how to best measure student self-efficacy, particularly for students with disabilities who have difficulty with introspection. This study measured student self-efficacy through a self-report questionnaire during every observation, however there may be more efficient methods that could be used. For example, probing self-efficacy periodically rather than every observation may yield a more accurate measure as the students would not be exposed to the questionnaire as frequently. There may also be different methods of collecting self-efficacy data. It may be possible to operationally define student self-efficacy so that data can be collected on specific behavior that is measurable and observable. Finding alternative methods for measuring self-efficacy can help researchers gain a better understanding of students' changes in self-efficacy when using interventions like the one implemented in this study.

Finally, future research needs to explore the effectiveness of this intervention with different populations of students enrolled in online schooling. The students in this study were high school students with ASD who demonstrated difficulties with self-management skills. However, students with ASD make up only a portion of students with disabilities

enrolled in online schooling. More research needs to be done to determine if this intervention can also be successfully implemented with students with different disabilities or learning characteristics as well as students of different ages. Early identification and intervention of skill deficits is important for students to overcome barriers to success, so implementing this intervention with younger students at the elementary and middle school levels would be of significant value for the field.

Conclusion

The current study demonstrated the feasibility and potential benefits of implementing a technology-aided CICO for students with disabilities attending a full-time online school. Results suggest that CICO is a promising approach to managing on-task behavior within virtual school settings, but the limitations of the study should be considered when evaluating the implications of the findings. In addition, this study highlights areas that must be considered when developing and implementing an individualized intervention in an online learning environment, particularly when it comes to supporting both parents and students. In order for students to gain the skills necessary to self-manage in these settings, steps need to be made to ensure students and parents are active participants in the development and decision-making processes. Though the findings are promising, future research should seek to replicate the study across larger and more diverse samples to evaluate the impact of behavior interventions and supports for students in online schools.

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APPENDIX A

Screening Instrument

Participant ID:_____

Inclusion Criteria For Student Participant

1. Enrolled in high school?	☐Yes ☐No
2. Has an ASD diagnosis?	☐Yes ☐No
3. Has an individual education plan?	☐Yes ☐No
4. Receives special education services?	☐Yes ☐No
5. Demonstrates difficulty with on-task behavior?	☐Yes ☐No
6. Has access to technology (i.e. phone or tablet?)	☐Yes ☐No
Students must meet the above criteria to be eligible to participate in the study.	

Inclusion Criteria For Parent Participant

1. Can participate in an initial training with the researcher to learn to implement the intervention being tested	☐Yes ☐No
2. Open to on-going coaching sessions with the researcher as needed	☐Yes ☐No
3. Can participate in three to five interviews with the researcher throughout the study?	☐Yes ☐No
4. Has access to electronic device?	☐Yes ☐No
5. Has access to technology (i.e. phone or tablet?)	☐Yes ☐No

6. Is able to demonstrate basic technology skills that include downloading and installing a mobile app, sending and receiving text messages, and navigating between pages on a mobile app or website	☐Yes ☐No
Parents must meet the above criteria to be eligible to participate in the study.	

APPENDIX B

Observational Data Collection Form

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Student: Start Time:_____   Stop Time:_____
Observer:
Target Behavior & Definition:

Directions: For each 30 second interval, write a "+" in the interval box when the student engages in the behavior for the entire duration, and write a "-" in the interval box when the student does not engage in the behavior for the entire duration.

	10 Second Intervals						
Minutes		1	2	3	4	5	6
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
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17							
18							
19							

APPENDIX C

Student Self-Efficacy Measure

Participant ID:_____   Date:_____

Question 1: It is easy for me to stay focused on my schoolwork right now.

5 Strongly Agree	4 Agree	3 Neither	2 Disagree	1 Strongly Disagree

Question 2: It is easy for me to try hard on my schoolwork right now.

5 Strongly Agree	4 Agree	3 Neither	2 Disagree	1 Strongly Disagree

Question 3: I can motivate myself to do my schoolwork, even when I don't want to do it.

5 Strongly Agree	4 Agree	3 Neither	2 Disagree	1 Strongly Disagree

Question 4: When I get distracted, I can refocus my attention on my schoolwork by myself.

