FUNCTION-BASED, COMPUTER-ASSISTED SDLMI IMPACT ON SELF-DETERMINATION AND ON-TASK BEHAVIOR FOR YOUTH WITH EXTENSIVE SUPPORT NEEDS

by

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ABSTRACT

ASHLEY PAIGE VOGGT. Function-Based, Computer-Assisted SDLMI Impact on Self-Determination and On-Task Behavior for Youth with Extensive Support Needs. (Under the direction of DR. CHARLES L. WOOD).

In-school and post-school outcomes are poor across all three areas of transition (i.e., education, employment, and independent living) for students requiring extensive support needs (ESN). Educators and researchers attempt to improve these outcomes through targeted interventions built around predictors (e.g., increased self-determination skills predict improved post-school outcomes, Mazzotti et al., 2016; Test et al., 2009). In isolation, research supports using function-based interventions, computer-assisted interventions, and interventions designed to increase self-determination skills for students with ESN; however, research is limited on intervention packages incorporating these elements. This study examined the effects of function-based, computer-assisted *Self-Determined Learning Model of Instruction* (SDLMI, Agran et al., 2000) on student knowledge of the SDLMI and on-task behavior in the classroom. Results indicated a functional relation between the intervention package and increased knowledge of the SDLMI and increased on-task behavior in the classroom. Effect sizes were large for increased knowledge of the SDLMI and moderate for on-task behavior. Additional measures included generalization to an untrained job skills setting, maintenance, student and teacher reports of student's levels of self-determination, and teacher reported levels of student's goal attainment. Teacher and student perceptions of the acceptability and effectiveness of the intervention were considered. Finally, implications for practice and suggestions for future research are discussed.

DEDICATION

First, I would like to dedicate this dissertation to the improvement of outcomes for youth with disabilities. I have felt called to continue this work in hopes that all my experiences so far, through teaching, research, and service, will put me in a position to spark change. My future goals will continue focusing on improving outcomes for youth with disabilities.

In addition, my family and friends – what a blessing it is to have too many to name here. Thank you all for believing in me when I was doubtful. I am humbled in gratitude by how many special souls have impacted my life. I could not stand where I am today without each one of you. A special thank you to my mom, for always modeling her strong will and determination and instilling in it me. Thank you to my dad, for always being my biggest fan; you are my source of enthusiastic optimism when I am running low. To my brother, thank you for being there to make me laugh and to share a beverage with me when I needed it, and you, most.

Finally, without the support of my loving husband, this final product would not have been possible. Thank you for your patience with my challenging behavior at times, your gentle encouragement, and for your continuous support as I have worked to attain my goals. And to our first born, Elijah, you are the biggest blessing of all. Your arrival motivated me to complete this dissertation earning you special recognition as my research assistant. As we are on to the next chapter of our lives, my goal is to always continue valuing the time we spend together as a family.

ACKNOWLEDGEMENTS

First, I would like to acknowledge my dissertation committee members. To Dr. Charles Wood, thank you for your support during the doctoral program as my advisor and as the chair of my dissertation committee. You shaped me through this program through your encouragement and expertise using the gift you have of pushing your advisees to be great, while supporting them and easing their stress and tension with a few words. I am truly grateful to you for your mentorship. Next, to Dr. Valerie Mazzotti, I have always found your work inspirational, so much so that I adapted your intervention for my dissertation study. Thank you for your willingness to share your expertise and support me through this process. To Dr. Fred Spooner, it has been an honor and a privilege to work with you and learn from you over the course of this program. Thank you for sharing your keen insights into the field of special education broadly, and specifically regarding teaching students with severe disabilities. To Dr. Claudia Flowers, your knowledge and expertise as an instructor and throughout this dissertation year have been valued and greatly appreciated.

In addition, I would like to thank the faculty of UNC Charlotte. In particular, thank you to Dr. Charles Wood and Dr. YaYu Lo for managing the leadership grant that funded my PhD Traineeship. Thank you to all the instructors of the course work I experienced by participating in the Adapted Curriculum Licensure Plus Program while obtaining my Master's Degree and while completing the program to obtain my PhD in special education. To the colleagues in my cohort, those before, and those after, thank you for the support, encouragement, IOA data, publication opportunities, shared laughs, meals, coffees – thank you for everything.

Next, a special thank you to Dr. Zoi Philippakos for the opportunity to work with you and learn from you as your graduate research assistant during the first year of my studies in the doctoral program. Your work ethic and kind heart are unmatched. I am grateful to know you professionally and also call you my friend. Also, a special thanks to Dr. Catherine Fowler and Dr. David Test for the opportunity to serve as a graduate research assistant for the National Technical Assistance Center on Transition (NTACT). I have learned so much from you both and will strive to follow your models of leadership in the future.

Finally, I would like to acknowledge the teachers who eagerly agreed to participate in this study. Often, teaching is a thankless job, but know the work you do is incredibly important, and you inspired me every day with your grit, determination, and passion. Thank you for welcoming me into your classrooms and for collaborating with me. And to the students, you made this study fun to implement. I enjoyed seeing you learn and grow. Thank you for your hard work and dedication. We met our goals this year!

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CHAPTER 1: INTRODUCTION

Statement of the Problem

Inclusion in general education and paid employment/work experience are in-school predictors of post-school success (Mazzotti et al., 2016; Test, Mazzotti et al., 2009); however, in-school and post-school education and employment outcomes for individuals with disabilities are lower than their same age peers without disabilities (Lipscomb et al., 2017; U.S. Department of Labor, 2019). Communication and behavioral challenges can be a barrier to positive post-school outcomes for students with disabilities. For example, the National Longitudinal Transition Study-2012 (NLTS-2012, Lipscomb et al., 2017) reported in-school data to demonstrate communication and behavioral challenges as the percentages of youth with disabilities who have health and communication needs exceed those of students without disabilities in terms of: (a) use of prescription behavioral medication (27% students with disabilities *vs*. 7% students without disabilities); (b) trouble communicating by any means (29% students with disabilities *vs*. 4% students without disabilities); (c) trouble understanding what other people are communicating (44% students with disabilities *vs*. 8% students without disabilities); and (d) knowing and demonstrating how to make good choices (94% students with disabilities *vs*. 97% students without disabilities). These challenges in communication leading to challenging behavior are reflected in the resulting consequences students face, including percentages of youth with disabilities being (a) suspended at rates compared to students without disabilities (29% *vs*. 14%); (b) expelled at higher rates (8% *vs*. 3%); and (c) arrested at higher rates (6% *vs*. 2%; Lipscomb et al., 2017).

Although 76% of youth with an Individualized Education Program (IEP) expect to obtain some postsecondary education, 94% of their peers have this expectation, a gap of nearly 20 percentage points (Lipscomb et al., 2017). There is a gap in planning to attend a four-year college of nearly 30 percentage points (51% *vs.* 80%; Lipscomb et al., 2017). Persons with a disability are less likely to have completed a bachelor's degree or higher compared to those without a disability (U.S. Department of Labor, 2019).

Overall, across both groups of individuals with and without disabilities, those who attained higher levels of education were more likely to be employed than those who had attained less education (U.S. Department of Labor, 2019). Forty percent of youth with an IEP report having had a paid job in the past year, compared to 50% of their peers without disabilities. Fortunately, schools are working to address this gap as youth with an IEP are more likely than youth without an IEP to have paid or unpaid school-sponsored work experiences (12% *vs.* 7%).

According to the U.S. Department of Labor (2019), the employment population ratio was 19.1% among those with a disability compared to 65.9% of persons without a disability. The unemployment rate for persons with a disability was 8% in 2018, more than twice the rate of those with no disability (3.7%); although this is a slight improvement compared to the previous year (U.S. Department of Labor, 2019). Across all levels of education in 2018, persons with a disability were much less likely to be employed than were their counterparts with no disability (U.S. Department of Labor, 2019). For persons with a disability, Blacks/African Americans (11.2%) and Hispanic/Latinx (9.8%) had higher unemployment rates than Whites (7.3%), and Asians (7.1%) in 2018 (U.S. Department of Labor, 2019).

Workers with a disability were more likely to be employed part time than those without a disability (U.S. Department of Labor, 2019). In 2018, 31% of workers with a disability usually worked part time, compared with 17% of those without a disability (U.S. Department of Labor, 2019). The proportion of workers with a disability who worked part time for economic reasons (e.g., working part-time because their hours had been reduced or because they were unable to find a full-time job) was slightly higher than their counterparts without a disability (4%, compared with 3%; U.S. Department of Labor, 2019).

Consistent with lower rates of outcomes related to postsecondary education and training and work experience, youth with disabilities also have poor outcomes related to daily living expectations and task completion as youth with an IEP are nearly 20% less likely to have parents who anticipate that their child will be living independently by age 30 (78% *vs.* 96%; U.S. Department of Labor, 2019). These poor outcomes across all three areas of transition (i.e., education, employment, and independent living) demonstrate the need for educators and researchers to make efforts to improve outcomes for students with disabilities.

In-school and post-school outcomes are especially poor for students with low-incidence disabilities or students requiring extensive support needs. Students with extensive support needs (e.g., intellectual disability, autism) are those who "require the most support to learn, often categorized as having intellectual disability, multiple disabilities, autism spectrum disorder, or related disabilities" (Kurth et al., 2018, p. 143). Due to a lack of communication skills, students who require extensive supports may have challenging behavior and could benefit from function-based interventions (Horner et al.,

2000; Mayes & Calhoun, 2011). These students especially require intensive strategies (e.g., function-based interventions) that match a range of specific student needs to sufficiently achieve or maintain desired outcomes and prevent future challenging behaviors (Office of Special Education Programs: Technical Assistance Center on Positive Behavioral Interventions and Supports, 2017). Challenging behaviors may include aggression, self-injury, non-compliance, inappropriate social behavior, or stereotypical behaviors (Westling, 2015). Challenging behaviors create barriers inhibiting students' academic and work performance; thus, students with disabilities face many barriers to educational access and progress (Ryndak et al., 2014).

Function-Based Interventions

To address challenging behaviors, research suggests implementing function-based interventions that begin by conducting a functional behavior assessment (FBA) which includes a set of procedures used to develop a behavior support plan based on hypothesized factors that are predictive of problem behavior (Crone & Horner, 2003). Function-based interventions address the function (i.e., causes) of behavior and are developed based on the Competing Pathways Model of problem behavior (O'Neill et al., 1997). According to this model, problem behavior is learned, serves a purpose, and is maintained by some form of reinforcement (Virues-Ortega et al., 2011). Students may engage in problem behaviors after a triggering event and/or to avoid or obtain attention, an activity or item, or sensory conditions (Umbreit et al., 2007). By conducting an FBA, educators attempt to understand the reasons for challenging student behavior and use this knowledge to develop a function-based intervention. In a function-based intervention, these antecedent and consequent conditions are changed to prevent the occurrence of

problem behavior and to promote prosocial behaviors (Neilsen & McEvoy, 2004; Scott & Kamps, 2007). Function-based interventions have an evidence-base demonstrating effectiveness across preschool (Wood et al., 2011), elementary school (Burke, et al., 2003; Lane et al., 2007), and at the secondary and postsecondary levels (Turton et al., 2011; Whitford et al., 2013).

Computer-Assisted Instruction

Computer-Assisted Instruction (CAI) can enhance instruction or interventions for students with disabilities. CAI is often used in special education classrooms for the following reasons: (a) to introduce novel instruction, (b) as a mode for drill and practice opportunities, (c) to stimulate and increase engagement, (d) as a method of assessment measures, and (e) to compliment teacher-directed instruction (Sigafoos et al., 2014; Valdez et al., 1999). Since the 1980s, a range of terms CAI are used interchangeably, such as: computer-based instruction, computer-based learning, and computer-based teaching (Valdez et al.). Regardless of the name used as reference, the procedure across all consistently involves educational technology that delivers instruction via computer-based technologies or computer programs (Valdez et al.). CAI can be transmitted through a variety of technological devices such as personal computers, iPads, and smart phones (Sigafoos et al.).

In addition, students with disabilities often require additional supports and opportunities for repetition to acquire academic, social, adaptive and functional skills. Implementing CAI is one method of supplementing traditional teacher-directed explicit instruction (Sigafoos et al., 2014). CAI is considered an evidence-based practice for students with disabilities and provides opportunities for students to engage to self-

directed learning processes to decrease reliance on prompts delivered by teachers or peers (Browder et al., 2014).

Meta-analyses have been conducted to compile evidence demonstrating the effectiveness of CAI (e.g., Dugan et al., 2007; Schmidt et al., 1985-1986; Weng et al., 2014). Results from these studies indicated CAI was an effective method of teaching academic and social skills (Schmidt et al., 1985-1986), academic and communication skills for secondary students (Dugan et al., 2007), and cognitive-based skills for school-aged children (e.g., targeted academic and social skills; Weng et al., 2014). Additionally, the effectiveness of CAI interventions across transition areas has been demonstrated (e.g., skill development in academics, employment, life/adaptive behavior/social, and self-determination).

Research supports the use of CAI to increase academic skills. Interventions targeting literacy skills using CAI were effective for students with mild to moderate intellectual disability in primary grades (Spooner et al., 2014), middle school (Mims et al., 2012), and in young adulthood (Purrazzella & Mechling, 2013). Also, CAI has been used to teach science skills to students with intellectual disability in middle school (McKissick et al., 2018; Smith et al., 2013) and young adulthood (Hart & Walon, 2012). Last, CAI supports achievement of mathematics skill for students with intellectual disability in elementary school (Ok & Bryant, 2016), middle school (Saunders et al., 2018), and young adulthood (Wajiuhullah et al., 2018).

Next, Gilson and colleagues (2017) conducted a systematic review of instructional methods to teach employment skills to secondary students with intellectual and developmental disabilities. In their analysis of 56 studies published between 1983

and 2015, 34 (60%) of the studies used technology or another instructional stimulus (e.g., self-management device, video/audio-based, picture/tactile-based intervention) to teach employment skills. This indicates, given the current ubiquitous role of technology in society today, instructional modalities may be shifting from traditional instructor-delivery to being technology-delivered.

In addition, experimental studies have demonstrated the effectiveness of CAI on acquisition of skills impacting post-school education, training, and employment. First, Mazzotti et al. (2010) analyzed the effects of CAI on four high school student's knowledge of post-school options (i.e., education, employment, and independent living). Results showed a functional relation between the dependent variable upon manipulation of the independent variable, suggesting CAI is an effective strategy to teach students about their options for post-school life. Also, Richter and Test (2011), conducted a study using a multiple-probe design across three participants with severe intellectual disability to examine effects of using multimedia social stories on knowledge of adult outcomes and opportunities among three adolescents with significant intellectual disability. Results indicated that multimedia social stories effectively increased student's knowledge of outcome areas and opportunities.

Self-Determination-Interventions

Test et al. (2009) and Mazzotti et al. (2016) together identified 20 in-school predictors of post-school success for students with disabilities, one of which was self-determination. Self-determination is comprised 12 component skills including: (a) choice-making; (b) decision-making; (c) goal-setting and attainment; (d) problem-solving; (e) independence, safety, and risk-taking; (f) self-awareness; (g) self-instruction;

(h) self-advocacy and leadership; (i) locus of control; (j) self-efficacy and outcome expectancy; (k) self-regulation and self-management; and (l) self-knowledge (Wehmeyer & Schalock, 2001).

One research-based method of teaching self-determination skills to students with and without disabilities is using *The Self-Determined Learning Model of Instruction* (SDLMI, Agran et al., 2000). The SLDMI has been identified as an evidence-based practice used by educators to encourage student engagement in self-regulated learning to increase self-determination, achieve academic and functional goals, and increase access to the general curriculum (Lee et al., 2015). Additionally, Browder et al. (2014) listed SDLMI as an effective, systematic, evidence-based method of teaching self-determination skills to students with severe intellectual disability that increases learners' autonomy through self-directed learning. The SDLMI teaches students to apply a self-regulated four-step problem-solving process: (a) identify a problem, (b) identify possible solutions, (c) identify possible barriers, and (d) identify consequences of solutions (Agran et al., 2000).

Experimental studies have demonstrated the effectiveness interventions for students with disabilities which target components of self-determination. Studies have effectively taught choice-making (Shogren et al., 2004; Sparks et al., 2016; Stephenson, 2016), self-advocacy (Cease-Cook et al., 2013; Cuenca-Sanchez et al., 2012; Neale & Test, 2010; Roberts et al., 2016; Test et al., 2005), self-management (Briesch & Chafouleas, 2009; Bruhn et al., 2016; Bruhn et al., 2015; Clemons et al., 2016; Wadsworth et al., 2015), and goal-setting and attainment (Bruhn et al., 2016; Harkin et

al., 2016; Mazzotti et al., 2012, 2013), to students with disabilities and challenging behaviors.

Intervention Packages

Research in the area of function-based interventions to teach self-determination skills is lacking. Only two published studies involving self-determination have considered the function of challenging behavior. First, Nittrouer et al. (2016) analyzed the impact of a collaborative process with person-centered teams and a functional assessment to target behavioral challenges in the workplace which included off-task behavior and task completion for three young adults with disabilities. Results were mixed, but the authors suggested the process can lead to meaningful change in the on-task and task completion for individuals with disabilities in inclusive employment settings. Specific components of the intervention (i.e., collaboration, goal setting, functional assessment, goal review) likely contributed to the effectiveness of the intervention on increasing on-task behavior and task completion.

In a second study, Mazzotti et al. (2020) tested the effects of a function-based, self-determined multi-component intervention on work-based problem behaviors for two secondary youth with disabilities. A functional relation was determined via visual analysis; thus, results indicated the intervention effectively reduced work-based problem behaviors for both participants. Omnibus *Tau-U* results for both participants ranged from effective to very effective (*Tau-U* = -0.72, p <0 .01; *Tau-U* = -0.98, $p < 0.01$, respectively). Finally, social validity was reported using the Treatment Acceptability Rating Form-Revised (TARF-R, Reimers & Wacker, 1988) with favorable ratings (important, acceptable, and feasible) of the intervention provided by job coaches and

participants (helped improve their behavior at work, was easy to use, provided a way to focus on a specific job task, and they liked the intervention).

The current dissertation study is most closely related to the work of Mazzotti et al. (2012) and Mazzotti et al. (2013). Both of these studies employed a multiple-probe across participants design to examine the effects of CAI on students' knowledge of the SDLMI and disruptive behavior for elementary students with learning disabilities or mild intellectual disability who were identified by their teacher as having chronic behavior problems.

Significance and Contributions

This study contributes to a limited evidence base of function-based, computer-assisted SDLMI. As a systematic replication of Mazzotti et al. (2012) and Mazzotti et al. (2013); this study used CAI to teach students about goal setting and attainment using the SDLMI. Instruction was presented using a similar computer-assisted format and variables measured were similar (i.e., knowledge of the SDLMI and on-task behavior). To extend previous research, this study was the first to consider the function of students' challenging behavior within the context of using SDLMI delivered through CAI to guide students to set a behavior goal to increase on-task classroom and work-based behavior and increase knowledge of the SDLMI.

Purpose and Research Questions

There is evidence suggesting a lack of research regarding the use of function-based, CAI to teach goal-setting skills to students with intellectual disability. Special education teachers must provide systematic instruction to increase self-determination skills for this population who require the most extensive supports. The purpose of this

systematic extension was to investigate the effects of function based, computer-assisted SDLMI on (a) students' knowledge and application of the SDLMI, (b) students' on-task behavior in the classroom, and (c) generalization of skills to a job skill setting.

The study aims to address the following research questions:

1. What is the effect of function-based, computer-assisted SDLMI on the knowledge of the SDLMI for youth with extensive support needs?
2. What is the effect of function-based, computer-assisted SDLMI on on-task behavior in the classroom for youth with extensive support needs?
3. To what extent do teacher ratings of Goal Attainment Scales (GAS) change after the Part One of function-based, computer-assisted SDLMI?
4. To what extent do the effects of function-based, computer-assisted SDLMI generalize to a second, untrained setting (e.g., a job skill setting) for youth with extensive support needs?
5. What are students', teachers', and job skill supervisors' perceptions of using function-based, computer-assisted SDLMI to increase the on-task behavior for youth with extensive support needs?

Limitations/Delimitations

This study has several limitations and delimitations to consider. First, the generality of results is limited to students and settings beyond those included in the study. Because the study employed a single-case multiple-probe across participants design, which seeks to establish a functional relation and social significance rather than statistical significance (Baer et al., 1968, 1987), results are not generalizable to a population that deviates from the students and settings described.

Next, inclusion criteria state students must exhibit challenging behaviors in the classroom (e.g., mild challenging behaviors, prompt reliance, off-task behavior); however, students must not exhibit aggressive or violent behaviors to be an eligible participant as the intervention is not designed for severe behavioral challenges. In addition, students will not have mastery in SDLMI or goal setting and attainment skills to participate.

Third, students may be adept in technology use which could make navigating the program easier; however, students will not have previous experience using technology in the capacity required for this intervention. Thus, students will have no previous experience in computer-based instruction in goal setting via SDLMI.

Finally, students may have experience using some form of self-monitoring/behavior monitoring checklists; however, students will not have previously experienced using self-monitoring as a replacement behavior to address the function of challenging behavior following instruction in goal setting via SDLMI. Students may have experienced some form of positive behavior interventions or supports in the past, but they will have never experienced all components of this intervention simultaneously.

Definition of Terms

Autism Spectrum Disorder (ASD): Autism, or ASD, refers to a range of conditions characterized by challenges with: (a) social communication and interaction deficits; and (b) restrictive and repetitive behaviors, interests, and activities (American Psychiatric Association, 2013). Every individual with ASD has unique strengths and differences and may present with additional characteristics including “intellectual impairment, sensory sensitivity, attention and executive

functioning problems, motor difficulties, and behavior problems" (Johnson, et al., 2007).

Computer-Assisted Instruction: Computer-assisted instruction (CAI) is transmitted through a variety of technological devices such as personal computers, iPads, and smart phones (Sigafoos et al., 2014). CAI involves presenting technology-mediated instructional stimuli, providing a technology-based platform for performing skills, and technological medium through which learners receive feedback (Sigafoos et al., 2014).

Extensive Support Needs: Those who "require the most support to learn, often categorized as having intellectual disability, multiple disabilities, autism spectrum disorder, or related disabilities" (Kurth et al., 2018, p. 143) requiring individualized, intensive strategies that match a range of specific student needs to sufficiently achieve or maintain desired outcomes and prevent future challenging behaviors (Office of Special Education Programs: Technical Assistance Center on Positive Behavioral Interventions and Supports (2017).

Function-based intervention: "A strategy used to improve behavior by developing intervention components based on prior assessment of the function of a challenging, or target, behavior" (Janney et al., 2013, p. 113).

Functional behavior assessment: "A systematic method of assessment for obtaining information about the purposes (functions) a problem behaviors serves for a person; results are used to guide the design of an intervention for decreasing the problem behavior and increasing appropriate behavior" (Cooper et al., 2020).

Generalization: Described one of the seven defining characteristics of applied behavior analysis and defined as a change in behavior can be generalized across environments, behaviors, and time (Baer et al., 1968, 1987). Stokes and Baer (1977) described that generalization occurs in several ways (a) if a trained behavior occurs at other times outside of the training times, (b) in other places without the requirement of training, or (c) if a related behavior develops that was not directly taught (Cooper et al., 2020)

Goal Setting and Attainment: Goal setting and attainment are taught by instructing students to define and express a goal, identify where they are currently performing in relation to that goal, develop a plan of action, and evaluate their progress toward achieving that goal (Agran et al., 2003; Wehmeyer & Schwartz, 1998).

Intellectual Disability: Based on the *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (*DSM-V*; 2013), an intellectual disability (intellectual developmental disorder) is a disorder with onset during the developmental period that includes both intellectual and adaptive functioning deficits in conceptual, social, and practical domains. The following three criteria must be met:

A. Deficits in intellectual functions, such as reasoning, problem-solving, planning, abstract thinking, judgment, academic learning, and learning from experience, and practical understanding confirmed by both clinical assessment and individualized, standardized intelligence testing.

B. Deficits in adaptive functioning that result in failure to meet developmental and sociocultural standards for personal independence

and social responsibility. Without ongoing support, the adaptive deficits limit functioning in one or more activities of daily life, such as communication, social participation, and independent living, and across multiple environments, such as home, school, work, and recreation. Adaptive functioning should be addressed using both clinical evaluation and individualized, culturally appropriate, psychometrically sound measures.

C. Onset of intellectual and adaptive deficits during the developmental period. The severity levels for intellectual disability are based on intelligence quotients (IQ): mild (IQ 70-55), moderate (IQ 55-40), severe (IQ 25-40) and profound (<25). IQ measures are less valid in the lower end of the IQ range.

Self-Determination: A "dispositional characteristic manifested as acting as the causal agent in one's life" (Shogren, Wehmeyer, Palmer, Forber-Pratt et al., 2015, p. 2); as well as, the ability to make choices, solve problems, set goals, evaluate options, take initiative to reach one's goals, and accept the consequences of one's actions (Rowe et al., 2015).

Self-Determined Learning Model of Instruction (SDLMI): "Enables teachers to teach students to employ self-regulated problem-solving strategies to achieve self-selected goals using student-directed instructional strategies" (Wehmeyer et al., 2000, p. 441).

Self-Evaluation: A procedure where a person compares his or her performance of a specific or target behavior with a predetermined goal or standard; this is often a

component of self-management and can also be called self-assessment (Cooper et al., 2020).

Self-Graphing: A form of self-observation, evaluation, and self-knowledge with an added graphing component (i.e., observing and recording one's behavior on a graph; Cooper et al., 2020).

Self-Management: Personal application of tactics to change a behavior that produces a desired behavior change (Cooper et al., 2020) and involves strategies used to manage and direct own behavior in settings where other controls are either not present or feasible (Gifford et al., 1984). Specific strategies included within self-management include self-monitoring, self-evaluation, self-regulated strategy development, self-instruction, and goal setting (Niesyn, 2009).

Self-Monitoring: A procedure in which a person observes their behavior automatically and records the occurrence and nonoccurrence of a target behavior (Cooper et al., 2020). A strategy for managing or regulating one's own behavior.

Self-Regulation: Can be defined as "self- generated thoughts, feelings and actions that are planned and cyclically adapted to the attainment of personal goals" (Zimmerman, 2005).

Technology: Technology is defined as any electronic item/equipment/application or virtual network that is used intentionally to increase/maintain, and/or improve daily living, word/productivity, and recreation/leisure capabilities used as a central feature of an intervention that supports the goal or outcome for the student (Odom et al., 2014).

Work-Based Learning Environment (WBLE): Environments in which learning occurs which may include a planned program of job training and work experiences such as job shadowing, informational interviews, and workplace tours; workplace mentoring; and work experience including apprenticeships, volunteer work, service learning, school-based enterprises, on-the-job training, and paid employment. Learning within each of environment could contribute to career development, career choice, and career success of individuals with disabilities (Benz & Lindstrom, 1997).

CHAPTER 2: REVIEW OF LITERATURE

In-school and post-school education and employment outcomes for individuals with disabilities are perpetually lower than their same age peers without disabilities (Lipscomb et al., 2017; U.S. Department of Labor, 2019) despite mounting evidence suggesting inclusion in general education, paid employment/work experience, and instruction in self-determination skills have been identified as in-school predictors of post-school success (Mazzotti et al., 2016; Test et al., 2009). The National Longitudinal Transition Study-2012 (NLTS-2012, Lipscomb et al., 2017) reported in-school data to demonstrate communication and behavioral challenges as the percentages of youth with disabilities who have health and communication needs exceed those of students without disabilities in terms of: (a) use of prescription behavioral medication (27% students with disabilities *vs.* 7% students without disabilities); (b) difficulty communicating by any means (29% students with disabilities *vs.* 4% students without disabilities); and (c) difficulty understanding what other people are communicating (44% students with disabilities *vs.* 8% students without disabilities). These challenges in communication can lead to challenging behavior and are reflected in the resulting consequences students face, including disproportionate numbers of youth with disabilities being (a) suspended at rates compared to students without disabilities (29% *vs.* 14%); (b) expelled at higher rates (8% vs. 3%); and (c) arrested at higher rates (6% *vs.* 2%; Lipscomb et al., 2017).

Although 76% of youth with an IEP expect to obtain some postsecondary education, 94% of their peers have this expectation, a gap of nearly 20 percentage points (Lipscomb et al., 2017). There is also a gap in planning to attend a four-year college of nearly 30 percentage points (51% *vs.* 80%; Lipscomb et al., 2017). Persons with a

disability are less likely to have completed a bachelor's degree or higher compared to those without a disability (U.S. Department of Labor, 2019).

Overall, across both groups of individuals with and without disabilities, those who attained higher levels of education were more likely to be employed than those who had attained less education (U.S. Department of Labor, 2019). Forty percent of youth with an IEP report having had a paid job in the past year, compared with half of their peers. Fortunately, schools are working to address this gap as youth with an IEP are more likely than youth without an IEP to have paid or unpaid school-sponsored work experiences (12% *vs.* 7%).

According to the U.S. Department of Labor (2019), the employment population ratio was 19.1% among those with a disability compared to 65.9% of persons without a disability. The unemployment rate for persons with a disability was 8.0 percent in 2018, more than twice the rate of those with no disability (3.7%); although this is a slight improvement compared to the previous year (U.S. Department of Labor, 2019). Across all levels of education in 2018, persons with a disability were much less likely to be employed than were their counterparts with no disability (U.S. Department of Labor, 2019). For persons with a disability, Blacks (11.2%) and Hispanics (9.8%) had higher unemployment rates than Whites (7.3%), and Asians (7.1%) in 2018 (U.S. Department of Labor, 2019).

Workers with a disability were more likely to be employed part time than those without a disability (U.S. Department of Labor, 2019). In 2018, 31% of workers with a disability usually worked part time, compared with 17% of those without a disability (U.S. Department of Labor, 2019). The proportion of workers with a disability who

worked part time for economic reasons (e.g., working part-time because their hours had been reduced or because they were unable to find a full-time job) was slightly higher than their counterparts without a disability (4%, compared with 3%; U.S. Department of Labor, 2019).

Consistent with lower rates of outcomes related to postsecondary education and training and work experience, youth with disabilities also have poor outcomes related to daily living expectations and task completion as youth with an IEP are nearly 20% less likely to have parents who anticipate that their child will be living independently by age 30 (78% *vs.* 96%; U.S. Department of Labor, 2019). These poor outcomes across all three areas of transition (i.e., education, employment, and independent living) demonstrate the need for educators and researchers to make efforts to improve outcomes for students with disabilities.

Research-based strategies are known to effectively teach students with disabilities the skills required to overcome the historically poor outcomes previously described. First, function-based approaches to address challenging behavior effectively by manipulating antecedent and consequent conditions have been used to prevent the occurrence of problem behavior and to promote prosocial behaviors (Neilsen & McEvoy, 2004; Scott & Kamps, 2007). Next, evidence suggests the effectiveness of using CAI to teach a variety of skills to students with disabilities to increase student-directed learning (Browder et al., 2014). Finally, research suggests implementing instruction in self-determination skills via SDLMI (Agran et al., 2000). The SLDMI has been identified as an evidence-based practice used by educators to promote student engagement in self-regulated learning to

increase self-determination, achieve academic and functional goals, and increase access to the general curriculum (Lee et al., 2015).

The figure below serves as a guide through the organization of the review of literature summarized in this chapter. As depicted in Figure 1 below, this literature review outlines four distinct strands including information regarding characteristics of the target student population, and empirical evidence detailing the history, advantages, and effectiveness of each component of the proposed intervention (i.e., function-based, computer-assisted, SDLMI).

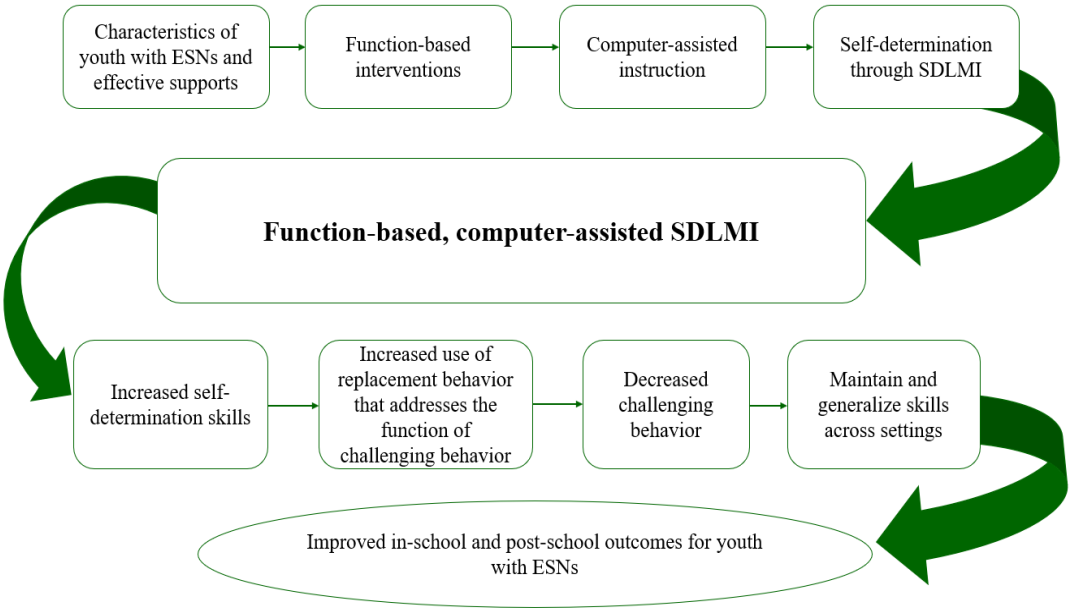

Figure 1. Logic Model of Function-Based, Computer-Assisted SDLMI.

Students with Extensive Support Needs

Characteristics of Students with Extensive Support Needs

As described previously, in-school and post-school outcomes are, in general, poor for individuals with disabilities; however, students with extensive support needs (i.e., intellectual disability, autism) consistently underperform compared to other disability categories according NLTS 2012 data which synthesizes comparisons across disability groups (Lipscomb et al., 2017). Compared to other disability categories, youth with intellectual disability are least likely to have parents or parents' spouses who have a four-year college degree or higher or have a paid job. Students with intellectual disability are more likely to attend lower-performing schools when compared to all other disability categories except deaf-blindness. While youth with intellectual disability reported high percentages of satisfaction about being at school, they also reported struggling to learn classwork. The lowest rates for youth expectations and parent expectations to obtain postsecondary education were reported for youth with intellectual disability. Rates of paid work experience for individuals with intellectual disability were lower than rates reported for youth with an Individualized Education Program; however, youth with intellectual disability had highest rates of paid or unpaid school-sponsored work experiences. Youth with intellectual disability generally have more trouble with expressive and receptive communication and have difficult performing daily living skills well and reported lower rates of parent expectations that youth with intellectual disability will live independently at age 30. In terms of autonomy and self-direction, individuals with intellectual disability reported higher percentages on knowing how to make friends but were among the lowest in percentages reporting choosing the activities done with

friends. Demographically, higher proportions of youth with intellectual disability are Black or not Hispanic and male.

Intellectual disability is characterized by originating prior to the age of 18 and results in "significant limitations in both intellectual functioning and adaptive behavior as expressed in conceptual, social, and practical adaptive skills" (Luckasson et al., 2002, p. 2). Additionally, the following must be considered in the identification of intellectual disability: (a) limitations in present functioning must be considered within the context of community environments typical of the individual's age peers and culture; (b) valid assessments consider cultural and linguistic diversity, and differences in communication, sensory, motor, and behavioral factors; (c) individual strengths often coexist with and must be considered with limitations; (d) a profile of needed supports must be considered a priority when describing limitations; and (e) the assumption that there will be an improvement of general life functioning of the person with intellectual disability as a result of appropriate personalized supports over a sustained period of time (Schalock et al., 2007). From an educational standpoint, The Individuals With Disabilities Education Act (IDEA, 2004) stipulates that students receiving services under the disability category of intellectual disability perform significantly below average in intellectual functioning, with existing concurrent deficits in adaptive behavior, which manifested during the developmental period and adversely affects a child's educational performance.

Currently, rather than a strict diagnosis based on intelligence testing alone, the *DSM-V* (American Psychiatric Association, 2013), requires consulting assessments which reflect both (a) clinical and standardized intelligence testing (i.e., Intelligence Quotient, IQ), and (b) adaptive behavior testing (e.g., Vineland Adaptive Behavior Scales–Third

Edition). The *DSM-V* defines intellectual disability as two standard deviations below the mean on intelligence measures (i.e., IQ score of 70 or below) with significant deficits in adaptive behavior (e.g., practical, daily living, conceptual, social, and interpersonal skills across settings; Tasse et al., 2012). Individuals with intellectual disability have a range of IQ scores: mild intellectual disability with IQ ranging between 55 and 70, moderate intellectual disability with IQ ranging between 40 and 55, and severe intellectual disability with IQ below 40 (Schalock et al., 2010).

Individuals with moderate and severe intellectual disability are characterized as requiring systematic and explicit instruction and supports in order to acquire skills related to integrating into community and vocational environments, managing their own self-care (e.g., personal hygiene, cooking and eating, cleaning and laundering), and engaging with others socially (Westling et al., 2015). Varying levels of supports and assistance may be needed for individuals with intellectual disability to function independently across skills and settings (Westling et al.).

Supports and Interventions for Youth with Extensive Support Needs

Historically, providing supports to those who require extensive support needs has been approached from a deficit-based model considering the patterns of education placements and programs in segregated classrooms with restricted access to content under the assumption that this particular population of students are best-served in homogeneous groups to support remediation of deficits (Shogren, Wehmeyer, Schalock et al., 2017). In contrast, a strengths-based approach offers supports to assist individuals with intellectual disability to successfully adjust to inclusive environmental demands where people learn, work, and live (Shogren et al.).

Next, Shogren et al. described characteristics of strengths-based approaches that must be considered when selecting and implementing interventions for individuals with intellectual disability. First, an emphasis must be placed consulting the social-ecological model of disability with the ultimate goal of building systems of supports that will enable optimal functioning across environments. Individualized supports are defined as resources or strategies that are designed for the person to support him/herself in everyday life and aim to promote the development, education, interests, functioning, and well-being (Thompson et al., 2009). Next, of equal importance is acknowledging the process that leads to positive outcomes by promoting flourishing, a concept from positive psychology (Seligman, 2011) through the capabilities approach building upon tenants of self-determination (Nussbaum, 2011; Shogren, 2013; Wehmeyer, 2013). Finally, Shogren et al. (2017) targeted three areas of individualized support including major life activity areas (e.g., exceptional behavioral support needs, school participation and learning activities); domains of personal well-being (e.g., self-determination); and dimensions of human functioning (e.g., intellectual functioning, adaptive skills). These suggestions align with the proposed dissertation study involving the use of function-based, computer-assisted SDLMI for individuals with extensive support needs.

It is important to view disability as a discrepancy between personal competencies and environmental demands (Shogren, Wehmeyer, Lane et al., 2017), or from the lens of the support model (Thompson et al., 2009). While all individuals require a certain degree of supports across various domains, people with intellectual disability often require more intensive supports due to the discrepancies between personal competencies and environmental demands (Shogren et al.). Specialized and individualized supports may

include those provided through Multitiered Systems of Supports (MTSS) as students receive increasingly specialized supports as needed via interventions targeting instruction in academic, behavioral, and social-emotional skills (Shogren et al., 2017). Shogren et al. (2017) explain that MTSS is consistent with what was previously described as a strengths-based approach because MTSS aims to provide all students with research-based supports across all domains (i.e., academic, behavioral, and social-emotional) and levels of support are adjusted based on students' needs (e.g., systematically implementing additional or more intensive interventions). Positive Behavior Interventions and Supports (PBIS) is one example of MTSS that aims to redesign environments and provide learning supports for positive behavior (Carr et al., 2002). Key aspects of tiered PBIS (Sugai & Horner, 2010) require ongoing universal supports for all students and increasingly specialized differentiated interventions for students with data indicating the motivating operations, antecedent events, and maintaining consequences for problem and pro-social behavior. PBIS is organized into three tiers or levels of support: (a) Tier 1 (e.g., universal supports for all students); (b) Tier 2 (e.g., low-intensity specialized supports for 5-15% of students); and (c) Tier 3 (e.g., functional assessment-based interventions for 1-5% of students; Lane, Oakes, & Cox, 2011).

The SDLMI (Wehmeyer et al., 2000) is another example of a tiered intervention that Shogren et al. (2017) suggest supports students through a self-regulated problem-solving process to learn about goal setting. Teachers support all students through the process of learning skills to promote problem-solving and goal-setting as a Tier 1 intervention with the option of providing increasingly intensive supports using explicit instruction in decision-making, problem-solving, self-management, or self-advocacy

skills at the Tier 2 group or individual level (Shogren et al., 2016). This current dissertation proposes an innovative Tier 3 option by incorporating a function-based approach with the SDLMI to address challenging behavior.

In addition, Nelson and Johnson (2017) described the integral role of both low- and high-tech forms of technology as a tool to support students with intellectual disability to access general education in order to experience positive academic, social, communication, and functional outcomes (Coyne et al., 2012; Knight et al., 2015). The role of technology in special education stems from the principles of Universal Design for Learning (UDL) which were based in a desire to make learning accessible to students with disabilities (Nelson & Johnson, 2017). Meyer et al. (2014) summarized effects of a grant-funded project implemented in the early 1990s by the Center for Applied Special Technology that involved designing tools using Apple IIe® computers to support learners with disabilities. The outcomes of the project were positive and showed that by using the tools and supports created, learners demonstrated increased abilities by expressing knowledge and skills not previously demonstrated once provided with alternate methods of responding. This work prompted the framework for UDL published in the seminal book, *Teaching Every Student in the Digital Age: Universal Design for Learning* (Rose & Meyer, 2002). There are three UDL guidelines including provision of multiple means of engagement, multiple means of representation, and multiple means of action and expression to facilitate the why, what, and how of learning respectively (Meyer et al., 2014). Important elements of consideration when designing instruction using principles of UDL include environmental design (e.g., anything from how seating is arranged to the

selection of digital tools and supports) and accounting for variability in the unique ways learners acquire knowledge and skills (Meyer et al., 2014).

One way to implement an approach based in UDL is to incorporate technology with the primary goal of maximizing learning and minimizing barriers (Nelson & Johnson, 2017). Nelson and Johnson suggested that technology may be used for the purposes of facilitating educational understanding (e.g., a digital version of a novel equipped with tools to support students with building vocabulary and background knowledge to participate in skills practice and application, content management, and content creation), providing assistive technology to promote educational understanding (e.g., text-to-speech tools to encourage learners' physical or intellectual access to educational content, communication, or learning environments), providing alternative means of communication (e.g., digital tools to support multi-directional communication between student, teachers, and peers through written, verbal, or other methods), and providing opportunities for an enhanced and balanced functional and academic learning experience (e.g., using digital tools to increase functional skills in community settings and academic skills to thrive in the standards-based classroom setting).

Thoma et al. (2017) outline specific intervention strategies and teaching practices that have been shown to be effective for individuals with intellectual disability in middle and high school. Similar to UDL, Universal Design for Transition (UDT) is another framework that informs effective instruction, especially for students with intellectual disability in middle and high school. UDT is designed to promote access to the general curriculum by linking academic, functional, and transition goals and content (Thoma et al., 2009). Structured teaching is another teaching strategy shown to be effective by

incorporating instruction delivered via teachers, paraprofessionals, peers, or parents, to students with intellectual disability in middle and high school. Structured teaching involves using concrete objects, tasks analyses, and prompting strategies (e.g., system of least prompts; Doyle et al., 1988) to deliver instruction systematically (Browder et al., 2003). Finally, interventions that support students with intellectual disability in high school to continue to develop skills in communication and self-determination were suggested (Morningstar et al., 2017).

Summary of Students with Intellectual and Developmental Disabilities

To summarize, outcomes for students with intellectual disability are poor in comparison to students with other disabilities. Students with disabilities, especially those with more significant disabilities often require systematic instruction and a continuum of varying levels of supports in order to acquire academic, employment, social, self-determination, and functional-related skills (Browder et al., 2003; Morningstar et al., 2017; Shogren et al., 2017; Thoma et al., 2009; Westling et al., 2015). Utilizing a support model through tiered frameworks such as MTSS (Shogren, Wehmeyer, Lane et al., 2017), PBIS (Shogren et al.), UDL (Nelson & Johnson, 2017), UDT (Thoma et al., 2017), and SDLMI (Shogren, Wehmeyer, Schalock et al., 2017) benefit students with intellectual disability. In combination with systematic, scaffolded instruction, students with disabilities benefit from incorporating technology to maximize learning experiences and minimize barriers in the learning environment (Nelson & Johnson, 2017). The next section provides an overview of function-based approaches, specifically addressing the third tier of MTSS described previously.

Function-Based Approaches

This section describes components of applied behavior analysis, the foundation on which function-based approaches rest. Additionally, research suggests function-based approaches effectively address challenging behaviors, an approach rooted in applied behavior analysis (ABA) that is appropriate for students with and without disabilities across various ages. Function-based approaches begin by conducting a FBA which includes a set of procedures used to develop a behavior support plan based on hypothesized factors predictive of problem behaviors (Crone & Horner, 2003). Students may engage in problem behaviors after a triggering event and/or to avoid or obtain attention, an activity or item, or under certain sensory conditions (Umbreit et al., 2007). By conducting an FBA, educators attempt to understand the functions (i.e., reasons) for student problem behavior (e.g., to get something or get out of something) and use this knowledge to develop a function-based intervention. Support for these interventions for individuals with disabilities across age groups are provided in the following strand.

Key Components of Applied Behavior Analysis

The 1920s and 1930s marked experimentation in learning. First, physiologist Pavlov (1927) described classical/respondent conditioning, which involved connections made between environmental stimuli (e.g., sights and sounds) and reflex reactions such as salivation in response to food. In his work drawing connections between a paired unconditioned stimulus (i.e., presentation of food in dog bowl) and a conditioned stimulus (i.e., ringing bell), Pavlov found the unconditioned stimulus produced an automatic reflex reaction (i.e., dogs salivation) and through meticulous manipulation,

Pavlov determined the same automatic reflex reaction (i.e., dogs salivation) could be produced when paired only with the conditioned stimulus (i.e., ringing bell).

Thorndike (1898) also contributed to understanding learning and development through his work which demonstrated that learning improves with repeated practice as hungry cats in a box took less time through repeated trials to remove barriers in order to escape from a cage and retrieve food developed. These experiments led to Thorndike's formulation of laws of behavior, specifically the Law of Effect, which suggests consequences that follow behavior help learning.

Another researcher associated with the momentum behind the behaviorism movement was Watson (1913) who criticized psychology because of the subjective methods in which mental phenomena (e.g., introspection, self-reported private experiences on thoughts and feelings) were measured and argued for a behaviorist approach in the field. Watson's perspective of behaviorism followed three basic assumptions: (a) all behavior is learned from the environment explained through the learning theory which combines classical and operant conditioning; (b) psychology should be seen as a science with theories grounded in empirical data carefully collected using controlled observable and measurable parameters with the goal of prediction and control of observable behavior, excluding internal events like thinking or feeling; and (c) behavior is the result of stimulus-response which involves determining the behavioral reaction that occurs in response to an environmental stimulus, or the opposite, predicting the environment stimulus that caused the behavioral reaction.

Influenced by Pavlov's, Thorndike's, and Watson's contributions, Skinner (1938) explored the impact of consequences on behavior in what he labeled as "operant

conditioning.” Operant behaviors were described as responses that had some influence on the environment which could be strengthened or weakened (increased or decreased) as a function of the events that follow. Skinner delineated four key principles of operant conditioning including reinforcement (i.e., the presentation or removal of an event after a response that increases the frequency of behavior), punishment (i.e., the presentation or removal of an event after a response that decreases the frequency of behavior), extinction (i.e., no longer presenting a reinforcing event after a response that decreases the frequency of the previously reinforced response), and stimulus control and discrimination (i.e., reinforcing the response in the presence of training one stimulus in order to increase the frequency of that response; but not reinforcing other responses in order to decrease those responses).

The extension of experimental methods of understanding behavior and learning outlined by Pavlov and Skinner in combination with the behaviorist movement advocated by Watson led to the area of research known currently as applied behavior analysis (ABA; Baer et al., 1968, 1987). Kazdin (2013, p. 33) outlined nine characteristics of ABA including: (a) a focus on overt behaviors; (b) a focus on behaviors that are of applied (social or clinical) significance; (c) targeting a small number of individuals over time; (d) assessing behavior through direct observation (e.g., counting the frequency or duration of behavior); (e) assessing behavior continuously over time to determine patters under specified conditions; (f) identifying current causes or factors that maintain behavior; (g) examining environmental and observable events to influence the frequency of behavior; (h) identifying, evaluating, and demonstrating the factors (antecedents and consequences) that are responsible for behavior change; and (i) monitoring for

intervention effects that make a clear difference in the everyday functioning of the individual.

Key Principles of Operant Conditioning in ABA

Kazdin (2013) defined contingencies of reinforcement examined in ABA as the relationships between behavior and the environmental events that influence behavior. There are three parts to a contingency including antecedents (i.e., stimuli, settings, contexts that occur behavior and influence behavior), behavior (i.e., actions performed or not performed by individuals), and consequences (i.e., events that follow behavior that may increase, decrease, or have no impact on what an individual does). Most importantly terms of antecedents in contingencies involve the role of motivation. Establishing operations have the power to alter the value of a reinforcer and increase the likelihood of engaging in behaviors to obtain the reinforcer (e.g., Thorndike's hungry cats demonstrated this increased motivation to retrieve food). On the other hand, abolishing operations have the power to alter the value of a reinforcer and decrease the likelihood of engaging in behaviors to obtain the reinforcer (e.g., Thorndike's cats may have demonstrated this decreased motivation to retrieve food if they were no longer hungry). Understanding these arrangements and predicting the variables involved in behavioral outcomes leads to opportunities to manipulate contingencies and change behavior through function-based approaches.

Function-Based Approaches

Seminal studies laid the groundwork for using function-based approaches to determine the function of challenging behavior. These studies focused more on determining motivation at the root of problem behavior as opposed to designing

interventions to promote appropriate behavior. First, Lovaas et al. (1965) determined the contingencies maintaining the self-injurious problem behaviors (e.g., head banging against wall, putting head and hair on heater to cause her hair to catch on fire) of a nine-year-old girl with schizophrenia. Due to the systematic approach of a functional analysis, Lovaas and colleagues determined the function of the child's behavior was related to obtaining social attention.

Similarly, Carr (1977) hypothesized the cause and maintenance of self-injurious behavior could be explained by means of obtaining social reinforcement or attention (e.g., evidenced in Lovass et al., 1965), avoiding an aversive stimulus (e.g., a demanding/undesired task or event), or because the act was automatically reinforcing (e.g., a self-stimulating act). This conclusion fits neatly with current classifications of function of behavior (Cooper et al., 2020) and marks the point researchers were encouraged to focus not on the behavior itself but on the function (i.e., purpose) the behavior serves.

Finally, Iwata et al. (1982) directed the attention of research to account for environmental factors by conducting a series of studies to determine the functional relation between the self-injurious behavior and present environmental conditions for nine children with developmental disabilities. A functional analysis or exposure to the following alternating conditions including free play, demands, and attention. Results indicated that challenging behavior occurred at higher rates in only one condition for six out of nine students, concluding the function of behavior was linked to the condition in which challenging behavior was most likely to occur.

Presently, FBAs are described as procedures that employ any method of assessments that attempt to determine a relationship between environmental events and a target behavior (Cooper et al., 2020). FBAs are defined as "a systematic process of identifying problem behaviors and the events that (a) reliably predict occurrence and nonoccurrence of behaviors and (b) maintain the behaviors across time" (Sugai et al., 2000, p. 137). An FBA identifies potential problem behaviors and environmental events occurring before and after the behavior that may influence, manipulate, or predict the future occurrences of behavior (Cooper et al., 2020). The purpose of conducting an FBA is to categorize behavior according to three distinct functions (a) to obtain a reinforcing stimulus (e.g., attention, a tangible item), (b) to avoid or escape an aversive stimulus (e.g., an unpleasant event or activity), or (c) to obtain an automatically reinforcing stimulus (e.g., engaging in stereotypic behaviors; Cooper et al., 2020; Repp & Horner, 1999). There are three general classifications of FBA including indirect FBA, direct FBA and functional analysis (FA).

Indirect FBA

Indirect FBA methods consult methods apart from direct observation including conducting functional assessment interviews (FAI; Kern et al., 1994), reviewing historical records (e.g., academic performance, IEP progress reports, disciplinary referrals), and utilizing behavior ratings and checklists (e.g., Motivation Assessment Scale (Durand & Crimmins, 1988), Questions About Behavioral Function (QABF; Matson & Vollmer, 1995), Functional Assessment Screening Tool (2013); Function Assessment Checklist for Teachers and Students (March et al., 2000). Since the indirect FBA is the simplest and most popular method of determining the function of a behavior,

it can be implemented by interventionists, teachers, paraprofessionals, and parents (Rooker et al., 2015); however, over time, the drawbacks of using indirect FBAs were due to limitations in accuracy of determining the function of the challenging behavior and discrepancies in the reliability between raters across different students and behaviors (Dufrene et al., 2017; Kearney et al., 2006; Witt et al., 2000). Thus, indirect FBAs should be followed by direct FBAs. Indirect FBAs can be used to inform decisions made after conducting direct FBAs.