5 Strongly Agree	4 Agree	3 Neither	2 Disagree	1 Strongly Disagree

Question 5: I can focus on my schoolwork when there are distractions around me.

5 Strongly Agree	4 Agree	3 Neither	2 Disagree	1 Strongly Disagree

APPENDIX D

Parent Interview Protocol

1. How would you describe your involvement with your child's education in online school?

2. In what ways have you supported your child when they are struggling or having difficulty with their schooling?

3. How would you describe your present level of confidence in your ability to support your child with their learning?

4. What, if anything, is difficult for you in terms of supporting your child's learning?

5. How has your confidence in your ability to support your child with their learning changed since the start of this study?

APPENDIX E

Parent Education Manual

A Technology-Aided Check-In/Check-Out for Online Learners: A Guide for

Implementation

Patrick Mallory

Boise State University

Parent Education Manual

First Step

Once a family has been targeted for participation in the intervention, identify two one-hour periods for the initial parent instruction meetings. Establish rapport with the parent to increase buy-in and make them feel comfortable with the intervention. Some examples of how to build rapport is to make sure that you spend some time each session asking about how the parent is doing, be open to questions they may have about you, and find relatable experiences you can share with the parent. Demonstrate that you are empathetic to issues or concerns they express regarding their child or the intervention, and reassure them that you are there to lend support. It is important that the parent and student feel comfortable with you and feel that they can talk to you about the process and issues they may be having with the intervention.

Meeting 1

1. Review Intervention Overview Handout (see Appendix E.1)
    a. Discuss the CICO process.
    b. Discuss the rationale for implementing CICO with the student.
    c. Discuss the importance of developing independent skills.
    d. Answer any questions about CICO
2. Review Reinforcement Handout (see Appendix E.2)
    a. Discuss the importance of reinforcement in teaching new behaviors
    b. Discuss the different types of reinforcers
    c. Discuss basic rules about using reinforcement
    d. Talk about what has been used for reinforcement in the past, as well as what has been effective or ineffective reinforcers.
    e. Answer any questions about reinforcement

Homework

Before the next meeting, the family will be asked to complete the following items:

a. Have the parent fill out the Functional Assessment Checklist for Teachers & Staff (FACTS) questionnaire to determine behaviors to target and their functions (see Appendix E.3).
b. Determine appropriate reinforcers using the reinforcement menu.
    ■ The student and parent may create a list of agreed upon reinforcers that the student may earn upon meeting their CICO point goals. See Appendix E.4 for an example reinforcement menu.

Meeting 2

Step 1. Begin by asking the parent if they have any questions after the last meeting.

Step 2. The researcher will create the Bloomz classroom so that it will be set up prior to adding students and parents. (*Note: Parents will be assigned a "Teacher Account" on this app since they are implementing the intervention). The researcher will then send the parent and student access codes through email. From there, they will create an account using following the steps below (*Note: The student may be present for this portion of the training or the parent may create an account for the student):

Creating Teacher Account	Creating Student Account
1. Click **Create Account** 2. Select **Join Class/Group** 3. Copy-paste the invitation code that you received in the email in **ENTER CODE** field 4. Click **Next** 5. Enter your **First Name**, **Last name** 6. Click **Language** and select your preferred language 7. **Email** gets prefilled and the user cannot edit it 8. Type a **Password** (Enter a minimum of 8 Character, need at least one number and one letter) 9. Select the **I agree to the terms and policy** checkbox 10. Click **Sign Up** 11. You will see the Class Invite from the researcher 12. Click **Join Class**	1. Navigate to https://app.bloomz.net OR Download the Bloomz app from the Appstore/ Playstore 2. Click on **Enter Code** 3. Enter the Code 4. Click **Next** 5. Enter the **Email/ Phone number** 6. Select Age 7. Enter **Password** 8. Enter the email of the parent who can permit you to create an account (If the age is over 14 years old, then this step is not needed)* 9. Select the Terms and Conditions checkbox 10. Click **Submit** *If the student is less than 14 yrs, they will need to wait for a parent to permit them to create the account to move forward. The parent should receive an approval email to the email address entered. Once they approve, the student can finish their account creation and will be able to see the Home page with the class in the left menu.*