Direct FBA

In contrast to the indirect FBA, a direct FBA requires direct observational data to be collected in a natural setting (e.g., classroom, home, or the community where the target behavior likely occurs; Umbreit et al., 2007). The most common method used when conducting a direct FBA in a school setting is antecedent-behavior-consequence (ABC) narrative recording (Cooper et al., 2020; Oliver et al., 2015) which involves recording the occurrence of a target problem behavior in relation to the occurrences of antecedent events (i.e., events immediately preceding the behavior), as well as the consequence of the target behavior (i.e., events immediately following the behavior; Cooper et al., 2020). Skinner first introduced ABC narrative recording in 1953, and later Bijou and colleagues (1968) adopted and refined this method to systematically describe student behavior using a four-column format that indicated the time in which the event occurred, antecedent events immediately preceding the target behavior, the response (i.e., the target behavior observed as operationally defined), and the maintaining consequent events immediately following the target behavior. In addition, O'Neill et al. (1997) provided support specifically for using direct FBA as a method to assess problem behavior as expressed in

daily routines in locations and times that problem behavior is most likely to occur with no more than five systematic observation sessions lasting approximately 20 min needed to provide a comprehensive assessment of variables controlling the problem behavior.

ABC narrative recordings conducted in direct FBAs have the advantage of being more accurate than indirect assessments due to the use of operational definitions of observable and measurable behavior and required documentation of reliability with another observer which can be completed by researcher, teachers, and paraprofessionals (Alter et al., 2008). The limitations of direct and indirect FBAs are due to lack of experimental control of variables controlling behavior. This limitation is addressed through functional analysis.

Functional Analysis

Cooper et al. (2020) define FA as an analysis of the function of a problem behavior that occurs naturally in a person's environment but is systematically manipulated in a controlled environment under clinical conditions. When utilizing an FA, researchers or practitioners can demonstrate experimental control over the conditions in which challenging behavior may be observed by arranging conditions including an alone condition which removes all environmental attention or demands, an escape from demands condition in which an aversive task or stimulus is first presented then immediately removed for a set amount of time (e.g., 10 s) contingent on the occurrence of challenging behavior, an attention condition in which attention is provided contingent on occurrences of challenging behavior, and a control condition in which reinforcement is freely available (Repp & Horner, 1999).

To demonstrate experimental control, conditions must be manipulated systematically; therefore, conducting an FA has limitations related to requiring extensive amounts of time and resources. An FA is only necessary when indirect and direct FBA methods are unable to accurately and consistently determine the function of a behavior (O'Neill, 1997). Alter et al. (2008) provided evidence for O'Neill's suggestion by comparing the use of direct and indirect FBAs with FAs to pinpoint the function of behavior for four students and found that direct FBAs matched the FAs for all students.

Individual with Disabilities Education Act (2004) requires educators to complete an FBA and Positive Behavior Support Plan when a student demonstrates problem behavior (Roberts, 2017). Positive behavior supports can be constructed according to the Competing Pathways Model of problem behavior (O'Neill et al., 1997) described in following section outlining function-based models.

Function-Based Models

Scott et al. (2012) described three assumptions of a function-based model of behavior including (a) all behaviors that are not instinctive (e.g., reflexes, automatic) have either been learned by observing others modeling or based on the consequences of that behavior (Watson, 1913); (b) all behavior is lawfully and predictably influenced by the surrounding environment (Pavlov, 1927); and (c) all behavior can be changed, often by varying the events that precede the behavior or consequences that occur after a behavior (Skinner, 1953).

Function-based approaches address the function (i.e., causes) of behavior based on the Competing Pathways Model of problem behavior (O'Neill et al., 1997). According to this model, problem behavior is learned, serves a purpose, and is maintained by some

form of reinforcement (Virues-Ortega et al., 2011). Factors that must be considered when designing function-based approaches to address challenging behavior include the four term contingency (i.e., setting events, antecedents, problem behavior within the context of desired behavior and teachable replacement or alternative behaviors, maintaining consequences for the challenging behavior and desired behavior, all leading to serve the same function of behavior). See figure two for a graphic demonstration of the competing pathways model.

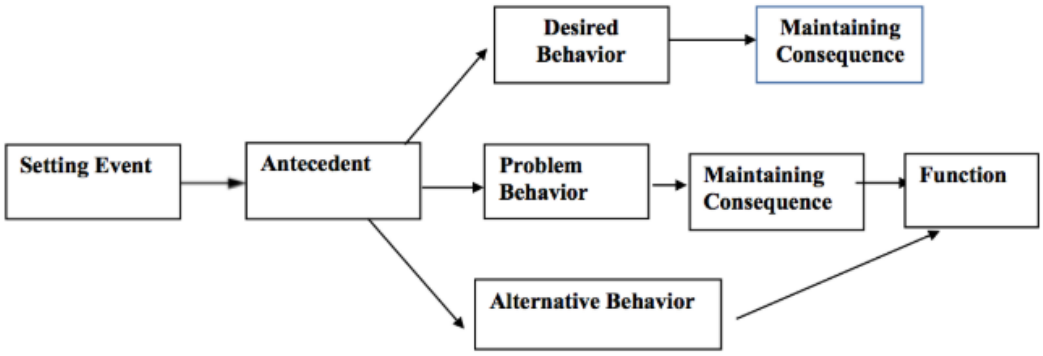

Figure 2. Competing Pathways Model to Construct Positive Behavior Support Plans.

First, the competing pathway model is centered on arrangements in the environment that lead to the same function of behavior (e.g., escape, attention, obtain tangibles). The process begins by identifying setting events or situations that make the challenging behavior more likely (e.g., illness, hunger, being tired, father is traveling; Cooper et al., 2020). The next step involves pinpointing antecedent events that occur immediately before the challenging behavior (e.g., teacher issues a request to work). Next, the problem behavior is operationally defined within the context of desired behavior (e.g., ideally expected behavior) and corresponding factors that result in maintaining consequences. From these considerations, alternative behaviors are selected

and trained to make the problem behavior irrelevant, inefficient, and ineffective (Cooper et al., 2020; Crone & Horner, 2003).

Once the function of challenging behavior is determined, the replacement behavior can be taught using systematic instruction to ensure that students with disabilities learn and maintain new skills. One method of systematic instruction teachers and interventionists use when teaching new behaviors is system of least prompts (SLP). Doyle et al., (1998) define SLP as a strategy consisting of a target stimulus and a hierarchy of at least two prompts with the opportunity for students to respond independently. Doyle and colleagues explain that if the student responds correctly to the presentation of the target stimulus, reinforcement is provided; however, if the student responds incorrectly, the least intrusive prompt is delivered followed by another opportunity for the student to respond, repeating the process until all of the prompts in the least-to-most hierarchy have been delivered, or until the students responds correctly.

Effectiveness and Advantages of Function-Based Interventions

Along with legal requirements for addressing challenging behavior via function-based considerations and interventions mandated by IDEA (2004; Roberts, 2017), interventions have stronger effects when function of behavior has been determined by an FBA (Filter & Horner, 2009; Ingram et al., 2005; Payne et al., 2007; Umbreit et al., 2007). Since FBAs provide a systematic approach for determining the function of behavior, designing interventions that support FBA data are more effective than applying interventions at random to target challenging behavior.

In a function-based intervention, antecedent and consequent conditions are changed to prevent the occurrence of problem behavior and to promote prosocial

behaviors (Neilsen & McEvoy, 2004; Scott & Kamps, 2007). Function-based interventions can be implemented in school settings (Walker et al., 2018) delivered with fidelity by teachers (Trussel et al., 2016), and para-educators in the general education classroom (Walker & Snell, 2017). Function-based interventions have an evidence-base demonstrating effectiveness across preschool (Wood et al., 2011), elementary school (Burke et al., 2003; Lane et al., 2007), and at the secondary and postsecondary levels (Turton et al., 2011; Whitford et al., 2013).

Function-Based Intervention Packages

Experimental studies have shown the effectiveness of interventions that were informed by functional assessment. Essentially, these interventions target skills that could serve as a replacement behavior to address the function of students' challenging behavior. The design of the intervention is derived from functional assessment results. These function-based intervention packages are described below.

Function-Based, Self-Determination Interventions

The research in the area of function-based interventions used to teach self-determination skills is lacking. Only two published studies involving self-determination have considered the function of challenging behavior. First, using a single-case multiple baseline across participants study, Nittrouer et al. (2016) analyzed the effects of a collaborative process with person-centered teams and a functional assessment to target behavioral challenges in the workplace which included off-task behavior and task completion for three young adults with disabilities. During pre-baseline, the intervention team conducted observations and interviews with the participants and their person-centered team to determine the function of the challenging behavior in response to the

demands of the job environment, and then, to develop individualized and specific goals and self-management plans for the young adults through the intervention phases. The intervention consisted of a goal review phase (lead researcher read the goal aloud to participants and the students were required to affirm or repeat back the goal) and a self-management phase (featuring a tool that was considered best practices for teaching people with disabilities self-management; mounted in view during the job, research team explained the purpose and modeled correct use) followed by a maintenance phase. Results were mixed, but the authors suggested the process could lead to meaningful change in the on-task and task completion for individuals with disabilities in inclusive employment settings. Specific components of the intervention (i.e., collaboration, goal setting, functional assessment and goal review) likely contributed to the effectiveness of the intervention on increasing on-task behavior and task completion.

In a second study, Mazzotti et al. (2020) conducted a single-case reversal design to test the effects of a function-based, self-determined multi-component intervention on work-based problem behaviors for two secondary youth with disabilities. First, the function of challenging behavior for participants was measured using an FBA with interviews (Functional Assessment Checklist for teachers and staff; March et al., 2000) and direct observations. Prior to the function-based, self-determined multi-component intervention, a goal-setting lesson plan adapted from Rowe et al. (2017) was implemented which supported participants in setting a short-term behavior goal and a long-term employment goal. During the intervention, students were prompted by MotivAiders® (Behavioral Change, 2018) via vibration pulse to signal when to engage in a trained behavior to reach a behavior change goal. The intervention procedures involved job

coaches who described a fidelity checklist including: (a) meet with students before and following work shifts; (b) remind students of short-term employment goals; (c) define on-task behaviors at work (e.g., follow directions); (d) provide positive feedback and behavior-specific praise when appropriately prompted by students during the job shift; and (e) briefly meet with students at the end of each work shift to provide positive feedback and one example of an on-task behavior students performed. There was a functional relation supporting that the intervention effectively reduced work-based problem behaviors for both participants. Omnibus *Tau-U* results for both participants ranged from effective to very effective (*Tau-U* = -0.72, $p < 0.01$; *Tau-U* = -0.98, $p < 0.01$, respectively). Finally, social validity was reported using the TARF-R (Reimers & Wacker, 1988) with favorable views of the intervention according to ratings provided by job coaches (important, acceptable, and feasible) and participants (helped improve their behavior at work, was easy to use, and provided a way to focus on a specific job task, and they liked the intervention).

In summary, there are only two studies that implemented interventions that teach self-determination skills while considering a function-based approach to addressing challenging behaviors, neither of which incorporated CAI. Expanding the research base around directly addressing the function of challenging behavior and developing behavior goals that serve to teach components of self-determination in response to challenging behavior (e.g., self-advocacy, self-management, self-regulation, and self-monitoring) should be a key focus of future research; thus indicating the need for the current dissertation study. The current study fills a gap in the literature by determining the effects

of function-based, computer-assisted SDLMI to increase self-determination skills and on-task behavior in the classroom.

Summary of Function-Based Approaches

Initially, Pavlov's work in classical conditioning (1927), Thorndike's Law of Effect (1898), and Skinner's work in operant condition (1938) and the behaviorism movement in psychology (Watson, 1913) led to a unique field of socially significant research focusing on observable and measurable behaviors in the context of the natural environment, ABA (Baer et al., 1968, 1987). Kazdin (2013) outlined contingencies and consideration in motivation that suggest understanding the arrangements and predicting the variables involved in behavioral outcomes leads to opportunities to manipulate contingencies and change behavior through function-based approaches.

Seminal pieces (Carr, 1977; Iwata et al., 1982; Lovaas et al., 1965), contributed to the current application of function-based assessments (i.e., indirect FBAs, direct FBAs, functional analyses) to determine the function of behavior in applied settings. Function-based models (e.g., Competing Pathways Model of problem behavior (O'Neill et al., 1997) provide a framework to guide decision making that concerns developing interventions to address the function of behavior.

Structuring interventions to address the function of problem behavior have stronger effects in general (Filter & Horner, 2009; Ingram et al., 2005; Payne et al., 2007; Umbreit et al., 2007). These interventions can be implemented by a variety of stakeholders (Trussel et al., 2016; Walker & Snell, 2017) across grade levels (Burke et al., 2003; Whitford et al., 2013; Wood, Ferrer et al., 2011). Finally, there is experimental evidence to support the use of intervention packages (e.g., goal setting to address

challenging behavior; Mazzotti et al., 2020; Nittrouer et al., 2016). The next strand expands on evidence to support the use of computer-assisted instruction.

Computer-Assisted Instruction

The following sections provide an overview of the evolution of CAI, advantages of using CAI, and the effectiveness of using CAI for students with disabilities across ages to teach academic, employment, and life skills. In addition, the importance of combining CAI with function-based interventions to increase self-determination will be discussed.

Evolution of Computer-Assisted Instruction

The use of computers as instructional devices for students to learn novel information can be traced back to the use of "teaching machines" (Pressey, 1924; Skinner, 1954). Since then, there have been three distinct periods in technology development and use in special education: (a) the microcomputer period (late 1970s to early 2000s; Benjamin 1988), (b) the internet period (from early 2000s to the 2010s; Aslan & Reigeluth, 2011), and (c) the period of mobile tablet computers (from the 2010s to present; Brown & Green, 2013). Computer-assisted instruction for students with disabilities may reduce teachers' time, effort, and energy (Benjamin 1988; Weng et al., 2014).

Most notably, advancements in technology came during the 1980s when Apple computers released the Apple IIe® series followed by the introduction of CAI as a viable supplement to special education (Jeffs et al., 2003). Along with the advancements in technology came laws that were put into place to support the use of technology and related services for individuals with disabilities (i.e., Americans with Disabilities Act of 1990, Assistive Technology Act of 1988, and Individuals with Disabilities Education Act

of 1990; Jeffs et al.). As technology continued to make advancements (e.g., IBM became the sole personal computer manufacturer by 1983, leading to the microcomputer commonly used in homes, offices, and schools by the early 2000s), amendments to laws were made to ensure that individuals with disabilities remain covered today (Jeffs et al.).

Since the 1980s, a range of references to computer-assisted instruction are used interchangeably, including computer-based instruction, computer-based learning, and computer-based teaching (Valdez et al., 1999). Regardless of the name used as reference, the procedure across all references consistently involves educational technology that delivers instruction via computer-based technologies or computer programs (Valdez et al.). CAI is preferred over other similar terms because it is a more commonly used term than computer-based instruction or computer-based learning, and historically it has a narrower definition for instructional purposes than computer-based instruction (Kulik & Kulik, 1991). One of the earliest definitions for CAI was provided by Wright and Forcier (1985, p. 96) which included:

> a learning environment characterized by instructional interaction between computer and student in which the teacher sets up the learning environment, ensures that each student has the necessary skills to engage in a particular cognitive activity, and adjusts the learning activities according to the students' needs.

CAI can be transmitted through a variety of technological devices such as personal computers, iPads, and smart phones (Sigafoos et al., 2014). CAI involves presenting technology-mediated instructional stimuli, providing a technology-based platform for performing skills, and offering technological medium through which learners receive feedback (Sigafoos et al., 2014). Odom and colleagues (2015) defined technology as "an electronic item/equipment, application, or virtual network that is used

to intentionally increase, maintain, and/or improve daily living, work/productivity, recreation leisure capabilities" (p. 3806). Some examples of CAI are programs or apps installed on a desktop computer, laptop or notebook computer, tablet (e.g., iPad), or handheld mobile device (e.g., Android phone, iPod, iPhone; Wong et al., 2014).

Advantages of Computer-Assisted Instruction

Students with disabilities often require additional supports and opportunities for repetition to acquire academic, social, adaptive and functional skills. Implementing CAI is one method of supplementing traditional teacher-directed explicit instruction (Sigafoos et al., 2014). There are five common reasons CAI is consistently used in special education classrooms: (a) to introduce novel instruction, (b) to serve as a mode for drill and practice opportunities, (c) to stimulate and increase engagement, (d) to function as a method of assessment measures, and (e) to compliment teacher-directed instruction (Sigafoos et al., 2014; Valdez et al., 1999).

Since the early 2000s, the use of CAI has extended to academic and functional curricula for students with low-incidence disabilities (e.g., autism, moderate-to-severe intellectual disability; Ayres et al., 2009; Pennington, 2010; Test et al., 2009; Weng et al., 2014). Mobile tablet computers continue to receive attention from scholars and practitioners in the field of special education based on several perceived advantages (Weng et al., 2014), including (a) multi-touch screen interface that registers three or more touch points at one time so that students with cognitive and physical disabilities can easily operate devices (Douglas et al., 2012; Newton & Dell, 2011; Shah, 2011); (b) economical medium to access applications (Ayres et al., 2013; Douglas et al., 2012); and

(c) increased mobility for flexible use in classrooms and communities (Ayres et al., 2013).

Evidence around the use of CAI suggests teachers and students benefit from implementing CAI-based interventions. First, CAI is considered an evidence-based practice for students with disabilities and provides opportunities for students to engage to self-directed learning processes to decrease reliance on prompts delivered by teachers or peers (Browder et al., 2014). Additionally, students benefit from self-directed learning (i.e., self-instruction) involves understanding of own unique learning needs, setting goals, taking initiative to address own learning needs by selecting and applying effective learning strategies, and evaluating learning outcomes (Knowles, 1975). Self-directed learning may or may not involve the support of others. According to IDEA (2004), special education services for students with disabilities requires accommodations and modifications; however, instructional design for students must be carefully planned to meet their unique needs, increase autonomy in performance, and promote generalization and maintenance of skills. Students with disabilities can demonstrate the ability to self-manage their own behavior when they are provided with adequate supports (e.g. technology-based supports; Mechling, 2011).

Another factor to consider when delivering computer-assisted instruction is the type of feedback students receive. For example, according to Van der Kleij et al. (2015), elaborated feedback (EF; e.g., providing an explanation) produced larger effect sizes (0.49) than feedback confirming the accuracy of the answer (KR; 0.05) or providing the correct answer outright (KCR; 0.32). Effects of EF were stronger than KR or KCR when higher-order thinking skills were targeted and for mathematical content compared to

social sciences, science, and languages. Immediacy of feedback also contributed to effect sizes.

There is mounting evidence to suggest advantages of using CAI. The next section outlines research to suggest CAI is an effective intervention which targets self-directed autonomous learning across a variety of disability categories, ages, and skillsets.

Effectiveness of CAI for Students with Disabilities

Meta-analyses of CAI studies have shown the effectiveness of CAI with students with disabilities (e.g., Dugan et al., 2007; Schmidt et al., 1985-1986; Weng et al., 2014). First, Schmidt and colleagues (1985-1986) synthesized 26 published and unpublished studies from 1968-1984 by examining the following variables: year of publication, participant characteristics (i.e., grade level and disability category), reliability of treatment, selection bias, level of significance, and statistics reported. The independent variable examined across all 26 studies was computer-assisted instruction, which was defined supplanting regular instruction or complementing regular instruction through drill and practice, tutorial applications, and problem solving. Using the vote counting method, the meta-analysis reported the frequency of studies that reported positive effects of CAI on student learning for students with disabilities and students at risk. Results of the meta-analysis indicated that 23 out of 26 (88.46%) studies reviewed reported positive effects of CAI on student learning. Eighteen out of the 26 (69.23%) studies provided additional statistical support for CAI as a tool to enhance student learning with a medium average effect size of 0.53.

Dougan and colleagues (2007) systematically reviewed studies published between 1990-2003 based on the use of technology for secondary students between the ages of 12-

22 years old. A total of 39 studies implemented technology-based interventions for secondary students involving assessment, CAI, simulation, telecommunication, or other (i.e., closed captioning, small group instruction, video disc instruction, or videotape review). Results indicated that 31 out of 39 (79.5%) studies involved CAI to teach academic content in reading (n = 12), writing (n = 5), math, (n = 4), or other (e.g., social skills, n = 10). Results statistically supported the effectiveness of CAI on academic outcomes (e.g., reading and math skills) as well as communication and social skills for secondary students with disabilities. Overall, a moderate effect size was calculated for 22 between-group and six within-subject design studies ranging from 0.38-0.46 and a large effect size was calculated for three single-case studies ranging from 1.01-6.88.

More recently, Weng et al. (2014) conducted a systematic review of published and unpublished studies between 1975–2013 to examine the effectiveness of CAI (i.e., drill and practice, tutorial instruction, problem solving, educational games) on cognitive learning outcomes (e.g., acquisition of targeted academic, social, and functional skills) for school-aged students with disabilities. A total of 21 studies were included in the analysis and results were consistent with previous findings suggesting a positive effect of CAI on cognitive skills (Dougan et al., 2007; Schmidt et al., 1985–1986) yielding a moderate weighted average effect size of 0.35 for eight group-comparison studies and the average weighted standard mean difference across 13 single-case studies was 1.68 which indicated a large effect size.

One year later, Van der Kleij et al. (2015) conducted a meta-analysis analyzing the effects of methods of providing item-based feedback in a computer-based environment for 40 articles published from 1968–2010. Van der Kleij and colleagues

calculated 70 effect sizes across 40 studies with results ranging from -0.78–2.29. Findings suggested that elaborated feedback (EF; e.g., providing an explanation) produced larger effect sizes (.049) than feedback confirming the correctness of the answer or knowledge of results (KR; 0.05) and providing the correct answer outright or knowledge of correct responses (KCR; 0.32). Effects of EF were stronger than KR or KCR when higher-order thinking skills were targeted and for math content compared to social sciences, science, and languages. Immediacy of feedback also contributed to effect sizes.

In conclusion, results from the previous systematic reviews demonstrate that CAI is an effective practice across age groups, disability categories, and increases development across skillsets. In addition, it is important to consider the effectiveness of CAI interventions extending across specific transition areas (e.g., skill development in academics, post-school education and training, employment, independent living, adaptive behavior, social, and self-determination). The following sections detail supporting research on these areas.

Effectiveness of CAI on Academic Skills

Teaching academic skills is imperative as students with disabilities continue to experience poor in-school outcomes (Lipscomb et al., 2017; U.S.D.O.L.). CIA has been effective in teaching academic skills for students with intellectual disability across grade levels. Most of the literature synthesizes the effectiveness of CAI interventions on academic skill acquisition for secondary students with high-incidence disabilities (Myers et al., 2015; Williams et al., 2018). Current research also provides support for using CAI as an intervention to enhance literacy skills for students with mild to moderate

intellectual disability in primary grades (Spooner et al., 2014), middle school (Mims et al., 2012), and in young adulthood (Purrazzella & Mechling, 2013). In addition, CAI has been used to teach science skills to students with intellectual disability in middle school (McKissick et al., 2018; Smith et al., 2013) and young adulthood (Hart & Walon, 2012). Finally, evidence suggests that CAI supports achievement of mathematics skill for students with intellectual disability in elementary school (Ok & Bryant, 2016), middle school (Saunders et al., 2018), and young adulthood (Wajiuhullah et al., 2018).

Specifically, considering the effectiveness of computer-assisted or technology-mediated academic interventions for students with moderate to severe disabilities in young adulthood (i.e., the focus population for the current dissertation study), Purrazzella and Mechling (2013) demonstrated positive outcomes of using a technology-based intervention by implementing a multiple-probe design across three young adults with moderate intellectual disability to investigate the effects of a computer-based instructional (CBI) package with a forward chaining procedure to teach manual spelling of grocery vocabulary words. First, the intervention procedure involved students writing words (from a unique preselected scaffolded word list for each student from the software program *Grocery Words* by Attainment Inc.) directly onto the multi-touch screen of a tablet PC. Next, students' written words were projected onto a large screen which allowed for observational learning of other students' words during small group instruction. Finally, students' acquisition of incidental information through reading targeted and observational vocabulary words within the small group arrangement was evaluated. Results indicated a functional relation, demonstrating the effectiveness of the CBI package for teaching manual spelling of target words as all three students reached

mastery criteria across each of the three sets of target spelling words. Students demonstrated increased proficiency in reading target words as well as spelling and reading non-target words.

Next, Hart and Walon (2012) employed a reversal design to examine the effects of video self-modeling delivered using a video on an iPad® on the unprompted academic responding on science content of one 10th grade male with autism and moderate intellectual disability. The intervention entailed the student watching a 1-minute video clip of the teacher prompt followed by the student himself providing a correct unprompted response (i.e., Teacher prompts, "Austin - give me an example of a reptile" to which the student responds immediately, "snake."). Results indicated a functional relation in that the technology-delivered intervention effectively increased unprompted responses when the participant was provided with the video self-modeling intervention. One key point from social validity provided by the teacher highlighted that this intervention was simple and short to implement; however, better effects could be achieved if the intervention was extended over a longer period. Additionally, the most compelling suggestion for teachers was that better effects may have been achieved if the paraprofessionals were trained to implement the intervention.

Finally, Wajiuhullah et al. (2018) conducted a pretest, posttest quasi-experimental study with 30 participants ages 8 to 16 years old with mild to moderate intellectual disability in Pakistan to test the effects of digital game-based learning as an example of a computer-assisted teaching technique (i.e., math games from BBC website according to inclusion criteria defined as: developed for number concepts, suitable for students with intellectual disability, age-appropriateness, and free online availability).

Students were randomly assigned to groups which were equivalent at pretest. The treatment group received traditional teacher-led instruction and participated in 10 sessions of playing the game for 30 min per day. Four phases of instruction were provided through game-based learning: (a) count objects (three sessions), (b) match objects (three sessions), (c) color the desired number of objects (two sessions), and (d) write the number in serial form objects (two sessions). The control group received traditional teacher-delivered instruction only. Results indicated a significant difference between treatment and control groups on posttest measures (t = -2.05(28), p = 0.049) with a large effect size (d = 0.75). Waijuhullah and colleagues concluded that these findings were consistent with previous research on the effectiveness of CAI and suggested that digital game-based learning motivates learners, offers immediate feedback, and promotes a positive attitude and increased engagement in learning.

In summary, while much of the literature targets younger student populations with disabilities, the above interventions illustrate positive effects when using CAI to teach academic skills to young adults with intellectual disability. Next, interventions using CAI to teach employment skills to youth with intellectual disability will be outlined.

Effectiveness of CAI on Employment Skills

In addition to supporting students' academic achievement, CAI also has been shown to effectively teach employment skills to youth with intellectual disability. Teaching employment skills is imperative due to the poor employment outcomes youth with disabilities experience (Lipscomb et al., 2017; U.S.D.O.L.). In a systematic review of instructional methods to teach employment skills to secondary students with intellectual and developmental disabilities, Gilson et al. (2017) reviewed 56 studies

published between 1983 and 2015, 34 (60%) of which used technology or another instructional stimulus (e.g., self-management device, video/audio-based, picture/tactile-based intervention) to teach employment skills. The three common types of employment tasks taught included clerical (e.g., photocopying, filing; *n* = 12), cleaning (e.g., mopping, washing dishes; *n* = 10) and retail (e.g., folding clothes, stocking items; *n* = 7). The discussion section of this review highlighted the use of technology featured in various studies (e.g., video, self-managed, augmentative and alternative communication, or audio devices) and pointed out that instructional strategies such as time delay, performance feedback, response prompting, or modeling can be embedded in instructional devices. Given the current ubiquitous role of technology in society today, instructional modalities have shifted from traditional instructor-delivery to being technology-delivered. To conclude, the authors suggest the use of technology is a promising pathway for students to obtain knowledge in school, employment, and community settings.

Individual experimental studies also have demonstrated the effectiveness of CAI on acquisition of skills impacting post-school education, training, and employment. First, Mazzotti et al. (2010) analyzed the effects of CAI on four high school student's knowledge of post-school options (i.e., education, employment, and independent living) by employing a multiple baseline design across behaviors. The CAI intervention presented information regarding post-school outcomes to students using a PC with PowerPoint (e.g., question: what does working by myself with support mean; answer: working by myself with a job coach until I can do the job on my own). A 30-point probe was used to measure student knowledge. Additionally, students were asked six questions to determine their generalization of content taught by applying knowledge of post-school

outcomes to their own lives and their own futures (e.g., Where do you want to live after high school? What support will you need?). Responses were rated using a rubric ranging from 0–3 points out of 12 possible points reflecting the extent to which responses were justified using key information from lessons. Results showed a functional relation between the dependent variable and the independent variable, suggesting CAI is an effective strategy to teach students about their options for post-school life. All four students generalized the information by demonstrating their ability to express preferences in the three transition areas.

Similarly, Richter and Test (2011) conducted a study using a multiple-probe design across three participants with severe intellectual disability to examine the effects of using multimedia social stories on knowledge of adult outcomes and opportunities among three adolescents with significant intellectual disability. The intervention comprised five components presented via PC with PowerPoint containing visuals obtained through Writing with Symbols 2000 to support readers through informative text regarding (a) four adult outcomes, (b) three residential opportunities, (c) three vocational opportunities, and (d) three recreational opportunities, with (e) a summary of all outcomes and opportunities. A 16-item probe was developed to measure student knowledge (i.e., four questions were related to outcomes and 12 questions were related to opportunities). Additionally, generalization was measured through a preference assessment in which students were asked to select and justify one opportunity within each outcome area (i.e., four possible points were awarded for identifying and providing a rationale statement). Visual analysis demonstrated a functional relation was established, supporting that multimedia social stories effectively increased student's knowledge of

outcome areas and opportunities. In addition, students generalized the knowledge learned in the intervention to state their preferences with rationale justification statements in an informal transition planning meeting.

The above studies showed employment skills were positively impacted by CAI-based interventions for youth with intellectual disability. The next section highlights interventions that support using CAI to teach life skills to students with intellectual disability.

Effectiveness of CAI on Life Skills

Research supports using technology to teach life skills to young adults with intellectual disability. Targeted instruction in life skills is important to address poor outcomes experienced by youth with disabilities (Lipscomb et al., 2017; U.S.D.O.L.).

In a systematic review conducted by Ramdoss et al. (2011), 11 studies published prior to 1990 (between 2002 and 2010) were found that used computer-based interventions (e.g., CAI including computer programs incorporating instructional trials with video, auditory, or picture prompts; excluding interventions implementing video-based instruction requiring minimal input from participants to control the interface and interventions using computers for the sole purpose of delivering a reinforcement) to teach life skills to individuals ages ranging from 7.7–58 years old with with intellectual disability or autism. One study provided instruction on using a debit card, one study instructed participants to use an automated teller machine, one study taught students to place an order at fast-food restaurants, and one study trained students to use public bus transportation. Two studies taught students to set a table and prepare simple meals using CAI. Five studies provided targeted instruction in grocery purchasing skills using CAI.

Overall, the effects were positive as 39 out of 42 (93%) of participants involved in the computer-based interventions acquired the daily living skills taught, indicating that computer-based interventions are a promising intervention strategy for teaching daily living skills to individuals with moderate intellectual disability. In addition, 6 out of the 11 studies collected maintenance data which indicated that participants maintained levels of mastery from 2–15 weeks post-intervention at levels similar to the final intervention phase. Unfortunately, some interventions designed to teach daily living skills are no longer commercially available; thus, interventionists and teachers must design programs using other formats (e.g., Microsoft PowerPoint, Window Movie Maker).

In a similar review, Mechling (2011), identified 21 studies which evaluated the efficacy of using twenty-first century portable electronic devices to teach persons with moderate intellectual disability and autism a variety of skills across settings. Types of twenty-first century skills devices that were used to implement interventions included media players with audio playback (*n* = 1 study), cell phones/smart phones (*n* = 3 studies), PDA with text, sound, and light cues (*n* = 3 studies), PDA with picture cues (n = 7 studies), and PDA with video cues and handheld video players (*n* = 7 studies). Skills taught using portable electronic devices included silverware sanitation and sorting, table setting, laundry, cleaning, locating books and DVDs using call numbers, travel, transition between school activities, scheduling and on-time behavior, independent task completion with scaffolding to move to more difficult tasks, software assembly, assembling pizza boxes, operating debit and copy machine, and operating a cell phone. All 21 studies indicated favorable outcomes resulting from using portable electronic devices as the method of presenting an intervention to students with moderate intellectual disability.

In addition to systematic literature reviews, experimental studies have shown the effectiveness of implementing CAI-based interventions for youth with intellectual disability. First, Mechling and Seid (2011) employed a multiple-probe design across three destinations, replicated across three participants to measure the impact of technology-based intervention using a Personal Digital Assistant (PDA) to teach pedestrian travel skills to three young adults with intellectual disability. The intervention also included a system of least prompts so that participants could begin to navigate independently (i.e., prompting hierarchy was prerecorded and loaded into the PDA and consisted of just picture of landmark, picture with verbal cue, and video model prompt supporting the entire navigation step). Results indicated that a functional relation was established across the three destinations as all participants increased their accuracy independently locating landmarks and final destination points and maintained navigational skills.

Next, Mechling et al., (2014) conducted a multiple-probe across three settings using continuous video-based modeling via laptop computer to teach three participants between 15 and 17 years old to complete multi-step home living tasks (i.e., cleaning an exercise bicycle, area rug, and kitchen counters). The intervention involved a video model of the task being performed in a continuous loop in which the participant was expected to complete the task in unison with the video model or by waiting for the video to loop around and prompt again. The participant had the option to complete task independently ahead of the video, by listening to the voice prompt, or by watching and listening to the video prompt. Results indicated a functional relation, thus suggesting this method of instruction was effective. Maintenance data suggested that levels of accuracy performing tasks remained consistent with intervention levels.

More recently, Goo et al. (2016) used computer-based video instruction on the acquisition and generalization of grocery purchasing skills for four students ages 17 to 18 years old with moderate intellectual disability. The researchers used a multiple-probe across participants design to determine the effects of the intervention, which featured computer-based video instruction, on the acquisition of grocery purchasing skills according to a 17-step task analysis (e.g., get a shopping cart, go to the correct aisle, etc.). Pretest, baseline, intervention, posttest, and generalization measures were considered in the analysis. Pretest and baseline measures reflected students' knowledge prior to receiving instruction in grocery purchasing. During baseline, a video with a voice recording of questions prompting students through each step in the task analysis (e.g., "Using the aisle signs, what aisle would you go to in order to get the first item on your shopping list?") while serving as a visual prompt for the three-item shopping list. The intervention involved showing students a 15 min video 1–2 times per day to teach grocery shopping skills through 17 short instructional videos modeling each step followed by the procedure used in baseline to prompt students through shopping procedures using questions and pictures. Additionally, immediate and corrective feedback was provided to students based on their responses. Results indicated a functional relation as the levels of percentage of correct responses immediately increased from lower levels during pretest and baseline to mastery set at 80% or higher during the intervention. Posttest and generalization data indicated that students struggled to maintain and generalize skills learned in this intervention to novel grocery stores as accuracy of percentage of correct responses declined for all participants.

In summary, CAI is one method to effectively teach a range of daily living skills to young adults with intellectual disability. The next section describes the efficacy of using CAI to teach self-determination skills.

Effectiveness of CAI on Self-Determination Skills

As a predictor of improved post-school outcomes (Mazzotti et al., 2016; Test et al., 2009) developing skills in self-determination is critical to promote student success. According to a literature review conducted by Mechling (2007), 40 studies published between 1990–2005 were identified using assistive technology (AT) to support persons with disabilities to initiate and complete daily tasks (i.e., AT used as a self-management tool). Studies measured the effects of AT on fluency of work performance (n = 1), initiation of tasks (n = 2), accuracy of task performance (n = 3), on-task behavior (n = 4), task engagement (n = 5), transitioning between tasks (n = 2), and independent performance and tasks completion (n = 25). Types of AT most commonly found were picture cues as; tactile prompting in the form of a vibration signal (n = 2); auditory prompting in the form of a prerecorded antecedent cue (n = 9); personal computers with sound, text, photo, and video capabilities (n = 11); and antecedent prompts (n = 17). Overall, due to the positive effects found in the synthesis of 40 studies, AT is a promising tool to increase students' self-management, thereby improving self-determination skills as students exert more independence and control in their lives, depend on support from others less often, and integrate successfully into community settings and daily activities. Mechling concluded that one key aspect of using AT as a self-management tool is ensuring that students with disabilities can self-operate the tools.

The current dissertation study is most closely related to the work of Mazzotti et al. (2012) and Mazzotti et al. (2013). First, Mazzotti et al. (2012) conducted a multiple-probe across participants design to examine the effects of CAI on students' knowledge of the SDLMI and disruptive behavior for three 10-year-old elementary students with learning disabilities or mild intellectual disability and were identified by their teacher as having chronic behavior problems. The CAI intervention presented mini lessons using a laptop with PowerPoint which taught goal-setting as students were supported through the SDLMI process. Student responses were measured using Camtasia Studio©, SDLMI knowledge was measured with a 27-item probe, and disruptive behavior (e.g. talking out during instruction) was measured using a partial interval data recording method. Results indicated that a functional relation was established demonstrating positive experimental effects. Levels of increased knowledge of SDLMI and decreased disruptive behaviors were observed between baseline and across the three phases of the multimedia delivered SDLMI-based intervention (i.e., set a goal, make a plan, and adjust the plan) for up to 3 weeks post-intervention for all three participants. During intervention and maintenance, rates of disruptive behavior were comparable to the "best behaved" students in the class according to the social comparison measures.

A follow-up study was conducted by Mazzotti et al. (2013) which involved a single-case multiple-probe design across four participants with students at risk for or with emotional disturbance to test the effects of a multimedia goal-setting intervention on students' knowledge of the SDLMI and disruptive behavior. The procedure mirrored the researchers' previous study using mini lessons presented via laptop with PowerPoint which taught goal-setting as students were supported through the SDLMI process.

Student responses were measured using Camtasia Studio, SDLMI knowledge was measured with a 27-item probe, and disruptive behavior (e.g. talking out during instruction) was measured using a partial interval data recording method. Results were consistent with outcomes determined in the previous study indicating that a functional relation was established demonstrating positive experimental effect as levels of knowledge of SDLMI increased and disruptive behaviors decreased across all phases. Maintenance data suggested that students-maintained levels of knowledge of SDLMI at comparable levels to the intervention phases for three weeks post-intervention. Finally, rates of disruptive behavior were comparable to the "best behaved" students in the class according to the social comparison measures.

Mazzotti et al. (2012, 2013) incorporated CAI to teach goal-setting via acquired knowledge of the SDLMI to address challenging behavior in the classroom; however, one key component the current study proposes to address which is lacking in the studies outlined by Mazzotti and colleagues (2012, 2013) is by considering the function of students' challenging behavior. The current study aims to first target the function of students' challenging behavior in order to teach a replacement behavior using the procedure described by Mazzotti and colleges (2012, 2013). In addition, the procedure will be adapted to be more user-friendly for students with moderate intellectual disability.

Summary of CAI

Teachers and students benefit from CAI since CAI is considered an evidence-based practice for students with disabilities and provides opportunities for students to engage in self-directed learning and to decrease reliance on prompts delivered by teachers or peers (Browder et al., 2014). Elaborated feedback provided in CAI warrants

consideration as it yields stronger effects and encourages higher order thinking (Van der Kleij et al., 2015). Meta-analyses of CAI studies have shown the effectiveness of CAI implemented with populations of students with disabilities (e.g., Dugan et al., 2007; Schmidt et al., 1985-1986; Weng et al., 2014). Experimental studies successfully implemented CAI to teach skills across transition areas such as academic skills (Hart & Walon, 2012; Purrazzella & Mechling, 2013; Wajiuhullah et al., 2018), employment skills (Gilson et al., 2017; Mazzotti et al., 2010; Richter & Test, 2011), life skills (Goo et al., 2016; Mechling, 2011; Mechling & Seid, 2011; Mechling et al., 2014; Ramdoss et al. 2011), and self-determination skills (Mazzotti et al., 2012; Mazzotti et al., 2013; Mazzotti et al., 2016; Mechling, 2007; Test et al., 2009).

Important considerations when implementing CAI include to ensure that participants are well trained in using the intervention and that sufficient time is provided for students to be proficient and maintain skills (Hart & Walon, 2012). In addition, teachers report challenges with scheduling adequate time to provide students with explicit instruction or ample opportunities to practice skills; CAI is one method of alleviating this struggle (Mazzotti et al., 2012, 2013; Wajiuhullah et al., 2018). To conclude, the current study is needed to address a gap in literature due to the lack of using CAI to teach students goal setting through acquiring knowledge of the SDLMI to increase appropriate on-task behavior in the classroom.

Self-Determination

The term self-determination was first used within the disability field by Bengt Nirje (1972) in a book chapter titled “The Right to Self-Determination” on the normalization principle describing self-determination as a personal construct referring to

the right to self-governance (Wolfensberger, 1972). It took nearly two decades before the concept of self-determination gained traction as a result of the US Department of Education, Office of Special Education Programs (OSEP) suggesting the need for research and model development in self-determination due to poor outcome data reflected in an early longitudinal study of post-school outcomes particularly for individuals with intellectual disability transitioning from school to adult life (Blackorby & Wagner, 1996). In combination with poor outcomes data the Blackorby and Wagner's 1996 report, a landmark study by Houghton et al. (1987) observed and measured exchanges between student expression of choice or preference in public schools, institutions, and university program sites during structured and unstructured activities (e.g., reactions, expressive statements, physical expressions, on rate and duration scales). Participants included 48 staff members and 37 students between the ages of 14 months and 21 years old. Results indicated that adult staff responded at very low rates to student-initiated expressions of choice or preference and staff-initiated opportunities for student expressions of choice or preference were significantly higher for younger students in the 0 to 5 years age range, demonstrating that youth with intellectual disability had restricted opportunities to make choices and participate in decisions about their lives. At which point, OSEP was compelled to provide grant funding to support model demonstration projects on self-determination theory, assessment, and intervention between 1990 and 1996 (Ward & Kohler, 1996). Early models of self-determination were birthed from these projects (Abery, 1994; Field & Hoffman, 1994; Mithaug, 1996; Powers et al., 1996; Wehmeyer, 2003). Most recently, self-determination was reconceptualized as Causal Agency Theory (Shogren, Wehmeyer, Palmer, Forber-Pratt et al., 2015) which stemmed from a

functional model of self-determination developed during early OSEP projects (Wehmeyer, 1999, 2003). Rather than a definitive list of behaviors, the Causal Agency Theory defines self-determination by the function served by the self-determined action for individuals (Wehmeyer et al., 1996). The next section provides a detailed summary of the evolution of the Self-Determination Theory.

Evolution of Self-Determination Theory

Origins of self-determination stem from Rotter's (1975) definition of locus of control which includes a belief of behavior reinforcement contingencies that are likely to influence a person's choices and actions. Locus of control suggests that individuals take responsibility for their actions and the consequences of their actions. As the conceptualization of self-determination evolved through research, the definitions of self-determination continued to reshape accordingly. Deci and Ryan (1985) defined self-determination as the ability to have choices and decide your one's own actions.

Field and Hoffman (1989, 1994) built their model of self-determination based on Gordon's (1977) four step process for developing a model which included synthesize current literature, conduct interviews, perform observations, consider internal expertise. A fifth step was added in developing their model as Field and Hoffman also considered external expertise. Since self-determination was a relatively new concept, the review of literature appraised several topic areas relevant to special education, psychology, independent living, rehabilitation, social work, and counseling using the keywords self-determination, self-advocacy, assertiveness, empowerment, creativity, self-esteem, self-efficacy, choice-making, self-concept, control, independence/interdependence, and competence.

Exploratory interviews were conducted with a purposeful sample composed of individuals with disabilities, parents, educators, and service providers in efforts to develop a structured interview protocol. A structured interview was conducted with 52 adults with and without disabilities who were employed and living in the community to define self-determination, identify components of self-determination, and list factors supporting or hindering an individual's ability to be self-determined (Field et al., 1992). Results indicated that components of self-determination were largely internal in nature (e.g., self-confidence).

Another structured interview was conducted with 105 students with disabilities in secondary education programs receiving special education (Field et al., 1993) who were initially observed and scored within the top third according to a checklist that assed behaviors associated with self-determination. Once again, results indicated that self-determination was associated with internal factors such as attitude and confidence. In addition, respondents indicated that significant others played an important role in supporting or hindering self-determination. Results of the structured interviews led Field and Hoffman to develop a model for self-determination that considered internal factors, behaviors, and skill development in accessing support and negotiating relationships.

Interviews were followed by two observational studies in which Field and colleagues (1992) using a checklist to assess behavior associated with self-determination (e.g., exploring options, goal setting, decision making, communication skills, risk taking, initiating actions). Results indicated that students with disabilities engaged in significantly higher frequencies of risk-taking behavior compared to students without disabilities.

Internal expertise was considered by compiling all information gathered in interviews and observations. A card-sort technique was used to classify the information into distinct themes. The earliest conception of the self-determination model by Field and Hoffman (1989) informed the structure of the information into themes.

External expertise was considered by organizing four review panels across three states consisting of 29 total participants including individuals with disabilities, parents, educators, and service providers who were asked to analyze and provide input on the proposed model. An explanation of the interview and observational data were provided to the panel to offer background information. The panel was asked to identify if the model was complete, if anything in the model was unnecessary, if the model followed a logical sequence, and if the process of the developing the model was sound. The model was adjusted based on the recommendations made by the panel.

Results of the process defined self-determination as "the ability to define and achieve goals based on a foundation of knowing and valuing oneself. It is promoted or discouraged by factors within the individual's control (e.g., values, knowledge, and skills) and variables that are environmental in nature (e.g., opportunities for choice-making, attitudes of others; Field & Hoffman, 1994, p. 164). The model of self-determination consisted of five components: know yourself, value yourself, plan, act, and experience outcomes and learn. Know yourself and value yourself rely on internal processes that influence self-determined behavior. Plan and act refer to skills that can be acquired to influence self-determined behavior, requiring the ability and the capacity for self-determined behavior. The final stage of self-determined behavior, experience outcomes and learn, requires an evaluation of one's progress by comparing achievements

to the expected outcomes or performance. This model of self-determination was designed to be appropriate for individuals with and without disabilities and inspired a curriculum based on the model, *Steps to Self-Determination* (Field & Hoffman, 1992). Field tests of the curriculum indicated positive outcomes as significant differences in knowledge and behavior associated with self-determination were observed.

Next, Mithaug (1996) aimed to resolve the discrepancy between the right and the experience of self-determination due to the lack of capacity and opportunity for self-determination which is negatively impacted for individuals whose personal, social, and economic circumstance are beyond their control. The equal opportunity theory operates from the position that all people deserve an optimal chance of a good life and it is society's obligation to ensure fair prospects for everyone by improving the capacity for autonomous thought and action through improved opportunities for effective choice and action. An emphasis is placed on optimizing the match between individual capacity and social opportunity to encourage more frequent expressions of self-determination.

Mithaug's social justice view of self-determination described in his equal opportunity theory spiraled out of landmark laws of the 1990s that still inform special education practices today (e.g., Americans with Disabilities Act of 1990, Individuals with Disabilities Education Act of 1990). Wehmeyer (1998) provided support of this social justice view of self-determination by defining two essential meanings of self-determination as a social component or basic human right, ideal, or principle and as an individual characteristic which constructs the psychological component of self-determination. This view is challenged according to a review of literature by Mithaug (1998) spanning one decade which identified three articles (Bambara et al., 1998; Brown

et al., 1998; Wehmeyer et al., 1998), none of which focused on determining a resolution on equalizing rights. Instead articles focused on accepting the right a priori then identifying ways to fulfill an obligation to respect it through interventions that target the rights related to capacity (Brown et al., 1998; Wehmeyer et al., 1998) and opportunity (Bambara et al., 1998) to self-determine.

Third, Powers et al. (1996) designed *TAKE CHARGE*, a multicomponent model of self-determination including the following components: mastery motivation (e.g., perceived competence, self-esteem, maintenance of an internal locus of control and internalization of goals and rewards; Harter, 1981) and self-efficacy (e.g., belief in the capacity to demonstrate a desired behavior which produces a desired result; Bandura, 1986) achieved through repetition and reinforcement of success. The components of *TAKE CHARGE* include coaching in the application of self-determination skills to achieve personal goals, peer-based mentorship experiences, and tools to support parents to promote student achievement and positive self-attributions.

In a randomized-control trial field test conducted by Powers et al. (2001) including 20 students with disabilities between the ages of 12 and 18, students in the treatment group were coached through the approach and learned strategies related to achievement (e.g., goal-setting, problem-solving, planning), partnership (e.g., self-advocacy, communication), and coping (e.g., self-monitoring and self-reinforcement to track and reward progress). Results indicated positive effects, providing general support for the efficacy of *TAKE CHARGE* as a model for promoting self-determination as an increase in empowerment in personal accomplishment was evidenced by the treatment group through higher proportions of goals set and achieved.

Fourth, Wehmeyer (2003) developed the functional model of self-determination. This model included four components: autonomy (i.e., a person's actions are based on their own preferences, values, or interests), self-regulation (i.e., demonstrated when a person creates a plan, identifies ways to address limitations of his or her own abilities related to future goals, makes decisions, and evaluates the plan and make changes), psychological empowerment (i.e., a person able to perform behaviors needed to influence outcomes in their environment, and anticipated outcomes will result), and self-realization (i.e., a person uses a comprehensive, reasonably accurate knowledge of themselves and their strengths and limitations and acts to capitalize on this knowledge in a beneficial way). These components of self-determination were impacted by capacity and opportunity. Factors influencing capacity were developmental shaped by learning while factors influencing opportunity were environmental shaped by experience. The functional model also considered the influence of supports in developing skills related to each of the four components. The functional model of self-determination posits that self-determination is defined by the function of the response class of self-determined behaviors which lead to taking control in one's life. Additionally, the concept of causal agency is central to the functional model of self-determination because causal agency implies that an individual makes or causes things to happen in their life. Thus, a causal agent has control in determining factors that impact their quality of life (i.e., emotional well-being, interpersonal relations, material well-being, personal development, physical well-being, self-determination, social inclusion, and rights; Schalock, 1996).

The functional model of self-determination was validated in research on several occasions. Structured interviews were conducted by Wehmeyer et al. (1996) to determine

the impact of the four essential characteristics on behavioral outcomes associated with self-determination. Respondents included more than 400 adults with intellectual disability using self-report measures of self-determination. The sample was divided into high and low indicators of self-determination and the sample who scored high on the self-determination measure differed significantly to the sample who score low based on having more positive beliefs or more adaptive behavior. The study confirmed the four essential characteristics were predictive of self-determination, particularly powerful predictors of self-determination were autonomy and self-regulation. In another study, Wehmeyer and Shwartz (1997) offered support for a link between increased self-determination and enhanced quality of life for adults with intellectual disability. Additional research connected increased self-determination predicted higher levels of improved educational outcomes, independence, employment rates, and increased earnings 1 year after school (Wehmeyer, 1993).

Research suggests the need for interventions based in this model to build self-determination capacity especially for individuals with intellectual disability because studies have shown that this population are less self-determined than their typically developing peers (Wehmeyer & Kelchner, 1994; Wehmeyer & Palmer, 1997). Wehmeyer et al., (1998) identified hundreds of instructional strategies and supports to promote the component elements of self-determination (i.e., teaching skills related to choice-making, decision-making, problem-solving, goal-setting and attainment, self-observation, self-evaluation, self-monitoring, self-instruction, self-advocacy and leadership, internal locus of control, positive attributions of efficacy and outcome expectancy, self-awareness, and self-knowledge).

Finally, Shogren, Wehmeyer, Palmer, Forber-Pratt et al. (2015) developed the Causal Agency Theory which was a reconceptualization of self-determination propelled by research that sparked newer understandings of disability, human functioning, and strengths-based approaches from positive psychology and the social-ecological models of disability (Shogren & Wehmeyer, 2017). Since the Causal Agency Theory views self-determination as a psychological construct that supports the belief that people are active contributors or agents of their behavior, self-determination is defined as a

> … dispositional characteristic manifested as acting as the causal agent in one's life. Self-determined people (i.e., causal agents) act in service to freely chosen goals. Self-determined actions function to enable a person to be the causal agent in their life (Shogren et al., 2015, p. 258).

In addition, self-determination is viewed as an enduring dispositional characteristic that can be measured and develop over time as people experience enhancing environmental contexts (e.g., skills and attitudes; Shogren et al., 2015). Specifically, learning goal generation and attainment contribute to the development of the essential characteristics of self-determined action (Shogren & Wehmeyer, 2017).

Shogren and Wehmeyer (2017) describe three central characteristics of self-determined action defined by several complementary constructs and elements believed to contribute to the function the self-determined action serves for the individual. The first characteristic of self-determined action is volition action which refers to people making conscious, intentional, self-initiated, autonomous choices based on their preferences. Elements of volition action include choice making, decision making, goal setting, problem solving, and planning, and skills. The second characteristic of self-determined action is agentic action which refers to a proactive, purposive, self-regulated process in which people identify pathways that lead to predetermined ends causing change.

Elements of agentic action include self- self-management (e.g., self-monitoring) goal-attainment, problem-solving, and self-advocacy skills. The third characteristic of self-determined action is action-control beliefs which refer to the personal empowerment to achieve freely chosen goals by acknowledging the link between self and goal (e.g., the belief in the possibility to do something and one's capability to do something), and acknowledging the link between self and the utility or usefulness of a given means for achieving the goal (e.g., having causal beliefs such as effort leads to goal achievement rather than attributing goal-attainment to external factors like luck). Elements of action-control beliefs include self-awareness and self-knowledge.