Step 3. The facilitator will guide the parents through the Bloomz App using the following checklist (*Note: The student may be present for this portion of training. If the student is not present, the facilitator will demonstrate how the student can use the app at another time prior to data collection.):

Checklist 1: Bloomz Training

Training Component	Covered?	
1. Install Bloomz App	Yes	No
2. Enter Access Codes	Yes	No
a. Facilitator will send Access Codes to parents and students once they have the app installed	Yes	No
3. Bloomz Overview		
a. Main feed	Yes	No
b. Behavior Management (will be discussed in next step)	Yes	No
c. Assigning teachers, parents, and students to class	Yes	No
d. Messages	Yes	No
e. Other features not pertinent to this study	Yes	No
4. Behavior Management		
a. Adding students	Yes	No
b. Adding/customizing behavior options	Yes	No
c. Setting goals	Yes	No
d. Awarding points	Yes	No
e. Adding notes with the behavior	Yes	No

Step 4. The facilitator will train the parent to implement CICO using the items on the following checklist:

Checklist 2: CICO Training

Training Component	Covered?	
5. Implementing Bloomz (Intervention Implementation)	Yes	No
a. Check in at beginning of class	Yes	No
b. Parent feedback to student during class	Yes	No
c. Check out at end of class	Yes	No
d. Repeat cycle for other classes throughout the day	Yes	No
e. Parent feedback to student at end of school	Yes	No
f. Award reinforcer if point goal is met	Yes	No

The facilitator will use the following strategies to help the parents learn to implement the intervention components:

1. The facilitator will model the components of the CICO intervention (Checklist 2) for the parent. Start by having the parent act as the child and the facilitator will be the interventionist. While modeling, the facilitator will describe what they are doing and how they are doing it.
2. Next, have the parent practice their role and the facilitator will act as the child. Provide immediate feedback while the parent is practicing their role in implementing the intervention. Practice the scenario several times until the parent is able to implement all elements successfully.

Ongoing Parent Coaching

From this step forward, the parent should be able to implement the intervention with the student. The first session should consist of the parent being the interventionist and the facilitator will be there to support the parent. The facilitator should only intervene when there are any questions or to provide reinforcement and encouragement to the parent. At the end of the session, the facilitator may want to debrief with the parent to determine a) what did and did not go well, b) any elements of the intervention the facilitator feels the parent needs further support with, and c) if any changes need to be made to the intervention. See Appendix E.6 for a parent debriefing form.

Implementation Fidelity Checks

Regular fidelity checks are important for ensuring that the intervention is being implemented as intended. Fidelity should be checked at least once every three observation sessions. Appendix E.5 provides a fidelity checklist that will aid the facilitator in determining fidelity of the intervention. The items should be answered for the specific session in which fidelity is being measured (i.e. observe one class session and answer the questions based on that observation).

If the parent falls below 88% accuracy for fidelity of implementation for two consecutive weeks, the facilitator will conduct a booster session. Prior to the booster session identify the areas that the parent is not meeting criteria on. During the session:

- Begin with identifying areas that are going well during the class sessions
- Discuss the steps of the routine that the parent is not consistently demonstrating
- Explain the importance of those steps to the parents
- Model the entire routine with the parent acting as the child
- Have the parent practice the routine with the researcher acting as the child

Appendix E.1: Intervention Overview

Check-In, Check-Out (CICO), also known as The Behavior Education Program (BEP), is a Tier 2 intervention designed for students whose problem behaviors (a) are unresponsive to Tier 1 practices and systems, (b) do not require more immediate individualized interventions, and (c) are observed across multiple settings or contexts (Crone et al., 2010). The CICO intervention is designed to be continuously available and easily accessed soon after a student candidate is identified. In addition, classroom teachers can usually implement the intervention in less than 5-10 minutes per day.

Traditional CICO

The traditional CICO follows the outline provided below. Figure 1 provides a visual representation for daily and weekly components of the CICO intervention cycle.

1. *CHECK-IN*. Participating students complete a "check-in" with a CICO facilitator each morning after arriving at school. The facilitator provides students with a Daily Progress Report (DPR) and offers encouragement for meeting daily behavior expectations and point goals.