As previously stated, self-determination is a psychological and dispositional construct that develops over time as it is influenced by environmental factors and is measurable. Two popular methods of globally evaluating self-determination came from the early OSEP projects from the 1990s; The Arc's Self-Determination Scale (SDS) and the AIR Self-Determination Scale (AIR). Due to the reconceptualization a new global assessment of self-determination was recently developed by Shogren, Wehmeyer, Little et al. (2017) called the Self-Determination Inventory (SDI) System. A separate measure of goal-attainment often supplements global self-determination measurements warrants attention.

First, the SDS was developed in 1995 by Wehmeyer and Kelchner based on the functional model of self-determination (Wehmeyer, 2003; Wehmeyer et al., 1996). The SDS was a 72-item self-report measure yielding a total 148 points (i.e., higher points awarded on the scale indicated higher levels of self-determination) along with a breakdown of subscale scores according to the four characteristics outlined in the

functional model of self-determination (i.e., autonomy, self-regulation, psychological empowerment, and self-realization). The SDS was normed with 500 adolescents with intellectual and learning disability with results indicating adequate reliability and validity for use with this population of individuals (Wehmeyer, 1996). Additional studies verified the theoretical structure of the SDS and provided evidence supporting the four related but distinct subscales which contribute to the construct of self-determination (Shogren et al., 2008). The SDS has been documented extensively in published literature and has built a sufficient evidence base indicating links between overall measures of self-determination and contextual factors (e.g., disability category, setting/environmental characteristics) as well as an outcome measure for interventions designed to develop self-determination skills (Shogren & Wehmeyer, 2017). For example, Wehmeyer et al. (2011), examined the impact of the intervention Whose Future is it Anyway? (WFA; Wehmeyer & Lawrence, 1995) on the self-determination of 493 middle and high school students receiving special education services. The treatment group received instruction in WFA, and teachers received ongoing coaching and supports throughout the intervention. The control group received a specially designed placebo intervention that was not expected to directly affect students' self-determination and transition knowledge along with ongoing coaching and supports throughout the intervention. Results indicated the WFA intervention had a positive effect as their self-determination and transition knowledge and skills across both middle and high school improved, evidenced by significant time effects for SDS, $F(1, 492) = 8.03$, $p < .005$, and AIR, $F(1, 492) = 4.92$, $p < .03$, as well as a significant Time × Treatment Group effects for AIR, $F(1, 492) = 6.22$, $p < .01$.

Next, the AIR was developed in 1994 by Wolman and colleagues. The AIR includes student, parent, and educator forms with 24-items with 90 total points yielding a percentage level of self-determination by combining results measuring capacity (e.g., things students do pertaining to self-determination and how students feel about performing self-determined behaviors) and opportunity subscale scores (e.g., perceptions of students' opportunities to perform self-determined behaviors at school and at home). The AIR was normed with 450 students with and without disabilities (intellectual disability included) and results indicated that the AIR has adequate reliability and validity to measure capacity and opportunity for self-determination (Wolman et al., 1994). Shogren et al. (2008) confirmed the theoretical structure of the AIR and established two related and distinct subscales (i.e., capacity and opportunity) contribute to the construct of self-determination. In addition to the study illustrating the effects of using AIR and SDS as a measure to indicate intervention effects of SDLMI (Wehmeyer et al., 2011), Wehmeyer et al. (2012) conducted a group-randomized, modified equivalent control group design study one year later with 312 high school students with cognitive disabilities to examine the impact of the SDLMI on self-determination implemented over 2 years. The treatment group received instruction in the SDLMI while the control group continued with typical classroom instruction in transition skills and self-determination. Within-group comparison results indicated that significant improvements were made between baseline and the final measures of self-determination at the end of year two according to both SDS and the AIR for both treatment and control groups; although, the treatment group ($d < .24$ on SDS; $d < .31$ on AIR measures) demonstrated greater degrees

of improved self-determination compared to the control group ($d < .05$ on SDS; $d < .01$ on AIR measures).

To summarize, the AIR differs from the SDS because the SDS measures students' overall or global self-determination which serves as a snapshot of a student's overall self-determination at one point in time. It does not explain why a student is more or less self-determined and it accounts for limited opportunities to engage in self-determined actions by the way in which questions are worded. The AIR measures capacity and opportunities that may impact self-determination development; the AIR, on the other hand, explicitly measures opportunity and capacity for self-determination at any point in time. AIR can be expected to be more responsive to changes in capacity and opportunity than SDS, and SDS can be more responsive to maturational changes. Thus, SDS and AIR measure different things, so teachers and interventionists can choose the assessment that best aligns with their needs.

Finally, the reconceptualization of self-determination in context of the Causal Agency Theory initiated the need for a new self-determination assessment. Most recently, Shogren, Wehmeyer, Little, et al. (2017) developed the SDI. Causal Agency Theory is derived from the functional model of self-determination; therefore, the SDI contains elements of the SDS plus additional domains of self-determination identified by Shogren et al. (2015). The SDI has student, parent, and teacher forms with 21-items that yield an overall percentage of self-determination by averaging percentages according to three subscales (i.e., volition action, agentic action, and action-control beliefs) and corresponding elements. Currently, pilot studies are being conducted to validate the SDI with large samples of students with and without disabilities (including students with

intellectual disability). Preliminary results indicate the tool has strong measurement properties for students with and without disabilities and confirms the Causal Agency Theory can be assessed (Shogren et al., 2017).

Self-Determination as a Predictor of In-School and Post-School Success

Currently, researchers have identified 20 in-school predictors of improved post-school outcomes for students with disabilities (Mazzotti et al., 2016; Test et al., 2009). Pertinent to this dissertation, one example of a predictor that is addressed through the proposed intervention includes goal-setting, a component of self-determination which is linked to improved education and employment outcomes that involves determining how you are going to accomplish what you want through self-set goals, determining plan for action, and measuring success with self-monitoring (Rowe et al., 2015). Second, self-determination/self-advocacy is a predictor which is linked to improved education and employment outcomes and involves the ability to make choices, solve problems, set goals, evaluate options, take initiative to reach one's goals, and accept consequences of one's actions (Rowe et al., 2015). Third, social skills are a predictor which is linked to improved education and employment outcomes and involves behaviors and attitudes that facilitate communication and cooperation through social conventions and social problem-solving (Rowe et al.). A final example, student support, is a predictor which is linked to improved post-school outcomes in education, employment, and independent living involving a network of people (e.g., family, friends, educators, adult service providers) who provide services and resources in multiple environments to prepare students to obtain their transition goals aligned with their preferences, interests, and needs (Rowe et al.).

When interventions supporting skill development in self-determination are implemented systematically for youth with intellectual disability, positive changes in self-determination (Lee et al., 2011; Wehmeyer et al., 2011, 2012, 2013;) can lead to improved post-school outcomes (Shogren et al., 2012; Shogren et al., 2015). Increased self-determination is gaining attention as a valued outcome across various domains (e.g., academic, employment, social, behavioral, functional) for all students, including those with intellectual disability (Shogren et al., 2016). For instance, Shogren, Wehmeyer, Lane et al. (2017) suggest embedding tiered self-determination interventions (e.g., SDLMI) within an MTSS framework to provide a range of supports including coverage for individuals requiring the most intensive and individualized supports (e.g., students with intellectual disability, autism).

Advantages of Self-Determination Interventions

Several research-based published curricula lend to the effectiveness of self-determination interventions. First, *Whose Future is it Anyway?* (WFA; Wehmeyer & Lawrence, 1995) is a curriculum outlining a student-directed process with 36 lessons that potentially provide varying levels of support for students with intellectual disability in middle and high school to learn skills that enable them to meaningfully participate in their transition planning meetings. WFA provides instruction in specific components of self-determination including self- and disability awareness, decision making and problem solving skills to impact transition-related outcomes, self-advocacy skills needed for identifying and securing community resources to support transition services, and self-evaluation skills needed to write and monitor progress in transition goals and objectives. An initial field test by Wehmeyer and Lawrence (1995) included 53 students with

disabilities. Results indicated the positive impact on increased self-determination according to AIR measures, self-efficacy according to The Self-Efficacy Scale (Sherer et al., 1982), and involvement in transition planning meetings that students experienced by participating in the WFA process according to questionnaires. Later, Wehmeyer et al., (2011) conducted a follow-up randomized group study with 493 middle and high school students with disabilities. Findings reported consistent results, students who participated in WFA had significantly higher levels of self-determination according to SDS and AIR (Pillai's Trace = .124, $F(2, 488) = 34.41$, $p < .001$, partial $\eta 2 = .124$) measures and higher levels of transition knowledge and skills ($F(1, 332) = 13.15$, $p < .001$), compared to the control group. Finally, more evidence of the effectiveness of WFA was indicated in the randomized trial study by Lee et al. (2011) compared the impact of WFA with and without the use of technology (i.e., *Rocket Reader*, a computer-based reading support program) on student engagement for 168 middle school students with disabilities. The control group accessed WFA without *Rocket Reader* while the experimental group accessed WFA with *Rocket Reader.* Similar effects were reported as increased levels of self-determination and transition knowledge and skills were found for both groups. The group who received supplementary supports via *Rocket Reader* outperformed the control group who did not receive supplementary technology supports on self-determination measures indicated by SDS and AIR measures, Wilk's $\Lambda = .93$, $F(5, 159) = 2.46$, $p < .05$, $\eta 2 = .07$ particularly in self-regulation, $F(1, 163) = 12.47$, $p < .01$, partial $\eta 2 = .07$. Thus, this study provides additional support for self-determination interventions can be enhanced by incorporating technology.

Next, *The Self-Directed IEP* (SDIEP), one component of the *ChoiceMaker Self-Determination Transition Curriculum* (Martin & Marshall, 1995), has effectively taught students with intellectual disability self-determination skills related to meaningful participation in transition planning meetings. Students learn to prepare and conduct their transition planning meetings through an 11-step process (i.e., stating the purpose, introducing attendees, reviewing past and present goals with status of progress, stating new goals, summarizing the meeting, and closing the meeting by thanking attendees). A randomized control group study by Martin et al. (2006) included 130 secondary students and 764 IEP team members verified by interview results. Observations using 10 s momentary times sampling indicated positive outcomes for students participating in SDIEP, specifically in measurements related to (a) attending more meetings; (b) being more actively engaged and showing more leadership during meetings; (c) self-advocating by expressing their interests, skills, and needs across educational, employment, and community environments; and (d) remembering their goals after the meeting. Seong et al., (2015) conducted another randomized control design with 338 students with disabilities. Students in the control group did not receive instruction to enhance self-determination while students in the treatment group received instruction in the SDIEP. Significant effects were found for the treatment group, Pillai's Trace = 0.03, $F(3, 333) = 3.47$, $p < .05$, indicating an overall enhanced transition and self-determination skills resulted for students who participated in the SDIEP intervention according to SDS, AIR, and the Transition Empowerment Scale (Powers et al., 2001).

Finally, *TAKE CHARGE for the Future* (Powers et al., 1996, 1998) is a curriculum that promotes student-directed education and transition planning in three

major skill areas (i.e., achievement, partnership, and coping skills) through skill facilitation coaching, mentoring (student-selected mentors of the same gender, who share common interests, and who experience similar challenges), ongoing peer support, and parent involvement. Essentially, students are provided with instruction and materials to support identification of their transition goals, organization and leadership of transition planning meetings, and achievement of goals by applying problem-solving, self-regulation, and partnership management strategies facilitated by coaching, mentorship, and parent involvement.

Powers et al. (2001) conducted a field test with 43 youth with disabilities to test the efficacy of the intervention, *TAKE CHARGE for the Future*, to promote student involvement in transition planning. Treatment group participants were randomly assigned to participate in the intervention and control group was wait listed to participate in the intervention later and continued receiving typical classroom instruction. Results indicated that participation in the curriculum significantly increased student involvement in transition planning according to the Education Planning Assessment, a 14-point researcher-made Likert-scale questionnaire in which students, parents and teachers self-reported the degree to which students were involved in meetings, as well as observations. Large effect sizes were reported across the following variables: student educational planning (f = .71), student empowerment (f = .61; measured by the Family Empowerment Scale (Koren et al., 1992), a questionnaire for youth, families, and service providers to indicate the degree to which they manage daily situations, access services, and advocate for others), educator educational planning (f = 1.16), parent educational planning (f = .79), and and parent transition awareness (f = .67; measured by The Transition Awareness

Survey (Martin & Marshall, 1993), a 14-item questionnaire in which students, teachers, or parents indicated the extent to which they agreed with items regarding their understanding of federal transition requirements or their knowledge about the agencies that may support high school graduates with disabilities).

Additionally, a randomized control trial conducted by Powers et al. (2012) targeted 69 youth in foster care who were 16.5–17.5 years old, including those with intellectual disability, found a significant effects and large effect sizes (ES) for students who participated in *TAKE CHARGE for the Future* on self-determination, $t(116) = 2.10$, $p = .0069$, ES = 1.10, and at follow-up one year post-school, $t(116) = 2.10$, $p = .0069$, ES = 1.09. Improved quality of life was evidenced as youth were significantly more likely to utilize transition services, complete high school, obtain employment, and live in the community, $t(116) = 2.55$, $p = 0.0029$, ES = 0.61, and at follow-up one year post-school, $t(116) = 2.55$, $p = 0.0008$, ES = 0.77.

Effectiveness of Self-Determination Interventions

As previously explained, Causal Agency Theory states that causal agents act in service to freely chosen goals (Shogren & Wehmeyer, 2017). Skills and attitudes (e.g., component elements such as choice-making, goal-setting, self-advocacy) facilitate causal agency to develop over time; therefore, it is at the level of developing skills and attitudes that instruction in self-determination must occur (Shogren & Wehmeyer, 2017). To begin, teachers and interventionists must assess self-determination (e.g., review results from SDS, AID, SDI), then implement interventions with the appropriate supports to teach skills and attitudes that will ultimately enhance levels of self-determination (Shogren & Wehmeyer, 2017). While students with intellectual disability may require

more intensive supports and interventions, research suggests that students with intellectual disability can acquire self-determination to become causal agents (Shogren & Wehmeyer, 2017). Supplementing curricular instruction by systematically teaching self-determination skills such as goal setting, problem-solving, and self-monitoring benefits students with disabilities (Wehmeyer et al., 2002).

The effectiveness of self-determination interventions was first evidenced by Algozzine et al. (2001) who conducted a series of meta-analyses including nine group design intervention studies and 13 single-case intervention studies that targeted instruction related to any component of self-determination (e.g., choice-making, goal-setting, self-advocacy, etc.) and could be analyzed statistically. Results from both meta-analyses consistently indicated that when students with disabilities were provided with instruction and supports in component elements of self-determination, they were able to learn, use, an apply skills. Average effect sizes were large (1.38) and a median percentage of nonoverlapping data for single-case studies was 95% (ranging from 64% to 100%). Overall, findings suggested that students with intellectual disability primarily receive instruction in the elements of self-determination related to choice making and self-management (e.g., antecedent prompts, self-monitoring, and self-evaluation). In addition, Cobb et al., (2009) found greater effects of multicomponent interventions to promote self-determination in their metasynthesis review including seven narrative and systematic reviews published between 2000 and 2009. Thus, interventions targeting several elements of self-determination simultaneously had greater impacts on self-determination skill development compared to interventions that targeted only one component. The following

sections will detail the effectiveness of self-determination skill acquisition by common component elements used in interventions for individuals with disabilities.

Choice Making

Choice making refers to the, "selection of an item or activity from an array of options at a particular moment in time" (Romaniuk & Miltenberger, 2001, p. 2). Choice making is often a focus of research likely due to a long history of evidence suggesting that individuals with intellectual disability lack opportunities to make choices and the negative effect this had on behavior and development (Dunlap et al., 1994; Houghton et al., 1987; Wehmeyer & Bolding, 1999); therefore, justifying the importance of teaching skills related to and creating opportunities for choice making. Researchers argue that problem behavior can be an expression of preference for students with emotional and behavior challenges and for students with intellectual disability (Dattilo & Mirenda, 1987; Dunlap et al., 1995) or a means of exerting control over one's life (Wehmeyer, 1999); thus, providing choice-making opportunities may enable people with disabilities to communicate their wishes and desires appropriately.

Shogren et al. (2004) conduced a meta-analysis of 13 single-case studies that taught choice making to individuals with disabilities and challenging behavior. Overall, findings supported the benefit of providing choice-making opportunities as an intervention for problem behavior for individuals with disabilities. The authors reported that choice-making interventions resulted in treatment levels below the lowest baseline data point 65.7% of the time according to percentage of nonoverlapping data, and 42.3% of treatment points after the first zero point remained at the zero level according to

percentage zero data; which indicated that choice making interventions provide promising outcomes.

Wehmeyer and Metzler (1995) conducted a survey which measured levels of choice and levels of control. Respondents included 4,544 individuals with intellectual disability between the ages of 21 and 86 (47% female, 80% Caucasian). Results indicated that individuals with intellectual disability experienced significantly fewer choice opportunities regarding their place of residence, employment, and in which leisure and social activities they participated. Additionally, Wehmeyer and Stancliffe (1995) found that choice opportunities varied for individuals with intellectual disability based on where they lived as more choices were offered to people who lived in supported communities *vs*. in collective settings.

Recent experimental studies have contributed evidence for promoting choice-making for individuals with intellectual disabilities across age groups. First, Stephenson (2016) incorporated technology using the Choiceboard™ Creator app on an iPad© teach choice making to a 7-year-old boy with severe intellectual disability, autism, and challenging behavior. A multiple-probe across three settings (i.e., free play, morning circle, and snack; three pages were created per setting with six choice options per page) was used to test the effects of the choice-making intervention. As the student activated a picture on an iPad, the teacher placed the items within reach and indicated that the student could take one. If the student did not touch a picture after a wait of at least 10 s, the teacher removed the iPad and the items and moved to the next trial. If the student made a valid choice, or selected the object that matched the picture, he then interacted with or consumed the object. If he selected an object that did not match the picture, the

teacher removed the object and delivered the correction procedure (e.g., “You said you wanted the chips.”), while simultaneously physically prompting the student to activate the picture matching the object selected. If he touched a picture, but did not take an item, this was treated as an invalid choice and the teacher went to the next trial without correction procedures. Results indicated promising effects of the intervention used to teach choice-making, with more variability in data across free play and morning circle settings. Snack, however, had the strongest functional relation and highest levels of data for percentage of correct choices made. In terms of using choice-making to facilitate language development, the student made gains in verbally matching objects and pictures and exchanging pictures for objects and objects for pictures; suggesting improvement in language development across three settings (increased from 36 total correct responses in 138 trials across three settings at pre assessment to 99 total correct responses in 20 trials across three settings at post assessment).

Additionally, Sparks et al. (2016) conducted a multiple-probe design across six high school students between the ages of 16 and 21 years old with intellectual disability to test the impact of a choice-making training intervention. The intervention presented the students with choice-making scenarios where 10 photographs of options and alternatives were presented, five photos were related to the scenario and five were unrelated (i.e., choices for outfits to where to a job interview). A functional relation for all participants with strong trends during maintenance suggested the effectiveness of the choice-training intervention on correct choices made.

In summary, studies have shown that when individuals with intellectual disability are provided with choices, a reduction in challenging behavior and an increase in

adaptive behavior are observed (Shogren et al., 2004; Sparks et al., 2016; Stephenson, 2016). Research suggests that choice-making should be infused throughout the daily life of an individual with intellectual disability (Shogren & Wehmeyer, 2017). Supports such as visual picture cues could be provided to support students with choice making and interventions should consider increasing the complexity of choice-making as an end goal of instruction (Shogren & Wehmeyer, 2017).

Self-Advocacy

Without consensus in the field concerning the definition of self-advocacy, researchers explain that self-advocacy has been defined through the context of a civil rights movement (Williams & Shoultz, 1982) and as an act or skill (Sievert et al., 1988). Test et al., 2005) described a conceptual framework of self-advocacy that includes four components (i.e., knowledge of self, knowledge of rights, communication, and leadership). First, knowledge of self refers to knowing one's own interests, preferences, strengths, needs, learning style, and attributes of one's disability (Abery et al., 1995; Durlak et al., 1994). Second, knowledge of rights refers to knowing one's rights as a citizen, as an individual with a disability, and as a student receiving services under the Individuals with Disabilities Education Act (IDEA; Rumrill, 1999; Sievert et al., 1988). Third, communication refers to expressive and receptive negotiation, persuasion, and compromise (Wehmeyer & Schwartz, 1997), as well as body language and listening skills (Nezu et al., 1991). Finally, leadership refers to an understanding of one's role within a culture of individuals with disabilities and standing up for the rights of a group (Advocating Change Together, 2002).

Test et al. (2005) conducted a methodological review of self-advocacy studies that taught self-advocacy skills through published curricula to researcher-developed interventions. The review yielded 25 self-advocacy studies (n = 11 single-case, n = 11 group experimental, n = 3 qualitative) published between 1972 and 2004 with interventions targeting self-advocacy skills for individuals with disabilities. Although the authors cautioned interpreting results because some studies included in the review were methodologically weak (e.g., failed to collect and report procedural fidelity data), essentially findings from the review were positive, indicating individuals across disability categories and age groups can learn self-advocacy skills through published curricula and researcher-made interventions. Some examples of self-advocacy skills measured included participation in IEP or transition planning meetings, identifying services and supports, assertiveness or expressing preferences, or formally assessed self-determination (e.g., SDS, AIR). Examples of published curricula (previously described) used to enhance self-advocacy included SDIEP from Choicemaker Self-Determination Curriculum, (Martin & Marshall, 1995) and WFA (Wehmeyer & Kelchner, 1995).

As a follow up to Test et al. (2005), another review was conducted by Roberts and colleagues (2016) that included 18 empirical studies published between 2004 and 2012. One study was quantitative and correlational in nature, two studies were mixed methods, three studies were qualitative, five were single-case studies, and seven studies were group experimental. Interventions targeted instruction in employment skills, IEP leadership, self-awareness, transition knowledge, college readiness, and rights/responsibilities. Interventions addressed the four components of self-advocacy described in the conceptual framework by Test et al. (2005) including knowledge of self, knowledge of rights,

communication, and leadership and taught self-advocacy through published curricula, peer tutoring, writing strategies, employment skills training, transition planning involvement, and supporting students to lead their IEP meetings. Examples of dependent variables measured included measurements of self-determination, gains in student transition knowledge, knowledge of postsecondary education rights and accommodations, and self-awareness. This review highlighted that students with learning disabilities were overrepresented when compared with other disability categories. Weaknesses in methodology were still an issue as only one group experimental and one single-case design study met quality indicators out of the 11 total experimental studies (National Secondary Transition Technical Assistance Center, 2007).

Research has demonstrated the effects of teaching self-advocacy for students across age groups and disability categories. First, Neale and Test (2010) examined the impact of the *I Can Use Effort* strategy on the quality of student verbal contributions and IEP participation of third and fourth grade students with learning disabilities. The *I Can Use Effort* strategy was implemented through five lessons lasting 25 min each incorporating the *I CAN* mnemonic to develop an understanding of how students were expected to contribute to the IEP planning meeting (i.e., Identify your skills, Check your learning choices, Answer the inventory sheets, and Name your goals), followed by the *EFFORT* mnemonic to teach and model behaviors that were expected in the meeting (i.e., Eye contact, Face the person, Facial expression, Ok posture, Relax, and Tone of voice). Using a multiple-probe design across four participants, results indicated a functional relation between the *I Can Use Effort* strategy and the quality of students' verbal contributions related to the IEP process and students' learning strengths and preferences

measured by a list of researcher-made probes scored using a 4-point Likert scale (0 = *no response given or "I don't know,"* 1 = *response did not relate to question*, 2 = *response was related to question but not with specific detail*, and 3 = *response was specific and with detail*). Examples of probes required students to list their strongest/weakest study skills, state the size of study group that works best for them, and name classroom behaviors that they think should be improved. In addition, maintenance data indicated that students maintained high levels of understanding the *I Can Use Effort* strategy according to the Likert scale for up to two weeks post intervention.

Next, Cuenca-Sanchez et al. (2012) conducted a group experimental study with 21 seventh graders with emotional and behavioral disabilities to test the effects of the Self-Regulated Strategy Development (SRSD) model instruction with a self-determination component on students' writing and self-determination; specifically students were taught to self-advocate using persuasive writing. The intervention consisted of SRSD which involved six stages of instruction including: (a) developing background knowledge, (b) discussing the strategy, (c) modeling of the strategy, (d) memorization, (e) collaborative support, and (f) independent practice (Harris et al., 2008). During instruction, four strategies for self-regulation were emphasized: goal setting, self-instruction, self-monitoring, and self-reinforcement. Mnemonic devices such as POW+TREE support SRSD instruction (i.e., POW stands for Pick my idea, Organize my notes, Write and say more; TREE stands for Topic Sentence, Reasons, Explanations, and Ending; Graham & Perin, 2007). Seven Powerful Self-Determined Behaviors chart and diagram that depicted behaviors (i.e., make a good choice, set a goal and plan, self-awareness, apply problem solving strategies, self-advocacy, monitor and evaluate

progress, and self-efficacy) was used as a self-determination component along with a self-determination contract adapted by Martin et al. (2003) which noted students' start and end time of writing, writing goal, strategy used, and evaluation of performance. Researcher-made scripted lesson plans, supplementary charts, and contracts were provided to treatment teachers. The control group used *Write Traits* classroom kit (Spandel, 2002) to teach writing. Sessions lasted for 30 min, four times a week, over 33 days. Results indicated support for using the intervention to improve writing and self-advocacy as students in the treatment group outperformed the control group at posttest in number of words written, $t(19) = 3.64$, $p < .001$; number of sentences, $z = -3.18$, $p < .05$; transition words used, $z = -3.28$, $p < .05$; number of paragraphs, $z = -3.34$, $p < .05$; number of essay parts, $t(19) = 4.59$, $p < .001$; essay quality $t(19) = 4.75$, $p < .001$; self-efficacy measures, $t(19) = 2.24$, $p = .037$; self-determination knowledge, $t(19) = 6.72$, $p < .001$; and self-determination questionnaire responses, $t(19) = 2.29$, $p = .033$. Teacher and student interviews qualitatively verified the quantitative results reported above.

Finally, Cease-Cook et al. (2013) conducted a multiple-probe design across five high school students with intellectual disabilities to determine the effects of the CD-ROM version of the S*elf-Advocacy Strategy* on quality of contributions in IEP meetings. The intervention involved a computer-based program with five lessons lasting 45 min each. Explicit instruction presented via the computer program taught students self-advocacy by providing a definition with examples and models, including participation in the IEP meeting using the mnemonic IPLAN (Inventory, Provide inventory, Listen to what others say and respond at appropriate times, Ask questions, and Name your goals) as well as teaching behaviors expected in meetings through the use of the mnemonic SHARE (i.e.,

Sit up straight, Have a pleasant tone of voice, Activate your thinking, Relax, and Engage in Eye contact). The dependent variables measured IEP contributions using the same 4-point Likert scale described previously by Neale and Test (2010). Results indicated a functional relation between using the CD-ROM version of the S*elf-Advocacy Strategy* and students' quality of contributions in their IEP meetings. In addition, all five students maintained skills for four weeks and generalized skills to their actual IEP meeting.

Self-Management

Self-management interventions are designed to create opportunities for students to practice the skills necessary to regulate their own learning and behavior. Some combination of the following strategies may be involved in self-management interventions: self-monitoring (i.e., self-observation, self-recording), self-evaluation, and self-reinforcement (Agran et al., 2003).

One form of self-management is antecedent cue regulation strategies (e.g., low- or high-tech visual picture/video, audio, text cues) which have been researched and results demonstrate positive effects for individuals with intellectual disability to learn self-management skills to support academic and transition related tasks (Davies et al., 2001; Mechling & O'Brien, 2010). Another form of self-management is self-monitoring which involves teaching students to record whether they have performed a targeted behavior. Research indicates positive outcomes across academic (Agran et al., 2005; Cihak, Wright, & Ayres, 2010; Gilberts et al., 2001; Hughes et al., 2002) and employment environments (Nittrouer et al., 2016; Woods & Martin, 2004) when self-monitoring is taught to individuals with intellectual disability. An additional component of self-management is self-evaluation which involves teaching students comparing their

performance, often through self-monitoring, with a specified target goal. Finally, the component of self-management known as self-reinforcement provides the opportunity for students to independently self-select and self-administer reinforcement that is accessible, immediate, and aligned with their preferences.

Next, Briesch and Chafouleas (2009) reviewed and analyzed literature featuring studies published between 1988 and 2008 on self-management interventions that promoted appropriate classroom behavior. A total of 30 studies were identified with 106 participants at the average age of 11 years old with and without disabilities. All of the students with disabilities had high-incidence disabilities (e.g., learning disabilities, emotional and behavioral disabilities, attention deficits). A total of 16 components of self-management interventions were identified, but only four components (i.e., select target behavior, define target behavior, observe target behavior, and record target behavior) were consistently used across all 30 studies. Only half of the studies involved an evaluation component for behavioral outcome variables. Overall, self-management interventions were found to be a promising method of promoting appropriate classroom behavior as effect sizes indicated a very strong effect for group studies (d = 2.30) and a moderate effect for single-case studies (PND = 76.30%). The authors urged caution when interpreting effects due to methodological weaknesses in study design and weak operational definitions of self-management yielded 16 distinct components.

In another systematic review, Bruhn et al. (2015) synthesized 41 studies published between 2000 and 2012. Studies reviewed specifically focused on the role of various elements (e.g., reinforcement, feedback, function, and technology) within self-monitoring interventions for students in Kindergarten through 12th grade with and without high-

incidence disabilities with behavior problems. One group design study, one study that failed to describe the design, and 39 single-case design studies were found in the search. Most often, on-task behavior was the dependent variable measured (*n* = 22 studies; 54%), eight studies (19.5%) programmed for generalization, and nine studies (22%) programmed from maintenance. Across all studies, participants were requested to self-monitor 53 different behaviors including remaining in assigned seat (*n* = 3), completing assignments (*n* = 5), and off task behaviors (*n* = 11). Reinforcement was provided in 25 studies (61%), with one study delivering noncontingent reinforcement and 24 studies delivering reinforcement contingent upon meeting a predetermined goal, following a procedure, or accurate recording. Additionally, feedback (i.e., from teachers, peers, other service providers) was included as a component of self-monitoring in 25 studies. Functional behavioral assessments were conducted prior to using self-monitoring as an antecedent intervention in 8 studies. Finally, 22 studies incorporated technology as a prompt for students to record behavior (e.g., kitchen timers, MotivAider or electronic vibrating pager, cell phone, or audio recordings) or as a medium for recording behavior (e.g., recording and graphing behavior using a handheld device, computer, and cell phone). Results indicated positive changes in student behavior documented through self-monitoring in every study suggesting self-monitoring is a powerful tool to facilitate behavior change in students with high-incidence disabilities.

Recent empirical studies offer additional support for using self-monitoring as an intervention to promote appropriate behavior for students with intellectual disabilities across grade levels. First, Wadsworth et al., (2015) conducted a multiple baseline across participants design including three elementary students with intellectual disability

between the ages of 7 and 9. The intervention involved teacher-monitoring and self-monitoring which was used to address noncompliance behavior for the three participants. The primary function of noncompliance behavior was determined to be escape through functional behavioral assessments conducted prior to the intervention. The three students were provided with a laminated sheet with four boxes, three boxes corresponding Velcro tokens and the fourth box was a visual reminder of their reward (break card). First, during teacher-monitoring, students earned a token and 10 s of play break for each instance of compliance with a work request. When three tokens were earned, and all boxes were filled they earned the break reward. Then, when compliance increased to 80% for two sessions, monitoring responsibilities shifted to the students and procedures continued as students self-monitored using the token system. Results indicated a functional relation suggesting the self-monitoring intervention effectively addressed challenging behavior as levels of compliance increased immediately in response to the intervention. High levels of compliance behavior were maintained as students self-monitored and the schedule of reinforcement was thinned from every fourth occurrence of compliant behavior to every seventh.

Bruhn et al. (2016) conducted a single-case reversal design plus maintenance to determine the effects of a multicomponent, self-monitoring app on an iPad during reading classes for two students in sixth and seventh grade with behavioral and learning problems receiving special education. The dependent variables included academic engagement and disruptive behavior. The intervention took place during *Read 180* instructional time which consisted of 90 min in total where students were provided with whole group instruction for the first 20 min, then divided into three groups to rotate through various

reading tasks (i.e., independent reading, computer-based reading activities, and small group instruction). Expected behaviors during Read 180 were operationally defined as be respectful (e.g., listen to other, follow directions, use appropriate language), be responsible (e.g., working carefully on assignments, ask for help if needed), and be ready (e.g., be prepared and on time) Students were responsible for self-monitoring their behavior using the author-created app, *SCORE IT*, during *Read 180* on a Likert scale from 0–4 (0 = *never*, 1 = *a little*, 2 = *sometimes*, 3 = *a lot*, 4 = *always*; a total of 60 points could be earned across the three behavior expectations in five recording sessions, if the student received a four each time resulting in 100% accuracy). In addition, teachers scored students' behavior in the app which showed student and teacher scores simultaneously and provided feedback to students regarding their scores. For both students, results indicated favorable outcomes when using the self-monitoring app as levels of academic engagement increased and levels of disruptive behavior remained lower. The intervention effectively addressed challenging behavior and demonstrated that students were able to meet behavior goals (set at 42/60 points, or 70%) and earn reinforcement (e.g., food or tickets that could be exchanged for a higher value reinforcer).

Finally, Clemons et al. (2016) examined the impact of self-monitoring using I-Connect for three high school students between the ages of 15 and 17 with learning disability, autism, and intellectual disability respectively. Using a reversal design, on-task behavior was measured when the I-Connect app on a cell phone was present for students to self-monitor. The app prompted, "Are you on task?" and provided the opportunity for the student to indicate yes or no via the touch screen. This prompt was issued every 1 min for students with learning disability and autism or every 30 s for student with intellectual

disability. Students were trained to learn what on-task behavior was and learned how to self-monitor using I-Connect through modeling. Results indicated a functional relation for all three students as percentage of on-task behavior increased and levels remained consistently high during the intervention phase. In contrast, the percentage of on-task behavior were lower without the presence of the self-monitoring app. Overall, using I-Connect demonstrated positive effects by increasing levels of on-task behavior and maintaining high levels of on-task behavior for up to four weeks post-intervention.

Goal Setting and Attainment

Goal setting and attainment are operationally defined as a component of self-determination that involves determining how one will accomplish what one wants by self-setting specific goals, determining a plan for action, and self-monitoring or measuring success (Rowe et al., 2015). According to a meta-analysis by Harkin et al. (2016) featuring 138 studies including students with and without disabilities, there is evidence to suggest monitoring goal progress is an effective self-regulation strategy, and interventions that increase the frequency of progress monitoring are likely to promote behavior change as increased goal attainment correlates positively with more frequent goal progress monitoring. Bruhn et al. (2016) provided more evidence supporting the use of goal-setting interventions to address challenging behavior for K–12 students with high-incidence disabilities and without disabilities through a systematic review of 40 studies (18 group design and 22 single-case). Overall, results were positive for interventions indicating behavior goal setting was often taught in elementary schools in the capacity of focused goal setting (n = 4 studies), social problem solving (n = 7 studies), self-management (n = 7 studies) and using check-in-check-out variations (n = 22

studies). Additional empirical research has supported the use of specific goal setting interventions, such as those using the SDLMI and incorporate technology, described previously (i.e., Mazzotti et al., 2012, 2013), to effectively teach goal setting to individuals with disabilities.

SDLMI. Cobb et al. (2009) suggested that effects were stronger when students participated in multicomponent interventions that promote self-determination. SDLMI (Wehmeyer et al., 2000) is an example of a well-researched multicomponent intervention consisting of student-directed, self-regulated problem-solving skills to promote goal-directed action. Defined as, "a plan or pattern that can be used to shape curriculums (long-term courses of study), to design instructional materials and to guide instruction in the classroom and other settings" (Joyce & Weil, 1980, p. 1).

The SDLMI student-directed process is initiated by a series of four *Student Questions* per each of the three parts of the SDLMI (i.e., set a goal, make a plan, adjust the goal or plan). Each *Student Question* is facilitated by a list of *Educational Supports* and linked to corresponding *Teacher Objectives*. The *Student Questions* are designed to prompt students through a problem-solving process applicable across a variety of domains (e.g., academic, social, behavioral, transition). While the four student questions differ across each part to guide students through setting a goal, making a plan, and adjusting the goal or plan, the questions follow a similar problem-solving sequence including (a) identify the problem, (b) identify possible solutions to the problem, (c) identify barriers to solving the problem, and (d) identify consequences for each solution. The *Student Questions* are merely a starting point for discussion; thus, additional supports provided through presentation of *Educational Supports* and *Teacher Objectives* can be

adapted to meet students' needs while maintaining the integrity of the structure of the program.

Effectiveness of the SDLMI. Research suggests the SDLMI is appropriate for students with and without disabilities across various content areas and can be adapted to support students with intellectual disability. The first field test of the SDLMI, conducted by Wehmeyer et al. (2000) included 21 teachers of students with disabilities (including intellectual disability) and demonstrated the viability of using the SDLMI to enable students to engage in goal-setting and attainment as students who received instruction in the SDLMI made more progress on their goals and a large percentage of students made more progress on their goals than their teacher expected. In addition, Agran et al. (2000) and McGlashing-Johnson et al. (2003) demonstrated the efficacy of using the SDLMI to teach goal-setting to students with severe disabilities through single-case design studies as students set education and employment-related goals and made progress on the goals.

A series of large randomized group design studies examined the impact of the SDLMI on self-determination, goal setting and goal attainment, and access to the general curriculum. First Lee et al. (2008) tested the effect of the SDLMI on access to the general education curriculum for 45 students with intellectual or learning disability in an a randomized-control trial. Students selected to receive instruction in the SDLMI learned to set and attain goals related to core content areas in the general education classroom. Students were observed in the classroom using momentary time sampling and data were collected on student goal attainment using Goal Attainment Scaling (GAS). The preliminary results indicated positive effects of the SDLMI on access to the general education curriculum, self-determination, and academic goal attainment. Wehmeyer et al.

(2012) extended these preliminary findings in a larger-scale group modified equivalent randomized-control study with 312 high school student with intellectual or learning disability. Significant differences were found between treatment and control groups after two years of intervention. Shogren et al. (2014) conducted an extension study to determine teachers' perspectives of student capacity and opportunity for self-determination and found that when teachers were trained and supported to implement the SDLMI, there were significant increases in perspectives of student capacity and opportunity for self-determination according to AIR measures. Finally, in a follow-up study including students who were involved in a previous study by Wehmeyer et al., (2012), Shogren et al. (2015) found that self-determination status when exiting school predicted more positive employment outcomes one year after school, employment status one year after school predicted employment status two years after school, and greater community access was predicted at year one and year two.

Summary of Self-Determination

Early models of self-determination stemmed from OSEP projects that were based on a need to develop model demonstrations of self-determination theory, assessment, and intervention. Most recently, self-determination has been reconceptualized as Causal Agency Theory (Shogren et al., 2015) which stemmed from a functional model of self-determination (Wehmeyer, 2003). Several measurements of self-determination (e.g., The Arc's Self-Determination Scale; Wehmeyer & Kelchner, 1995) and published curricula (e.g., WFA? Wehmeyer & Lawrence, 1995) have been developed to support self-determination skill development for student with and without disabilities.

When interventions supporting skill development in self-determination are implemented systematically for youth with intellectual disability, positive changes in self-determination result (Lee et al., 2011; Wehmeyer et al., 2011, 2012, 2013). Positive changes in self-determination are linked to improved post-school outcomes (Shogren et al., 2012; Shogren et al., 2015). Cobb et al. (2009) suggested that effects were stronger when students participated in multicomponent interventions that promote self-determination (e.g., The SDLMI, Wehmeyer et al., 2000). Research synthesized within each strand of this literature review offers support for the method and design described in the following chapter.

CHAPTER 3: METHOD

This study employed a single-case multiple-probe design across participants (Cooper et al., 2020; Horner & Baer, 1978) to determine the effects of function-based, computer-assisted SDLMI on knowledge of SDLMI and on-task behavior for youth with extensive support needs. Youth received special education services in a self-contained classroom at a suburban high school and participate in work-based learning activities in the classroom setting. In addition, student levels of self-determination and the application of goal setting were measured. The following sections describe participants, setting, experimental design, dependent variables, procedures, data analysis, potential threats to validity, social validity, and generalization.

Institutional Review Board

Prior to data collection, approval for conducting research with human subjects was obtained by the researcher from the University of North Carolina at Charlotte Institutional Review Board. In addition, the researcher obtained written consent from the school district, principal, teachers, student parents or guardians, and student participants. Informed consent was obtained from parents or guardians without undue inducement, force, fraud, duress, or any form of constraint or coercion. Only after parents or guardians provided consent were students participants asked to provide assent to indicate their willingness to participate in the study. All parties were informed of their rights and they were assured that they could terminate participation at any time without penalty. See Appendix A for consent forms for teachers/job skill supervisors, Appendix B for consent forms for parents, and Appendix C for consent and assent forms for students.

Participants

Two classroom teachers (pseudonyms used throughout) were recruited based on if the students served (i.e., students with extensive support needs, intellectual disability, autism, challenging behavior across classroom and job skill settings) met the inclusion criteria. Teacher assent to participate in the study was obtained prior to teachers identifying potentially eligible students. Students had to meet the following inclusion criteria: (a) received special education services under IDEA and require extensive supports (e.g., diagnosis of intellectual disability, autism); (b) were between the ages of 13 and 22; (c) exhibited challenging behaviors across school and job skill settings (e.g., off-task, distractibility, incomplete work, require multiple requests/proximity from teacher to complete tasks); (d) on-task behavior observed in less than 70% in baseline observation intervals; and (e) had good attendance (missed fewer than 10 days in the previous school year). After teachers identified student participants, parental consent and student assent was obtained prior to participation in the study. Three high school students who required extensive supports were recruited for participation in this study. The following sections describe teacher and student participants.

Teacher Participants

After IRB and county approval was obtained to conduct research, two teachers were recruited based on the students they served. Teacher participants also served as job skill supervisors for student participants as student participants were not yet of age to attend work off campus. Demographic data are provided for Ms. Penny and Mr. Leonard.

Ms. Penny. Ms. Penny was a White/Indian female, in her first year of teaching students following the Occupational Course of Study (OCS). One student participant

(Tomer) was assigned to Ms. Penny's caseload and required extensive supports to access academic content. Ms. Penny completed her Bachelor's degree in Special Education and is currently enrolled in coursework pursuing her Master's degree in Special Education. Ms. Penny reported using technology-assisted instruction in class regularly, but she had no prior experience with the SDLMI.

Mr. Leonard. Mr. Leonard was a White male in his second year of teaching. Two student participants (Pietro and Yael) were on Mr. Leonard's caseload and participated in the Social and Academic Instruction for Life (SAIL) program; therefore, his students received extensive supports and adaptations of the general curriculum. Mr. Leonard's previous experience included four years of working with individuals with disabilities in various capacities (i.e., in a youth detention center, as an ABA technician, and as a part-time teacher). Mr. Leonard obtained a degree in Criminal Justice; however, as a lateral-entry teacher, he is currently enrolled in special education coursework. While technology-assisted instruction is often incorporated in Mr. Leonard's class, he reported no prior experience with the SDLMI.

Student Participants

Teachers identified the three student participants (pseudonyms used throughout) based on each student's unique behavior needs and meeting inclusion criteria as defined above. Demographic data are provided for Tomer, Pietro, and Yael in the following sections.

Tomer. Tomer was a White 15-year-old male, in 9th grade following OCS in Ms. Penny's class. Tomer received special education services under the disability categories intellectual disability and educational autism. Most recent results from formal testing

indicated a broad achievement score of 44 (<0.1 percentile, extremely low range), broad reading score of 46 (<0.1 percentile, extremely low range), broad math score of 57 (<0.2 percentile, extremely low range), and broad writing score of 40 (<0.1 percentile, extremely low range) on Woodcock Johnson Tests of Achievement – IV (Woodcock, McGrew, & Mather, 2007). According to the Autism Diagnostic Schedule, Second Edition (ADOS-2; Gotham, Risi, Pickles, & Lord, 2012), These scores suggest a moderate level of intellectual disability. Tomer has a severe articulation delay characterized by omissions and substitutions. Additionally, receptive and expressive scores were more than two standard deviations below the mean. These results were consistent with results from Vineland-3 Adaptive Behavior Scales (Vineland-3; Sparrow, Cicchetti, & Saulnier, 2016) and reflected pervasive expressive and receptive language deficits across settings. Results on the Adaptive Behavior Assessment System (ABAS-III; Harrison & Oakland, 2015) indicated a general adaptive composite score of 80 (9^{th} percentile), a conceptual score of 78 (7^{th} percentile), a social score of 80, (9^{th} percentile), and a practical score of 84 (14^{th} percentile). These results were consistent with the classroom teacher's measures of academic performance (i.e., reading 52 words per min at the second grade level and math proficiency at second grade equivalency) suggesting the Tomer has limitations in short-term/working memory, attention/control, use of language vocabulary, auditory processing, word reading, sentence completion, math computation, written/expressive language, interpersonal skills, and daily living skills.

Tomer's challenging behavior in the classroom was operationally defined as being disengaged from the learning environment by distracting the teacher, other students or self; inhibiting engagement in classroom materials (e.g., not looking at materials for more

than 3 s, head down, on computer or having computer/head phones out on desk when not necessary), talking unrelated to current activity/lesson for more than 3 s, bothering other students/instructor by touching, poking, or making noises for more than 3 s, out of seat/learning area without permission for more than 3 s. The function of Tomer's challenging behavior in the classroom was attention (see the FBA results section, p. 129, for more detail).

Pietro. Pietro was a 14-year-old White male in 9th grade receiving special education services in Mr. Leonard's class under the disability categories educational autism and intellectual disability. According to the most recent formal testing using standard scores from the Universal Nonverbal Intelligence Test – Second Edition (UNIT2; Bracken & McCallum, 2016), Pietro's full scale Intelligence Quotient was 52, working memory was 57, reasoning was 61, symbolic was 58, non-symbolic was 59, and visual motor was 52 (<.01 percentile, very low in all areas). ABAS-III scores were extremely low on parent and teacher forms with a general adaptive composite of 44 for parent and teacher, 53 and 57 for parent and teacher respectively for conceptual measures, and 40 and 45 for parent and teacher respectively for practical measures, 60 and 55 for parent and teacher respectively for social measures. These results were consistent with the classroom teacher's measures of academic performance (i.e., reading the second-grade level and math proficiency at second grade equivalency) and suggest a moderate level of intellectual disability.

Pietro's challenging behavior in the classroom was operationally defined as being disengaged from the learning environment by distracting the teacher, other students, or self; inhibiting engagement in classroom materials (e.g., not looking at materials for more

than 3 s; looks away from materials or instruction for more than 3 s; looks at the lesson but does not engage/respond within 3 s when prompted; prompted more than twice to engage or respond to lesson/materials), making noises (e.g., asking "What happens if I scream?", dropping pencil). The function of Pietro's challenging behavior in the classroom was escape (see the FBA results section, p. 131, for more detail).

Yael. Yael was a 15-year-old White female in 10th grade receiving special education services in Mr. Leonard's class under the disability categories educational autism and intellectual disability. Vineland-3 results on most resent formal testing indicated an Adaptive Behavior Composite of 32. ABAS-III scores were extremely low on parent and teacher forms with a general adaptive composite of 60 for parent and 45 teacher, 63 and 51 for parent and teacher respectively for conceptual measures, and 58 and 50 for parent and teacher respectively for practical measures, 65 and 57 for parent and teacher respectively for social measures. Standard score results were very low (<.01 percentile) on the Differential Ability Scales-II (DAS-II; Elliott, 2007) indicated a general composite of 32 verbal score of 30, nonverbal score was 43, and spatial was 34. Yael struggles with limitations in speech language development. These results were consistent with the classroom teacher's measures of academic performance (i.e., reading the first-grade level and math proficiency at first grade equivalency) and suggest a moderate level of intellectual disability.

Yael's challenging behavior in the classroom was operationally defined as being disengaged from the learning environment by distracting the teacher, other students, or self; inhibiting engagement in classroom materials (e.g., not looking at materials for more than 3 s; looking at nails, self-stimulation using hands/hair), bothering other

students/teacher (e.g., making loud vocalizations which are often incoherent, singing, talking), being out of seat/learning area without permission for more than 3 s. The function of Yael's challenging behavior in the classroom was automatic (see the FBA results section, p. 134, for more detail).

Setting

The setting was two self-contained classrooms located in a public high school that served both students with mild to moderate intellectual disability following extensions of the general curriculum and OCS. Approximately seven students attended each class respectively for 21%–60% of their day. Students were provided instruction in all content areas in this classroom and joined elective classes with supports and adaptations. In addition to academic content, instruction in job skills (i.e., the generalization condition) was also provided in the classroom or in a shared space as both teachers collaborated to supervise job skill training for students who were not yet 16 years old, the age in which students were provided with job skill training off campus. The intervention was implemented in a separate room within each of the classrooms to eliminate distractions.

The public high school was located in a rural district in the southeast United States. Student demographic distribution was 50% Black or African American, 6% Hispanic or Latinx, 40% White or Caucasian with 59% of students being economically disadvantaged (students receive free or reduced-priced lunch). Gender distribution at the school was relatively equivalent with 48% of the student body being female.

Materials

Eight lessons were adapted from the SDLMI to systematically teach the three parts of the SDLMI (i.e., set a goal, make a plan, adjust the plan/goal). The computer-

based lessons incorporated materials adapted from the Mazzotti et al. (2012, 2013) studies. Each of the eight lessons ranged from 8 to 15 min with an average of 15 slides per lesson. Lessons were created on a PC laptop equipped with Microsoft PowerPoint© and incorporated visuals from Google Images© for generic stock photos selected purposefully to support struggling readers with key vocabulary. PowerPoint slides were converted to video modules using the screen recording platform *Screencast-o-matic* and finally uploaded to *YouTube*©. Students were responsible for navigating the modules using their own Chromebooks provided by the school. Finally, a GoPro® video camera was used to to create permanent product recordings of all sessions for both dependent variables (i.e., knowledge of SDLMI and on-task behavior in classroom/job skill settings). See Appendix D for a sample of the narrative of function-based, computer-assisted SDLMI and Appendix E for a sample of the PowerPoint© slides.

Other materials included data sheets created by the researcher to record (a) SDLMI knowledge, (b) on-task behavior, (c) procedural fidelity checklist, (d) and interobserver agreement checklist. Social validity questionnaires for teachers, job skill supervisors and students were provided based on TARF-R (Reimers & Walker, 1988; Mazzotti et al., 2020). Additionally, pretest and posttest measures were collected to record levels of student-reported and teacher-reported self-determination using the SDI (Shogren, Wehmeyer, Little et al., 2015). Finally, goal attainment application was measured using GAS (Kiresuk & Lund, 1978).

Researcher and Outside Observer

The researcher was a third-year doctoral candidate in Special Education with four years of experience as a special education teacher, three of which were spent teaching

high school students with moderate to severe intellectual disability in a self-contained classroom. The researcher has a bachelor's degree in psychology and a master's degree in special education, adapted curriculum. As primary interventionist, the researcher was responsible for obtaining IRB approval, coordinating approval with district and school-level administration, developing the function-based computer assisted SDLMI package and corresponding measurement probes (i.e., knowledge of SDLMI and on-task behavior), facilitating administration of the SDI and GAS at pretest and posttest, being present for all data collection sessions as primary data collector, and training an outside observer to collect interobserver agreement, procedural reliability, and fidelity data.

The outside observer was a doctoral student at UNC Charlotte with 5 years of experience as a special education teacher. The outside observer was trained to collect interobserver agreement data on both dependent variables (i.e., knowledge of SDLMI and percentage of intervals on-task) across 30% all phases of the intervention after viewing video recorded intervention sessions. In addition, the outside observer was trained to collect procedural fidelity across 30% of the intervention phases.

Experimental Design

The experimental design was a single-case multiple-probe across participants (Cooper et al., 2020; Ledford & Gast, 2018; Horner & Baer, 1978). Three student participants were identified by their teachers based on the inclusion criteria. A minimum of three data points were collected during baseline, and after a stable trend was observed for all students, the first student moved into the training and intervention phases. During this time, the remaining students stayed in baseline. Intermittent baseline probes were administered at a minimum of every fourth session and concurrently for at least three

consecutive sessions prior to moving into the intervention phase (Cooper et al., 2020). Decisions for entrance into the intervention were based on researcher observations and recommendations from the teacher to determine the student who demonstrated a stable baseline trend and required the least support to move through the intervention successfully. It was necessary to start with the student who required the least support so that other students to had ample time and support in intervention as needed without stalling the intervention process. This entrance criteria applied for all students to enter intervention. New students were added into the intervention in a staggered manner when the first student met mastery criterion for Part One of the intervention and moved into the Part Two.

Dependent Variables

Data were collected on two primary dependent variables including student knowledge of the SDLMI and on-task behavior in the classroom. Three supplementary outcome variables included on-task behavior in a generalized untrained job skill setting, descriptive pretest and posttest data for levels of self-determination, and descriptive pretest and posttest data for application of goal setting. These variables are described in detail in the following sections.