2. *FREQUENT TEACHER FEEDBACK.* Using expectations listed on the DPR, students receive regularly scheduled specific feedback about behavioral performance from their classroom teacher. Teacher feedback occurs at the end of each class period or during natural transitions throughout the school day. Specifically, the classroom teacher gives positive, specific praise for appropriate behavior, provides corrective feedback when applicable, and then rates student demonstration of expectations using a predetermined point system.

3. *CHECK-OUT.* At the end of each school day, students return to the intervention facilitator for "checkout". At this time points earned on the DPR are totaled. Intervention facilitators provide students with additional verbal praise and may offer secondary reinforcer if daily or weekly goals are met. If a point goal is not met, the facilitator provides re-teaching of expectations and supportive encouragement.

4. ***FAMILY PARTICIPATION.*** Students will take their DPR home at the end of each day for their parents/guardians to review. This allows an opportunity to receive additional feedback from a parent/guardian. Parents are asked to sign and then return the DPR to school the following day.
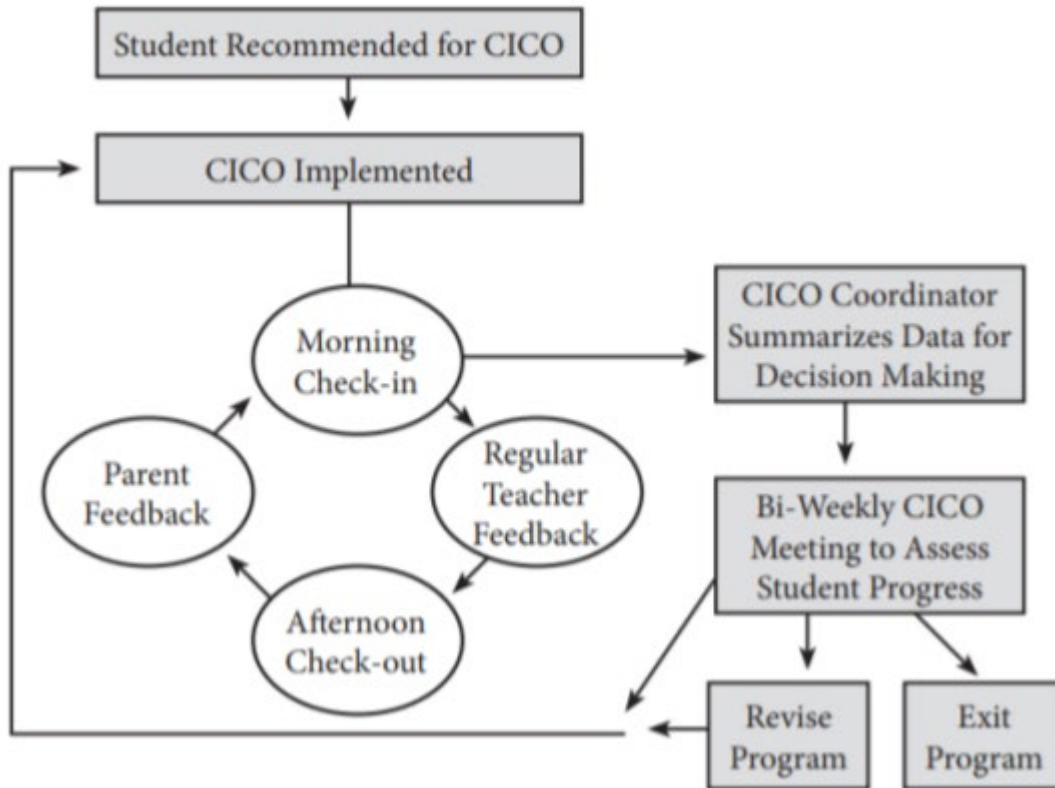

Figure E.1.   CICO implementation process

Technology-Aided CICO For Online Settings

The technology-aided CICO follows a similar process as the traditional CICO, however there are some noticeable differences. Figure 2 provides the steps used in the implementation of the technology-aided CICO intervention.

1. ***CHECK-IN***. Participating students complete a "check-in" with a parent or caregiver at the beginning of their schooling. The parent ensures that the student has access to the technology through which the CICO is being

delivered. The parent will review expectations and encouragement for meeting their daily point goal.