Knowledge of SDLMI

The first dependent variable, knowledge of SDLMI, used a 15-item probe which was developed based on the works of Fowler (2008), Mazzotti et al. (2012, 2013), and Palmer and Wehmeyer (2003). See Appendix F for the sample Probe Data Sheet measuring SDLMI Knowledge Responses. The structure of the probes complimented the structure of function-based, computer-assisted SDLMI lessons which had three parts (i.e.,

set a goal, make a plan, adjust the plan/goal). Students received up to 8 points per section to result in a total of 24 points. The 24 points were allocated to reflect students' ability to select and state the definition of the three basic parts of the SDLMI worth 1 point each (i.e., questions to prompt setting a goal, making a plan, and adjusting the plan were counted as correct or incorrect, Palmer & Wehmeyer, 2003). Four supporting questions related to each of the three parts counted as two points each depending on the level of prompting required to select the correct answer (i.e., independently correct = 2 points, one verbal prompt provided to reach correct response on second trial = 1 point, and incorrect with more than one verbal prompt = 0 points). Probes were presented to students using a format consistent with the intervention. PowerPoint© slides unique to the student's goals were converted to video using *Screencast-o-matic* with embedded supports such as a bell to indicate when student responses were expected with a 5 s wait time. Each probe question included three choices (i.e., one correct response and two distractors). Students were provided with multiple means to respond to probes (orally, point to their answers on the screen, or use response cards) and responses were captured with the GoPro®. Correct responses were calculated item-by-item, converted to a percentage, and graphed for comparison with the second dependent variable.

On-Task Behavior

The purpose of this study was to target the function of challenging behavior and teach a replacement behavior (i.e., on-task behavior). First, challenging behavior was identified and operationally defined using the Functional Assessment Checklist for Teachers and Staff (FACTS; March, Horner, Lewis-Palmer, Brown, Crone, Todd, & Carr, 2000; Mazzotti et al., 2020). This study targeted the function of challenging

behavior determined through direct and indirect assessments including classroom observations and interviews with teachers with the intention of increasing on-task or expected behavior in the classroom or job skill settings aligned with posted classroom or job skill setting rules and expectations. Percentage of on-task behavior was measured in 15 min whole-interval observation sessions using a researcher-developed data sheet (i.e., observing 10 s, recording 5 s) during classroom instructional activities or job-related activities. Whole-interval recording was selected based on its sensitivity in extending the length of on-task behaviors because on-task behavior is credited only when students engage in on-task behavior for the entire length of the interval (Cooper et al., 2020). The same data sheets and procedures were used to measure and analyze on-task behavior data in the classroom and in the generalized job skill setting. See Appendix G for the data sheet used to collect data on on-task behavior. Correct responses indicating knowledge of the SDLMI were graphed to show comparisons to measures of students' on-task behavior (percentage of intervals engaging in on-task behavior).

Additional Measures

SDI

Pretests and posttests measuring student's self-determination were collected and analyzed using the empirically validated Self-Determination Inventory-Student Report (SDI-SR) and Self-Determination Inventory: Parent/Teacher Report (SDI-PTR; Shogren, Wehmeyer, Little, et al., 2015). The SDI-SR is an online, self-reported measure of students' self-determination. Additionally, teachers completed the SDI-PTR to assess teacher perceptions of students' changes in self-determination to highlight areas in which individual students or groups of students need additional supports. Three self-

determination constructs are measured in both student and teacher versions of the SDI including volition action, agentic action, and action-control beliefs and attitudes. Under the volition action construct, two subdomains were measured: (a) autonomy with the intent described as "acting on the basis of preference, beliefs, interests, and abilities," and (b) self-initiation with the intent described as "self-governed action." Three subdomains fall under the agentic action construct: (a) self-direction with the intent described as "responding to challenges and opportunities;" (b) pathways thinking with the intent described as "proactive, purposive identification of paths to a goal;" and (c) self-regulation with the intent described as interpersonal cognitive problem solving." Finally, three subdomains under the action-control beliefs and attitudes construct include: (a) psychological empowerment with the intent described as "beliefs about having what it takes to achieve goals;" (b) self-realization with the intent described as: "self-awareness and self-knowledge;" and (c) control expectancy with the intent described as "belief about link between self, means, and goal in a context." Level of self-determination was reported as a percentage.

GAS

In addition, teachers provided pre- and posttest measures of goal attainment using GAS (Kiresuk & Lund, 1978). The GAS was administered to teachers as pretest and posttest measures of student goal setting application. Specifically, the GAS measures the degree to which student goals are attained through five possible goal outcomes using a scale from -2 or goal attainment reflects "much less than expected" to +2 or goal attainment reflects "much more than expected." For example, a student's goal is to remain focused on an academic or job task for 15 min with 3 or fewer prompts from

teachers or job skill supervisors, the student would receive a score of 0 meeting the "expected level of outcome" if they remained on-task for 15 min with exactly three verbal prompts provided to redirect off-task behavior). Using the same goal, if a student required no verbal prompts to remain on-task, a score of +2 would be awarded; thus, the students' goal attainment would reflect "much more than expected." On the other hand, if the student required five or more verbal prompts to remain on-task during the 15 min work period, the student would receive a score of -2 reflective of attainment "much less than expected."

The GAS was administered to teachers as a pretest measure at the end of Part One of the intervention, before students begin to work on their goal. GAS posttest was administered to teachers at the end of Phase 3 following the implementation of intervention and again after maintenance data were collected. Together, teachers and students tracked changes in student goal attainment over time. See Appendix H for a Sample Goal Attainment Scale (Sharp, 2006).

Social Validity

Social validity data were collected to measure social acceptability of the goals and outcomes of the study through a post-intervention questionnaire adapted from the TARF-R (Reimers & Walker, 1988; Mazzotti et al., 2020). Social validity was administered to the student participants and special education teacher participants to consider their opinions regarding the appropriateness of behaviors targeted and effectiveness of function-based, computer-assisted SDLMI on student's abilities to (a) set goals, make plans, and adjust their plans and maintain knowledge learned; (b) the feasibility of function-based, computer-assisted SDLMI; and (c) the overall significance

of the study. Intervention outcomes were measured through questions such as: *How acceptable did you find the intervention?* Intervention goals were measured through questions such as: *How willing are you to carry out this intervention in the future?* Some questions were based on a 5-point Likert scale, while other were open-ended. See Appendix I for the teacher social validity questionnaire, Appendix J for the job skill supervisor social validity questionnaire, and Appendix K for the student social validity questionnaire.

Interobserver Agreement and Procedural Fidelity

Interobserver agreement (IOA) and procedural fidelity ensure reliability and fidelity. Intervention sessions were video recorded and a trained second observer (doctoral student) scored a minimum of 30% of sessions across all phases of the study. The sections below describe IOA and procedural fidelity procedures and measures.

Interobserver Agreement

Interobserver agreement (IOA) was conducted for a minimum of 30% of sessions across all phases of the study (i.e., Function-Based Assessment, baseline, intervention, maintenance, and generalization) to determine the extent to which two observers reported the same results when observing and measuring the same event (Cooper et al., 2020). These data ensured that target behaviors were clearly defined, and measures were consistent, reliable, accurate, and replicable (Cooper et al.). Another researcher (doctoral student) viewed video recordings of the sessions together with the lead researcher and recorded data on both dependent variables. Prior to collecting and scoring IOA data, the primary researcher and the second researcher scored sample sessions until 90% agreement or greater was achieved for three consecutive sample sessions. The item-by-

item method was used to measure IOA on student knowledge of the SDLMI and the interval-by-interval method was used to measure IOA on percentage of intervals in which students engaged in on-task behavior; thus, agreements were counted if both researchers scored identical on an item or interval and disagreements were counted if researchers scored differently on an item or interval. IOA was calculated by adding the number of items agreed upon and dividing that sum by the total number of items to result in a percentage of agreement (Cooper et al.). If at any point the percentage of agreement fell below 80%, retraining occurred using the initial process described until 90% agreement was reached for three consecutive sessions.

Procedural Fidelity

Procedural fidelity data were collected using a checklist that recorded whether the steps involved in function-based, computer-assisted SDLMI occurred as prescribed (Billingsley, Munson, & White, 1980). The checklist included six steps for the interventionist to complete with 100% accuracy (e.g., researcher sets up GoPro® prior to student arriving to the session, researcher instructs students to log into computer and their Gmail, students locate the email from researcher and click link to open module in YouTube). Another researcher (doctoral student) scored procedural fidelity using the item-by-item method in at least 30% of the sessions for each phase (baseline, intervention, maintenance, and generalization). To ensure reliability of procedural fidelity, intervention sessions and probe sessions were recorded and observed by a secondary data collector, who calculated interobserver agreement and procedural fidelity. See Appendix L for the data sheet to collect data on procedural fidelity.

Procedures

Data collection and instructional sessions on the SDLMI occurred during the spring semester of the 2020 school year in an unoccupied room located in students' classrooms to eliminate distractions for the student participating in the study and other students in the classroom who were not participating in the study. The researcher sat in the same room, but not directly beside the student as they sat at a table to independently complete the video based SDLMI lesson modules and answer SDLMI probes. If the student required assistance, the researcher assisted with technical difficulties upon request by employing a system of least prompts to ensure that students manipulated the program as independently as possible. A GoPro® video camera was set up in an area of the room used for SDLMI instruction to avoid distracting students and captured the lesson as a permanent product used for interobserver agreement (IOA) and procedural fidelity purposes.

Data collection for on-task behavior occurred in the classroom during whole-group instruction. A GoPro® video camera was set up in an area of the classroom that was not distracting to students in order to capture the participants' on-task behavior. The researcher stood next to the camera to record data and anecdotal notes. The same protocol was used to record on-task behavior in the untrained job skill generalization setting. These videos were used as permanent products for IOA purposes.

Students participated in the intervention once per day, five days each week, unless technical difficulties or weather prohibited data collection. The primary researcher was present to implement the intervention and collect data during each session. The researcher assisted the students in reintegrating into classroom lessons when each session

finished. The study consisted of the following phases: (a) brief FBA, (b) pre-test measures of levels of self-determination and goal attainment; (c) baseline, (d) training, (e) three parts of function-based, computer-assisted SDLMI, (f) maintenance, (g) generalization, and (h) post-test measures of levels of self-determination and goal attainment. The next sections outline these phase components in detail.

FBA

First, the researcher conducted indirect assessments by interviewing the teachers to determine the function of each student's challenging behavior using the FACTS (March et al., 2000). Interviews were structured using the FACTS, as teachers indicated the following for each student: (a) challenging behaviors, (b) when, where, and with whom the behaviors were most likely to occur; (c) antecedents and consequences in relation to the behavior; (d) summary of the results gleaned from the checklist with confidence rating; and (e) previous/current efforts made to control the behavior. Target behaviors and goals for students' replacement behavior were derived from the FACTS assessment along with data from direct assessments (i.e., observations of students in class/job skills). A minimum of four antecedent-behavior-consequence (ABC) observations were conducted and interobserver agreement data were calculated across 30% of the observations to ensure reliability and accuracy of the description of target behavior. A Board-Certified Behavior Analyst-Doctoral BCBA-D) confirmed hypotheses derived from FACTS, interviews, and ABC observation summaries provided by the researcher.

Baseline

During baseline the 15-item probe was presented to students to indicate their baseline knowledge of the SDLMI. In addition, percentage of intervals of on-task classroom behaviors were recorded using a whole-interval recording data sheet during integrated whole class instruction. The study employed a single-case multiple-probe across participants design (Cooper et al., 2020; Ledford & Gast, 2018; Horner & Baer, 1978). A minimum of three data points was collected during baseline, and after a stable trend was observed for all students, the first student moved into the training and intervention phases. During this time, the remaining students stayed in baseline. Intermittent baseline probes were administered at a minimum of every fourth session and concurrently for at least three consecutive sessions prior to moving into the intervention phase (Cooper et al., 2020). Decisions for entrance into the intervention were based on researcher observations and recommendations from the teacher to determine the student who demonstrated a stable baseline trend and required the least support to move through the intervention successfully. It was necessary to start with the student who required the least support so that other students to had ample time and support in intervention as needed without stalling the intervention process. This entrance criteria applied for all students to enter intervention. New students were added into the intervention in a staggered manner when the first student met mastery criterion for Part One of the intervention and moved into Part Two.

Training

Prior to entering the intervention phase, students were trained to use the function-based, computer-assisted SDLMI modules. Students practiced logging into their

computers and Gmail accounts, located the email from the researcher, clicked the link provided, watched videos and responded to simple questions (e.g., What grade are you in? Who is the president of the USA? Is it dark or light at 11:00 am?) to practice for intervention sessions and probes in which students were provided with opportunities to respond. Additional supports were provided to the students using a system of least prompts (e.g., gesture, verbal, physical) during guided practice sessions when help was requested. Supplementary descriptive data were collected on frequency of students raising their hand to ask for help and the level of prompting required during the training and intervention phases. This data provided insight to support the self-directed learning nature involved in the intervention design. Training sessions occurred for an average of 8 min and mastery criterion was met when the students reached 80% accuracy independently, at which point, students then moved into Part One of the intervention.

Intervention

Function-based, computer-assisted SDLMI consisted of three parts. Mastery criterion on the SDLMI knowledge probe was six out of eight correct responses (75%) for two out of three consecutive trials on each of the three SDLMI parts. Additionally, students' challenging behavior was measured each day. Data from both dependent variables were graphed and analyzed daily. As the first participant completed Part One of function-based, computer-assisted SDLMI by reaching the mastery criteria, the next student entered training and intervention according to the researcher and teacher decisions regarding baseline stability and requiring less support. The intervention included eight lessons corresponding to three SDLMI parts: (a) three lessons for setting a goal, (b) three lessons for making a plan, (c) and two lessons for adjusting the goal. To

supplement social skills instruction, students completed one 8-15 min session each day, five days per week. Post-intervention assessments measured student's knowledge of SDLMI using the 24-point probe.

Part One: Set a Goal. Setting a goal was taught to students through three lessons: (a) Lesson 1: Identify Strengths and Needs, (b) Lesson 2: Expected Classroom Behavior, and (c) Lesson 3: Setting a Behavior Goal. This introductory set of lessons provided an overview of the three parts of the SDLMI, explained expectations of appropriate behavior through examples and nonexamples, suggested behavioral changes that should be made to meet expectations at school, and offered definitions with examples of goals at school based on the function of student's challenging behavior (i.e., escape, attention, or automatic).

Part Two: Make a Plan. Three more lessons instructed students to select and begin implementing strategies to meet their goal including (a) Lesson 4: Problem-Solve and Make a Plan, (b) Lesson 5: Identifying Supports, and (c) Lesson 6: Finalize the Plan. Through lessons provided in Part Two, students learned about barriers and strategies for overcoming barriers, selected tools that helped them reach their behavior goal, and developed a plan with a timeline and evaluation measure to determine if the goal was met.

Part Three: Adjust the Plan. In Part Three, two lessons were provided to determine if students were progressing toward or met their goal. Lesson 7: Self-Evaluation and Lesson 8: Adjust the Plan provided students with instruction to analyze the data related to using their behavior change tools (graphing data related to using a behavior self-monitoring checklist). Students were provided with instruction to determine

if their behavior goal was met, and if the goal was not met, instruction on options for changing the plan (e.g., choosing a different tool) was provided.

Booster Sessions

If students did not reach mastery in any given part of the intervention (6 out of 8 possible points for 2 out of 3 consecutive sessions), a booster session was provided to ensure students reached mastery. A booster session consisted of (a) explicit instruction provided through the module, (b) overt connections between content in modules and the SDLMI probe questions and an opportunity for guided practice (e.g., "You will see a question like this later. Think back and remember what you are learning in your module.") and (c) independent practice (i.e., students participated in a practice probe where correct answers were highlighted). For one student (Yael), an additional visual support highlighting key symbols discussed in the module and linked to probe questions was provided.

Maintenance

Maintenance data of SDLMI knowledge and on-task or expected behavior in the classroom were collected once per week for a minimum of two weeks after the intervention ends for each participant. IOA and procedural fidelity measures extended to this phase as well using the same data recording forms for both dependent variables and GAS measures of goal attainment.

Generalization

On-task or expected behavior was recorded in the job skill setting to determine if any effects from the behavior intervention that addressed the function of challenging behavior in the classroom transferred to a setting where instruction in goal setting was not

explicitly provided but students still struggled with the same behavioral challenges. According to FBA data, the function of student's challenging behavior was consistent across classroom and job skill settings. Job skill tasks consisted of filing, organizing, assembling pens, and assembling first aid kits in the classroom setting. Job skills were completed in the same setting as classroom instruction; thus, it was logical to measure generality of intervention effects across both classroom and job skill settings. Generalization data were collected once during the baseline phase and once during maintenance phase. The same data sheets and procedures were used to measure and analyze on-task behavior data in the classroom and in the generalized job skill setting.

Data Analysis

A visual analysis of graphed data representing percent correct on SDLMI knowledge probes and percentage of intervals engaged in on-task behavior was conducted. Data across all intervention phases were examined using single-case design evaluation for trend, level, slope, variability, immediacy of effects, and similarity of data in order to determine decisions about phase change, and presence of a functional relation. A functional relation between the independent variable and change in behavior and levels of SDLMI knowledge were demonstrated if baseline levels remain stable and low, and participants show a change in level and trend only as a result of the targeted intervention (Ledford & Gast, 2014).

Additionally, effect sizes for dependent variables were calculated as a statistical measure to compliment visual analysis. A nonoverlap ES, Tau-U, was used to measure effects because it allows for adjustment if results present undesirable baselines and allows for confidence intervals to be reported (Parker et al., 2011). *Tau-U* has been shown to be

more robust than other nonoverlap ESs (i.e., percent of non-overlapping data; Parker et al., 2011) and correspond accurately with visual analysis (Brossart et al., 2014). To calculate *Tau-U*, data from each baseline phase and each intervention phase were entered into a web-based *Tau-U* calculator (http://www.singlecaseresearch.org/calculators/tau-u; Vannest et al., 2016). If baseline trends were trend undesirable (i.e., a trend in a direction anticipated by the intervention), the ES was corrected. *Tau-U* scores range from −1 to 1 (Parker et al. 2011) and can be interpreted using the following criteria: (a) 0.20 or lower suggests a small effect; (b) between 0.20 and 0.60 suggests a moderate effect; (c) 0.60 to 0.80 suggests a large effect; and (d) above 0.80 suggests a very large effect (Vannest & Ninci, 2015).

CHAPTER 4: RESULTS

Outcomes of the study are reported in the following sections. Results for interobserver agreement (IOA) and procedural fidelity are presented first, followed by results for each research question.

Interobserver Agreement

IOA data measured the extent to which two observers reported the same results when observing and measuring the same event (Cooper et al., 2020). A second observer collected interobserver agreement (IOA) data using permanent product (video observations captured with the GoPro®) and the data collection sheets for both dependent variables (knowledge of the SDLMI and on-task behavior; Appendices F AND G, respectively).

Functional Behavior Assessment

To ensure accuracy and reliability, four Antecedent-Behavior-Consequence (A-B-C) direct assessment observations were conducted in the classroom setting and were video recorded. IOA data were collected for 33.33% of the observation sessions (once for each participant). Mean IOA for A-B-C observations was 97.18% (range 94.31%–100%).

Knowledge of SDLMI

The item-by-item method was used to measure IOA on student knowledge of the SDLMI. Intervention and probe sessions were video recorded and viewed by an outside researcher. IOA was collected on knowledge of SDLMI for 40.68% of sessions per participant across all phases of the study. Results indicated mean IOA for all participants was 100% across all phases.

On-Task Behavior

The interval-by-interval method was used to measure IOA on percentage of intervals in which students engaged in on-task behavior. Classroom observation sessions and generalization sessions in the untrained job skill setting were video recorded and an outside observer viewed 40.68% of all sessions per participant across all phases of the study together with the lead researcher. Overall, mean IOA across all participants was 99.71% (range 98%–100%) during baseline, 99.51% (range 94.37%–100%) during intervention, 100% during maintenance, and 100% during generalization.

Procedural Fidelity

A second observer also assessed procedural fidelity to verify the degree to which the intervention package was implemented as designed. Procedural fidelity data were collected for 40.68% of sessions per participant across all phases of the study. Procedural fidelity data were collected using Results indicated the mean procedural fidelity was 100%. permanent product (video) recording and the procedural fidelity form. Videos were captured using the GoPro®.

Results for Research Question 1: What is the effect of function-based, computer-assisted SDLMI on the knowledge of the SDLMI for youth with extensive support needs?

Research Question 2: What is the effect of function-based, computer-assisted SDLMI on on-task behavior in the classroom for youth with extensive support needs?

Figure 3 shows results for each participant. Each graph shows percentages correct on probes measuring knowledge of SDLMI and intervals of on-task behavior across

baseline, three parts of the function-based computer-assisted SDLMI, and maintenance. Visual analysis of the graph indicates a functional relation between function-based computer-assisted SDLMI and increased knowledge of SDLMI and increased on-task behavior for all three participants.

Tomer

First, a Functional Behavior Assessment was conducted to determine the function of Tomer's challenging behavior. According to the FACTS (March et al., 2000), Ms. Penny indicated that Tomer's behavior would be important to address (rated 4.5 out of 6). Behavior occurred with moderate intensity (i.e., 3.5 out of 5) once or twice per day especially in first period with his foster brother or other young men in the class and included demonstrating disruptive behavior, verbal harassment/verbally inappropriate behavior (e.g., talking back, having an attitude, being disrespectful), insubordination, and incomplete work. Related issues that predicted when challenging behaviors were to occur were described as negative social interactions (i.e., interactions with peers/demands from the teacher, task dependent, worse during writing and reading or tasks perceived as difficult), conflicts at home (e.g., foster brother conflicts carried over to school), being reprimanded from the teacher which resulted in arguing and defending himself (talking back). In terms of consequences, more items from the list of things obtained were noted (i.e., adult attention; peer attention; preferred activities which included being on the computer listening to rap music or watching car videos on YouTube) compared to things avoided or escaped (i.e., hard tasks related to reading and writing). The following summary of behavior hypothesis resulted from the interview: When transitioning from most to least preferred tasks/activities (free time to reading/writing), challenging

behaviors may include talking back and having a disrespectful attitude which is worsened when he is involved in negative social interactions with peers (i.e., difficulty letting things go; must have the last word) to obtain attention. During the FACTS interview, the teacher confirmed this statement was observed and would apply to the job skill setting as well. This hypothesis was confirmed through four A-B-C classroom observations and verified by a BCBA-D. In the past, strategies for preventing challenging behavior included changing peer seating and frequently verbally prompting and redirecting behavior.

During baseline, Tomer's performance on the SDLMI probe was low with a mean score of 25% correct and scores ranging from 16.67% to 33.33% correct. Tomer met criteria for inclusion as his on-task behavior during baseline indicated high variability with a low-level mean of 42.35% of intervals engaged in on-task behavior, ranging from 13.7% to 64.79% of intervals engaged in on-task behavior.

During Part One of the function-based, computer-assisted SDLMI, Tomer's performance on the SDLMI probe indicated an increasing trend with a mean score of 19.4% correct and scores ranging from 16.67% to 20.83% correct. Tomer's on-task behavior during Part One indicated an increasing trend with a mean of 25.68% of intervals engaged in on-task behavior, ranging from 10.48% to 53.52%. After lesson 3, Tomer did not meet mastery criteria of 6 out of 8 possible points for Part One for 2 out of 3 consecutive days. Therefore, he required two booster sessions. An immediacy of effect resulted following the booster sessions provided as supports to supplement Part One instruction as performance on SDLMI probes increased (M = 87.5%; range = 83.33% – 91.67%) and on-task behavior increased (M = 85.91%; range = 85.51% –86.3%).

During Part Two, Tomer's performance on the SDLMI probe continued to show an increasing trend with a mean score of 95.14% correct and scores ranging from 93.75% to 95.83% correct. Tomer's on-task behavior during Part Two indicated variability in trend with a mean of 61.93% of intervals engaged in on-task behavior, ranging from 16.9% to 95.65%. After lesson 6, Tomer met mastery criteria of 6 out of 8 possible points in 2 out of 3 consecutive days and no boosters were required.

During Part Three, Tomer's performance on the SDLMI probe remained at a stable high level with a mean score of 97.92% correct and scores ranging from 95.83% to 100% correct. Tomer's on-task behavior during Part Three also indicated a stable high level with a mean of 92.08% of intervals engaged in on-task behavior, ranging from 89.86% to 94.29%. After lesson 8, Tomer met mastery criteria of 6 out of 8 possible points in 2 out of 3 consecutive days.

During the 3 consecutive weeks of maintenance, Tomer's performance on SDLMI probes remained stable and high (M =100%); however, intervals engaged in on-task behavior decreased following intervention but remain higher than baseline (M =75.99%; range = 43.84% –100%). These data were consistent with the GAS posttest data discussed in the next section.

Pietro

First, a Functional Behavior Assessment was conducted to determine the function of Pietro's challenging behavior. According to the FACTS, March et al. (2000), Mr. Leonard indicated Pietro's behavior would be very important to address (rated 5.5 out of 6). The behavior occurred with low intensity (i.e., 1 out of 6) consistently all day until he is verbally prompted and redirected. The challenging behavior included being

unresponsive to demands or requests provided to the whole class unless his name is used with a verbal prompt directly and individually. Related issues that may predict when the challenging behavior may occur were listed as the possibility of side effects related to the use of medications and avoiding tasks perceived as difficult or too long. In terms of consequences, more items from the list of things avoided or escaped were noted (i.e., hard tasks, mental effort) compared to things obtained. The following summary of behavior hypothesis resulted from the interview: When given a work demand or task, challenging behaviors may include lack of engagement (e.g., staring off in space, looking away from work/tasks/instruction) to escape work or task demands. During the FACTS interview, the teacher confirmed this statement was observed and would apply to the job skill setting as well. This hypothesis was confirmed through four A-B-C classroom observations and verified by a BCBA-D. In the past, strategies for preventing challenging behavior included changing Pietro's seating, providing one-on-one teacher or teacher assistant support with frequent verbal prompting to redirect behavior, and the use of a behavior rating scale.

During baseline, Pietro's performance on the SDLMI probe indicated a stable trend with a low-level mean score of 28.75% correct and scores ranging from 14.58% to 37.5% correct. Pietro's met criteria for inclusion as his on-task behavior during baseline indicated a stable low-level mean of 54.44% of intervals engaged in on-task behavior, ranging from 44.29% to 65.28% of intervals engaged in on-task behavior.