2. ***REGULAR PARENT FEEDBACK.*** Using expectations listed in the mobile app, students receive regularly scheduled specific feedback about behavioral performance from the parent. Parent feedback occurs at the end of each class period or during natural transitions throughout the school day. Specifically, the parent gives positive, specific praise for appropriate behavior, provides corrective feedback when applicable, and then rates student demonstration of expectations using a predetermined point system.

3. ***CHECK-OUT.*** At the end of each school day, the student "checks out" with their parent. At this time, points earned on the mobile app are totaled. The Parent then provides the student with additional verbal praise and may offer secondary reinforcer if daily or weekly goals are met. If a point goal is not met, the parent provides re-teaching of expectations and supportive encouragement.
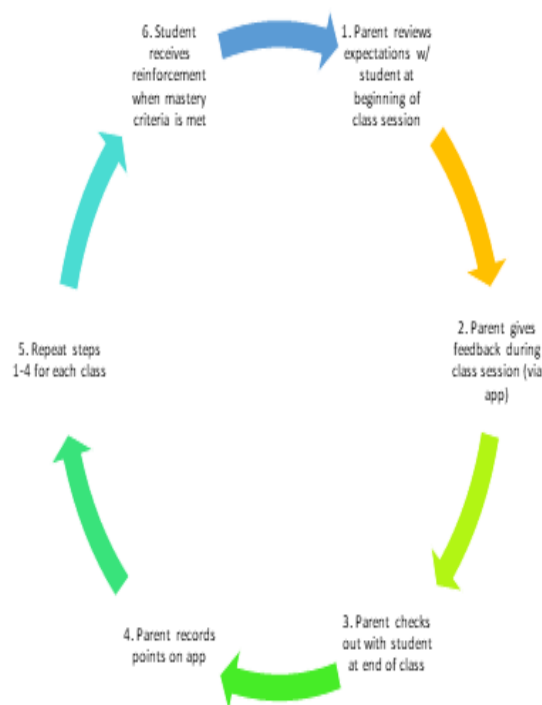

Figure E.2.   Modified CICO process using Bloomz app.

Appendix E.2: Reinforcement Overview Handout

Positive Reinforcement

- ❖ **A positive reinforcer is anything that is added following a behavior that increases the likelihood of the behavior occurring again in the future.** Rewards are often given to children when they engage in desirable behaviors, but if the reward does not cause those behaviors to increase in the future, then the reward is not actually a reinforcer.
- ❖ Positive reinforcement can provide additional motivation to help shape and increase developmentally appropriate behaviors.

Types of Reinforcement

Natural Reinforcement: A child's positive behaviors and social interactions are reinforced naturally. The natural consequences of positive behaviors become reinforcing themselves. Successful interactions become motivating to the child.
Examples:

- ❖ There is a ball out of reach for a child. The child says, "Ball," and an adult hands the ball to the child. Access to the ball is reinforcing and increases the likelihood of the child requesting "ball" in the future.
- ❖ A child is struggling with a difficult puzzle. The child says, "Help," and an adult helps the child. Completion of the puzzle is reinforcing. This successful interaction increases the likelihood of the child attempting puzzles in the future and requesting help when needed.

Social Reinforcement: A child's behaviors are reinforced by positive social interactions. Social reinforcement can include smiles, tickles, high fives, and praise.
Examples:

- ❖ A child hesitantly raises his hand in class to answer a question. The teacher's praise for his efforts or a peer's wink from across the room are forms of social reinforcement. The positive social interactions offer the child a source of confidence in raising his hand in the future.
- ❖ A child stands close to his mother while walking through a busy area. The mother pats her son on the back or offers a hug for his positive behavior.

Activity Based Reinforcement: Access to fun activities can serve as reinforcers for a child's behavior.
Examples:

- ❖ A child finishes all of his chores. Activity based reinforcement could include access to a computer game for 20 minutes.
- ❖ A parent who requires a child to wash his hands before sitting down to a favorite snack is using activity-based reinforcement.

Tangible Reinforcement: A child's positive behavior is reinforced by access to desired items that may not be related to the specific behavior.

Examples:
> ❖ A child who labels a color correctly is given a piece of candy.
> ❖ A child who sits nicely at the doctor's office is given a sticker.

Effective Reinforcement

When done effectively, positive reinforcement can be a very powerful tool in increasing behaviors. Important components of all forms of reinforcement:

1.) **<u>Immediacy</u>** – reinforcement should be given as soon after the target behavior as possible.

2.) **<u>Contingency</u>** – a child should only receive a reinforcer when the target behaviors occur.

3.) **<u>Variability</u>** – to ensure a child doesn't get satiated or bored of a specific reinforcer, use a variety of preferred items.

4.) **<u>Uniqueness to the child</u>** – there is no one reinforcer that works for everyone. Every child is different, as are his or her preferences and effective reinforcers.

How to Identify Reinforcers

> ❖ Since reinforcement should be unique to the child, direct observation is the most effective way to identify potential reinforcers. What kinds of activities does the child often do? When given a choice between activities what will the child choose? When left alone what will the child play with? How does the child respond to social praise?
>
> ❖ Once a potential reinforcer is identified, it may be necessary to make that item or activity unavailable, except for when the child exhibits the target behavior. This will make the reinforcer more valuable and more motivating to work for.
>
> ❖ Be aware that a child's preference may change often, and selection of reinforcers should change accordingly.

Remember: something is only a reinforcer if it increases the behavior it follows!

Fading Reinforcement

Ultimately, we want children to respond without the addition of artificial reinforcers. Once a child is responding reliably, it is important to thin the use of artificial motivators and establish more naturally occurring consequences as reinforcers. Naturally occurring consequences may include things that children would easily access in their environment on their own when they exhibit desirable behaviors. An example of naturally occurring consequences a child may access for a behavior, such as saying hi to a peer, may be praise from adults or attention from peers.

Some Reinforcement Cautions

> ❖ Reinforcement should be planned and not introduced as a bribe when a child refuses to do something.

- ❖ Positive reinforcers should not be offered to a child to entice them to stop engaging in challenging behaviors.
- ❖ Reinforcers given to a child should be large enough to increase behavior but as small as practical. For example, if a child works for praise and a pat on the back, then it is not necessary to use cookies as well.
- ❖ Do not promise or offer reinforcers that you cannot or do not intend to deliver.

Appendix E.2: Functional Assessment Checklist for Teachers and Staff (FACTS-Part A)

Student: _____ Date: _____
Interviewer: _____ Respondent(s): _____

Student Profile: Please identify at least three strengths or contributions the student brings to school.
_____
_____

Problem Behavior(s): Identify problem behaviors

___ Tardy	___ Fight/physical Aggression		___ Disruptive	___ Theft
___ Unrespon-sive	___ Inappropriate Language		___ Insubordination	___ Vandalism
___ With-drawn	___ Verbal Harassment		___ Work not done	___ Other _____
	___ Verbally Inappropriate		___ Self-injury	
Describe problem behavior:		_____ _____		

Identifying Routines: Where, When and With Whom Problem Behaviors are Most Likely.

Schedule (Times)	Activity	Likelihood of Problem Behavior		Specific Problem Behavior
		Low	High	
		1 2 3 4 5	6	
		1 2 3 4 5	6	
		1 2 3 4 5	6	
		1 2 3 4 5	6	
		1 2 3 4 5	6	
		1 2 3 4 5	6	
		1 2 3 4 5	6	
		1 2 3 4 5	6	
		1 2 3 4 5	6	

		1 2 3 4 5 6	
		1 2 3 4 5 6	

Select 1-3 Routines for further assessment: Select routines based on (a) similarity of activities (conditions) with ratings of 4, 5 or 6 and (b) similarity of problem behavior(s). Complete the FACTS-Part B for each routine identified.

Functional Assessment Checklist for Teachers & Staff (FACTS-Part B)

Routine/Activities/Context: Which routine(only one) from the FACTS-Part A is assessed?

Routine/Activities/Context	Problem Behavior(s)

Provide more detail about the problem behavior(s):

What does the problem behavior(s) look like?

How often does the problem behavior(s) occur?

How long does the problem behavior(s) last when it does occur?

What is the intensity/level of danger of the problem behavior(s)?

What are the events that predict when the problem behavior(s) will occur? (Predictors)

Related Issues (setting events)		Environmental Features	
___ illness Other:_____		___ reprimand/correction	___ structured activity
___ drug use _____		___ physical demands	___ unstructured time
___ negative social _____		___ socially isolated	___ tasks too boring
___ conflict at home _____		___ with peers	___ activity too long
___ academic failure _____		___ Other	___ tasks too difficult
		_____	

What consequences appear most likely to maintain the problem behavior(s)?

Things that are Obtained		Things Avoided or Escaped From	
___ adult attention Other: _____		___ hard tasks Other: _____	
___ peer attention _____		___ reprimands _____	
___ preferred activity _____		___ peer negatives _____	
___ money/things _____		___ physical effort _____	
		___ adult attention _____	

SUMMARY OF BEHAVIOR
Identify the summary that will be used to build a plan of behavior support.

Setting Events & Predictors	Problem Behavior(s)	Maintaining Consequence(s)

How confident are you that the <u>Summary of Behavior</u> is accurate?

Not very confident					Very Confident
1	2	3	4	5	6

What current efforts have been used to control the problem behavior?

Strategies for preventing problem behavior	Strategies for responding to problem behavior
___ schedule change Other: _____ ___ seating change _____ ___ curriculum change	___ reprimand Other: _____ ___ office referral _____ ___ detention _____

March, Horner, Lewis-Palmer, Brown , Crone, Todd, & Carr (2000)

Appendix E.4: Reinforcer Menu

What Am I Working For?

1.

2.

3.

4.

5.

Appendix E.5: Implementation Fidelity Checklist

Fidelity Component	Status
1. The student checked in with the parent at the beginning of class.	Yes No N/A
2. The parent positively acknowledged the student at check in, making sure the student had access to the Bloomz app.	Yes No N/A
3. The parent has access to the Bloomz app at the beginning of class.	Yes No N/A
4. The parent reviewed the student's goals with the student at the beginning of class.	Yes No N/A
5. The parent provided contingent feedback on Bloomz at least once during the class period.	Yes No N/A
6. The student checked out with the parent at the end of the class period.	Yes No N/A
7. The parent records points on the Bloomz app at the end of class period.	Yes No N/A
8. The parent provides feedback to the student at the end of the school day.	Yes No N/A
9. If the student's point goal is met, the student receives reinforcement.	Yes No N/A
Percentage (# of Yes/# of items) x 100	
Comments & Observations:	

Appendix E.6: Parent Debriefing Form

Based on your observation and scoring on the Implementation Fidelity Checklist, complete the following items:

What is going well?
What is not going well?
What steps can be taken to make improvements?
Parent tasks to work on:

***End of Parent Education Manual

APPENDIX F

Implementation Fidelity Checklist

Fidelity Component	Status
1. The student checked in with the parent at the beginning of class.	Yes No N/A
2. The parent positively acknowledged the student at check in, making sure the student had access to the Bloomz app.	Yes No N/A
3. The parent has access to the Bloomz app at the beginning of class.	Yes No N/A
4. The parent reviewed the student's goals with the student at the beginning of class.	Yes No N/A
5. The parent provided contingent feedback on Bloomz at least once during the class period.	Yes No N/A
6. The student checked out with the parent at the end of the class period.	Yes No N/A
7. The parent records points on the Bloomz app at the end of class period.	Yes No N/A
8. The parent provides a comment with each point awarded.	Yes No N/A
9. The parent provides feedback to the student at the end of the school day.	Yes No N/A
10. If the student's point goal is met, the student receives reinforcement.	Yes No N/A
Percentage (# of Yes/# of items) x 100	
Comments & Observations:	

APPENDIX G

Social Validity Measure

1. What are your overall thoughts or opinions about your experience being in this study?

2. What about the study did you find to be positive or beneficial for you? For your student?

3. What about the study did you find to be negative or unhelpful for you? For your student?

4. What are your thoughts on using the Bloomz app during the study?

5. What are your thoughts on the training/coaching components of the study?

6. On a scale of 1 to 10 (1 = not at all, 10 = extremely), how useful do you believe the intervention was for supporting your student in their schooling? Please explain.

7. Anything else?