During Part One of the function-based, computer-assisted SDLMI, Pietro's performance on the SDLMI probe indicated an increasing trend with a mean score of 27.08% correct and scores ranging from 14.58% to 33.33% correct. Pietro's on-task

behavior during Part One indicated an increasing but variable trend with a mean of 73.39% of intervals engaged in on-task behavior, ranging from 64.29% to 86.54%. After lesson 3, Pietro did not meet mastery criteria of 6 out of 8 possible points for Part One for 2 out of 3 consecutive days, requiring two booster sessions. The trend for knowledge of SDLMI increased following the booster sessions provided as supports to supplement Part One instruction as performance on SDLMI probes increased (*M* = 58.34%; range = 54.17%–62.5%); however, on-task behavior decreased (*M* = 39.39%; range = 33.7%–45.07%).

During Part Two, Pietro's performance on the SDLMI probe showed a stable and slightly increasing trend with a mean score of 68.06% correct and scores ranging from 54.17% to 75% correct. Pietro's on-task behavior during Part Two indicated a stable slightly increasing trend with a mean of 71.23% of intervals engaged in on-task behavior, ranging from 56.57% to 87.32%. After lesson 6, Pietro did not meet mastery criteria of 6 out of 8 possible points in 2 out of 3 consecutive days; thus, three boosters were required. Following the booster sessions provided as supports to supplement Part Two instruction, the trends remained stable and increased slightly as performance on SDLMI probes increased (*M* = 72.22%; range = 70.83%–75%) and on-task behavior increased (*M* = 75.6%; range = 56.25%–97.01%).

During Part Three, Pietro's performance on the SDLMI probe continued to show a stable, slightly increasing trend with a mean score of 87.5% correct and scores ranging from 54.17% to 75% correct. Pietro's on-task behavior during Part Three indicated stable, slightly increasing trend with a mean of 77.09% of intervals engaged in on-task behavior, ranging from 65.67% to 87.32%. After lesson 8, Pietro did not meet mastery

criteria of 6 out of 8 possible points in 2 out of 3 consecutive days; thus, two boosters were required. Following the booster sessions provided as supports to supplement Part Three instruction, a stable, slightly increasing trend was evident as performance on SDLMI probes increased (*M* = 83.33%) and on-task behavior increased (*M* = 79.8%; range = 77.78% –81.81%).

Due to school closings across the state in response to the COVID-19 crisis, maintenance data were collected for 2 consecutive weeks following the intervention for Pietro. During 2 consecutive weeks of maintenance, Pietro's performance on SDLMI probes (*M* = 72.92; range = 62.5% –83.33%) decreased and on-task behavior (*M* = 86.19; range = 77.14% –95.24%) increased. These variability in these data are supported by the GAS posttest data discussed in the next section.

Yael

First, a Functional Behavior Assessment was conducted to determine the function of Yael's challenging behavior. According to the FACTS (March et al., 2000), Mr. Leonard indicated Yael's behavior would be very important to address (rated 5.5 out of 6). The behavior occurred with high intensity (i.e., 5 out of 6) consistently all day until he is verbally prompted and redirected. The challenging behavior included being disruptive and vocally inappropriate by making loud vocalizations or singing during both structured and unstructured class time and self-stimulatory behavior (i.e., nail biting, twirling hair, bouncing in seat, waving fingers in front of face). Consequences appeared to be automatic or sensory related compared to things obtained (e.g., adult attention by laughing when redirected or asked to use inside voice). The following summary of behavior hypothesis resulted from the interview: During structured or unstructured class

activities, challenging behaviors may include loud vocalizations that are disruptive (e.g., speaking, humming, singing, laughing, bouncing in seat, hand flapping, finger waving, or fingernail picking) which serves an automatic/sensory-based function. During the FACTS interview, the teacher confirmed this statement was observed and would apply to the job skill setting as well. This hypothesis was confirmed through four A-B-C classroom observations and verified by a BCBA-D. In the past, strategies for preventing challenging behavior included changing Yael's seating, providing one-on-one teacher or teacher assistant support with frequent verbal prompting to redirect behavior, and the use of a behavior rating scale.

During baseline, Yael's performance on the SDLMI probe was stable with a low-level mean score of 22.92% correct and scores ranging from 12.5% to 29.17% correct. Yael's on-task behavior during baseline indicated high variability with a low-level mean of 51.36% of intervals engaged in on-task behavior, ranging from 30.56% to 72.22% of intervals engaged in on-task behavior.

During Part One of the function-based, computer-assisted SDLMI, Yael's performance on the SDLMI probe indicated an increasing trend with a mean score of 33.33% correct and scores ranging from 25% to 41.67% correct. Yael's on-task behavior during Part One indicated an increasing trend with a mean of 48.62% of intervals engaged in on-task behavior, ranging from 32.31% to 64.29%. After lesson 3, Yael did not meet mastery criteria of 6 out of 8 possible points for Part One for 2 out of 3 consecutive days; thus, two boosters were required. An immediacy of effect resulted following the booster sessions provided as supports to supplement Part One instruction as

performance on SDLMI probes increased (*M* = 66.67%; range = 62.5% –70.83%) and on-task behavior increased (*M* = 62.13%; range = 57.58% –66.67%).

During Part Two, Yael's performance on the SDLMI probe show an increased trend which remained stable with a mean score of 95.83% correct. Yael's on-task behavior during Part Two indicated a slightly increasing trend with a mean of 68.21% of intervals engaged in on-task behavior, ranging from 57.14% to 73.13%. After lesson 6, Yael met mastery criteria of 6 out of 8 possible points in 2 out of 3 consecutive days.

During Part Three, Yael's performance on the SDLMI probe continued to show an increasing but variable trend with a mean score of 93.75% correct, and scores ranging from 87.5% to 100% correct. Yael's on-task behavior during Part Three indicated an increasing trend with a mean of 91.69% of intervals engaged in on-task behavior, ranging from 73.13% to 92.68%. After lesson 8, Yael met mastery criteria of 6 out of 8 possible points in 2 out of 3 consecutive days.

During the 3 consecutive weeks of maintenance, Yael's performance on SDLMI probes (*M* = 93.05; range = 77.14% –95.24%) and intervals engaged in on-task behavior (*M* = 58.78; range = 51.62% –67.92%) decreased. These data were consistent with the GAS posttest data discussed in the next section.

Overall, Tomer's average on-task behavior increased from 42.35% during baseline to 61.88% during the intervention. Pietro's average on-task behavior increased from 54.44% during baseline to 70.62% during the intervention. Yael's average on-task behavior increased from 51.36% during baseline to 66.03% during the intervention. The *Tau-U* ES for students' on-task behavior ranged from 0.40 to 0.60 (moderate effects), with a moderate omnibus ES of 0.50 (CI95 = [0.13, 0.88]). The *Tau-U* ES for Tomer's

on-task behavior was 0.40 (CI90 = [-0.25, 1.00]). Pietro's *Tau-U* ES for on-task behavior was 0.60 (CI90 = [0.10, 1.00]). The *Tau-U* ES for Yael's on-task behavior was 0.48 (CI90 = [0.01, 0.95]).

Tomer's average SDLMI knowledge probe performance increased from 25% during baseline to 71.46% during the intervention. Pietro's average SDLMI knowledge probe performance increased from 28.75% during baseline to 65.49% during the intervention. Yael's average SDLMI knowledge probe performance increased from 22.92% during baseline to 73.12% during the intervention. The *Tau-U* ES for students' knowledge on SDLMI probes ranged from 0.57 to 0.91, with a large omnibus ES of 0.77 (CI95 = [0.40, 1.00]). Tomer's *Tau-U* ES for SDLMI knowledge probe performance was 0.57 (CI90 = [-0.08, 1.00]). Pietro's *Tau-U* ES for SDLMI knowledge probe performance was 0.79 (CI90 = [0.29, 1.00]). The *Tau-U* ES for Yael's SDLMI knowledge probe performance was 0.91 (CI90 = [0.44, 1.00]).

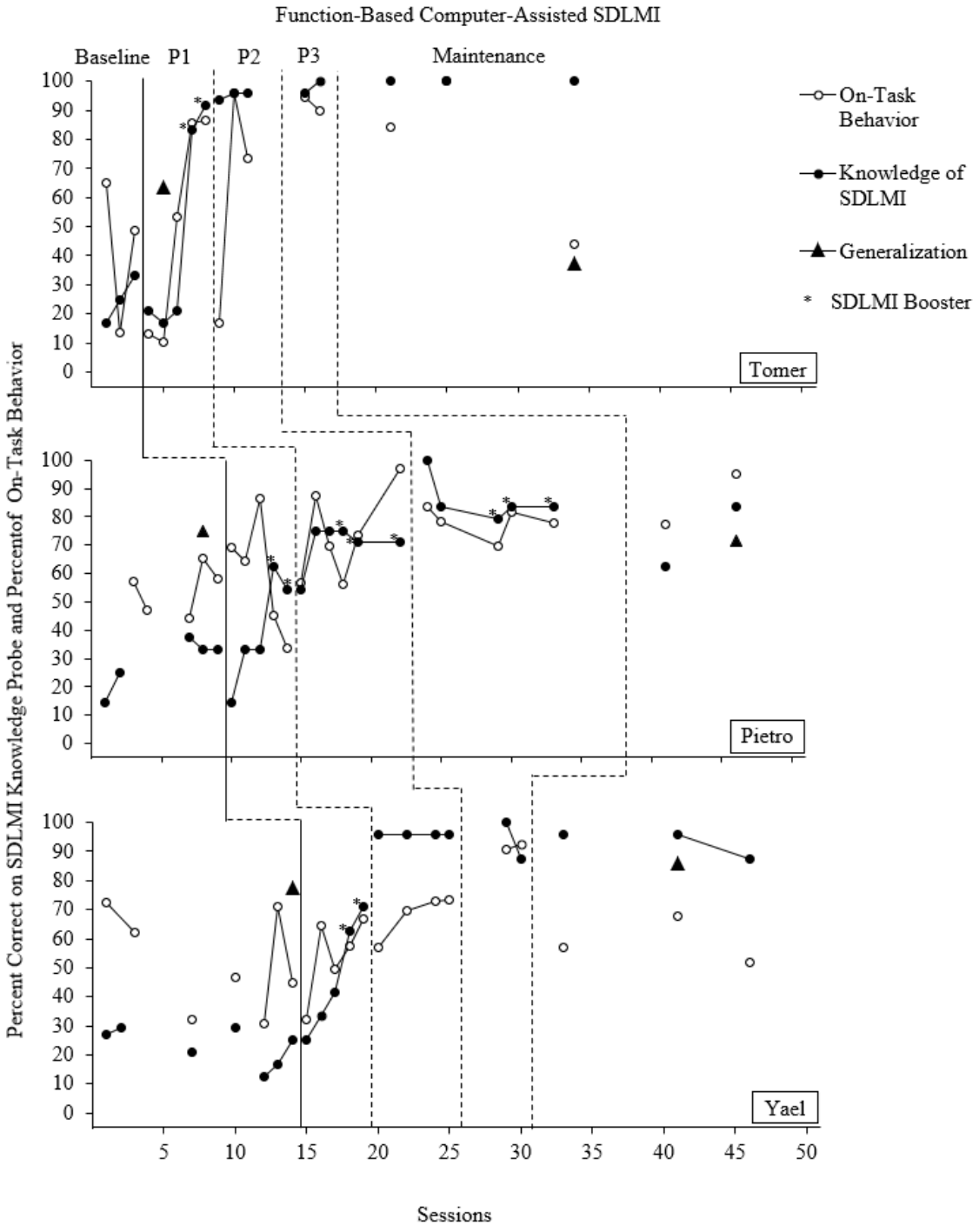

Figure 3. Graph comparing percent correct on probes measuring SDLMI knowledge and intervals of on-task behavior.

Note. P1, P2, P3 = Three parts of SDLMI (set a goal, make a plan, and adjust the plan).

Results for Research Question 3: To what extent do teacher ratings of GAS change after Part One of function-based, computer-assisted SDLMI?

Teachers provided pretest GAS (Kiresuk & Lund, 1978) measures at the end of Part 1 of the intervention, before students began working on their goal. GAS as a posttest was administered to teachers at the end of Part 3 following the implementation of intervention and again after maintenance data were collected. The next sections provide pretest and posttest results on GAS for each participant. See Table 1 for GAS pretest and posttest results for each participant.

Table 1:

Goal Attainment Scale pretest and posttest results across participants

	Tomer	Pietro	Yael
Pretest	-1	-2	-1
Posttest	2	0	2
Maintenance	-1	-2	-1

Tomer

Ms. Penny completed the GAS for Tomer. Tomer's goal was to be a responsible student by following directions and doing work quickly, quietly and with good quality without disrupting the class. Tomer used a behavior self-monitoring checklist with components of "being a responsible student" (e.g., be prepared with all materials needed for the lesson; clear desk of distractions; sit up straight, look at teacher/assignment; raise my hand and wait to be called on to comment, ask a question, or leave my work area). Tomer was responsible for rating his behavior on a scale from 1-3 (1 = *less than expected behavior*, on task 60% of the time in a 15 min class observation session, requires no more than four verbal prompts from teachers to complete a given task; 2 = *expected behavior*, on task 70% of the time in a 15 min class observation, requires no more than 3 verbal

prompts from teachers to complete a given task; and 3 = *better than expected behavior*, on task 80% of the time in a 15 min class observation, requires 2 or fewer verbal prompts from teachers to complete a given task) and then compared his ratings with teacher scores to verify accuracy. See Table 2 below for a description of goals measured by GAS for Tomer.

Table 2:

Tomer's Goal Attainment Scale

Level of Expected Outcome	Rating	Description of Goal
Much more than expected	+2	90% of the 15 min observation session on-task; 1 or fewer verbal prompts from teacher
More than expected	+1	80% of the 15 min observation session on-task; 2 or fewer verbal prompts from teacher
Expected	0	70% of the 15 min observation session on-task; no more than 3 verbal prompts from teacher
Less than expected	-1	60% of the 15 min observation session on-task; no more than 4 verbal prompts from teacher
Much less than expected	-2	50% of the 15 min observation session on-task; 5 or more verbal prompts from teacher

These replacement behaviors to support the goal were explained in Tomer's module lessons and there was a discussion around how these replacement behaviors addressed the function of Tomer's challenging behavior, attention. Provided the function of Tomer's challenging behavior was attention, the behavior checklist and rating scale emphasized appropriate classroom behaviors and checking in with the teachers at the end of classes to verify scores provided opportunities for attention and positive reinforcement. The self-monitoring component included graphing the points earned at the end of the day, with the goal of earning 30 points in 2 out of 3 consecutive days.

In addition to GAS scores, self-determination was measured using the SDI student and teacher reports. See Figures 4 and 5 below for Tomer's pre- and posttest comparisons of self-determination. The SDI scales changed between pre- and posttest measures. The three main constructs from pretest were (a) Volition Action with autonomy and self-initiation subconstructs; (b) Agentic Action with pathways thinking and self-direction subconstructs; and (c) Action Control Beliefs with control expectancy, psychological empowerment, and self-realization subconstructs. In the posttest, the three main constructs were similar in nature but renamed as (a) Decide with component skills of self-determination described as choice making, decision making, goal setting problem solving, and planning; (b) Act with component skills of self-determination described as self-management, goal-attaining, problem solving, and self-advocacy); and (c) Believe with component skills of self-determination described as self-awareness and self-knowledge. In the pretest SDI, the student rated self-determination much higher (overall *M* = 93%; range = 83%–100%) compared to the teacher (overall *M* = 43%; range = 25%–60%). The teacher indicated strengths in autonomy and psychological empowerment while self-initiation and self-direction were weaker constructs. The student reported strengths across all constructs. In the posttest, student and teacher reports of the levels of student self-determination were more equivalent as the student report indicated overall *M* = 41% (range = 13%–58%) and teacher indicated overall *M* = 49% (range = 33%–63%). Overall levels of self-determination decreased between pre and posttest SDI reports on student and teacher forms. Student and teacher scores consistently identified strengths in Decide and Believe constructs, while the Act construct was weaker (Act was rated around

20 percentage points less than Decide and Believe constructs by the student and teacher respectively) according to posttest reports.

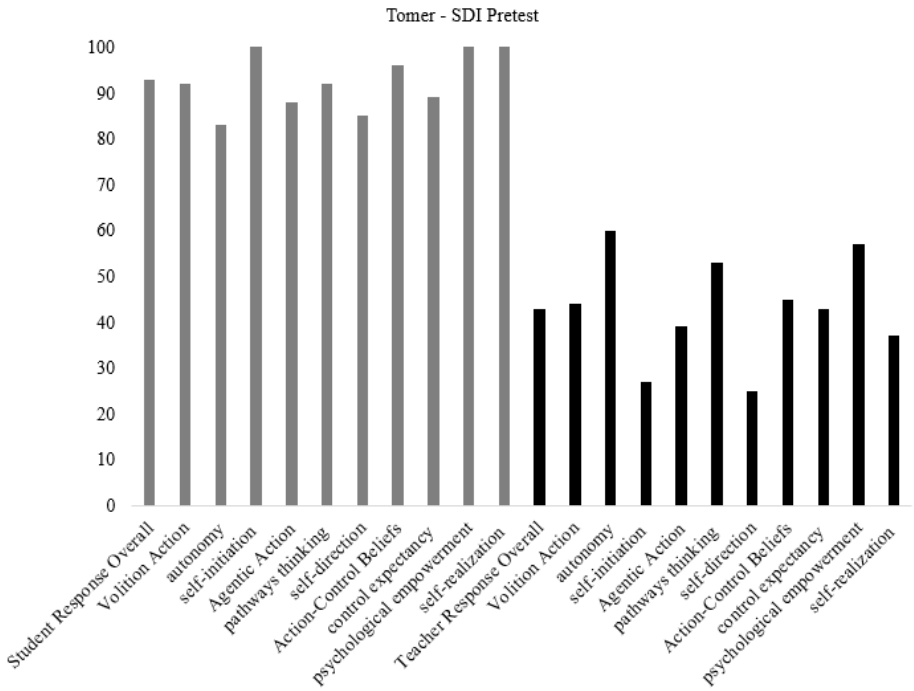

Figure 4. Tomer's pretest results on the SDI (student and teacher report).

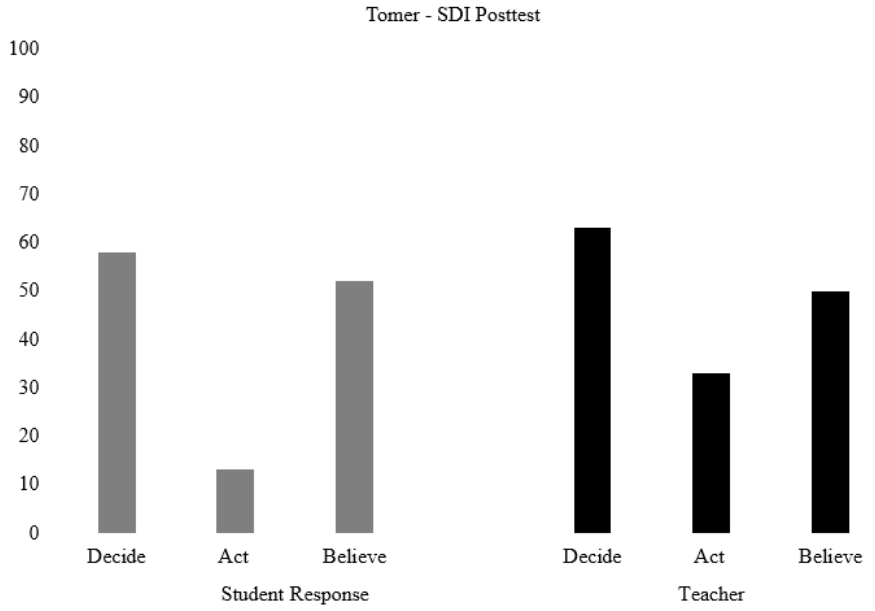

Figure 5. Tomer's posttest results on the SDI (student and teacher report).

Pietro

Mr. Leonard completed the GAS for Pietro. Pietro's goal was to begin working immediately and continue working until the task is complete. Pietro used a cue card that specified "beginning to work immediately and continue working until the task was complete" (i.e., get started right away, keep working until the task is complete, ask for help if stuck, tell the teacher when finished to see what comes next on the schedule). Pietro also used a timer that was set to sound at 10 s intervals for 15 min at which point he used an iPad with a counter app to touch the icon to give himself a point for on-task behavior. The goal was to get 30 points (i.e., 30 out of 40 or 75% of intervals on-task) in 2 out of 3 consecutive days. See Table 3 below for a description of goals measured by GAS for Pietro.

Table 3:

Pietro's Goal Attainment Scale

Level of Expected Outcome	Rating	Description of Goal
Much more than expected	+2	80% of the 20 min observation session on-task; 1 or fewer verbal prompts from teacher
More than expected	+1	75% of the 20 min observation session on-task; 2 or fewer verbal prompts from teacher
Expected	0	70% of the 20 min observation session on-task; no more than 3 verbal prompts from teacher
Less than expected	-1	65% of the 20 min observation session on-task; no more than 4 verbal prompts from teacher
Much less than expected	-2	60% of the 20 min observation session on-task; 5 or more verbal prompts from teacher

These replacement behaviors to support the goal were explained in Pietro's module lessons and there was a discussion around how these replacement behaviors

addressed the function of Pietro's challenging behavior, escape. Provided the function of Pietro's challenging behavior was escape, the cue card with self-monitoring component (graphing points earned with goal of reaching 75% on-task in 2 out of 3 consecutive sessions) provided instruction in expected classroom behaviors and the opportunity to earn a break on the beanbag when the goal of 30 points was attained.

In addition to GAS scores, self-determination was measured using the SDI student and teacher reports. See Figures 6 and 7 below for Pietro's pre- and posttest comparisons of self-determination. In the pretest SDI, the student rated self-determination much higher (overall *M* = 48%; range = 9%–96%) compared to the teacher (overall *M* = 8%; range = 0%–12%). The teacher indicated strengths in volition action and autonomy while agentic action and self-direction were weaker constructs. The student indicated strengths in autonomy and control expectancy while self-initiation and self-direction were weaker constructs. In the posttest, student and teacher reports of the levels of student self-determination were more equivalent as the student report indicated overall *M* = 50%, range = 35%–62% and teacher indicated overall *M* = 30%, range = 20%–45%. Overall levels of self-determination increased between pre and posttest SDI reports on student and teacher forms. Student and teacher scores consistently identified strengths in Decide and Believe constructs, while Act was weaker according to posttest reports.

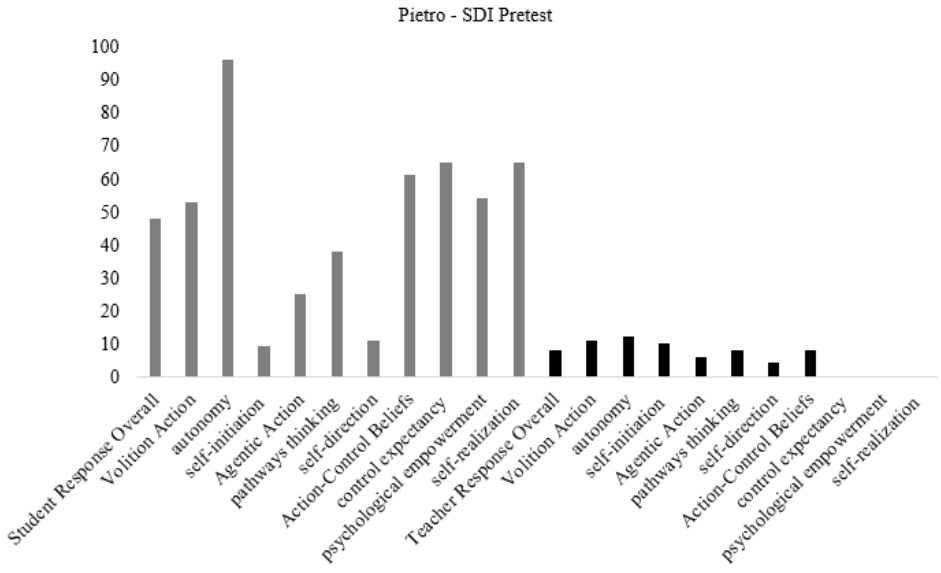

Figure 6. Pietro's pretest results on the SDI (student and teacher report).

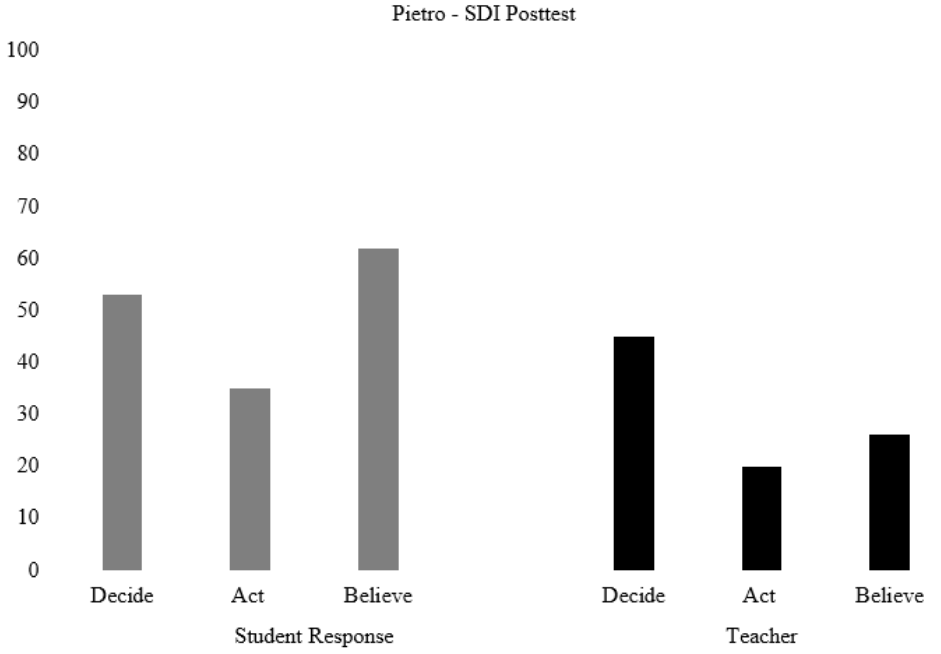

Figure 7. Pietro's posttest results on the SDI (student and teacher report).

Yael

Mr. Leonard completed the GAS for Yael. Yael's goal was to eliminate distractions and remain focused on work. Yale used a sensory tool paired with a visual cue card that specified using a sensory tool to help remain focused on work, keep tone

and volume of voice low, keep hands still, and be still and quiet in seat. Yael also used a timer that was set to sound at 10 s intervals for 15 min at which point she used an iPad with a counter app to touch the icon to give herself a point for on-task behavior. The goal was to get 30 points (i.e., 30 out of 40 or 75% of intervals on-task) in 2 out of 3 consecutive days. See Table 4 below for a description of goals measured by GAS for Yael.

Table 4:

Yael's Goal Attainment Scale

Level of Expected Outcome	Rating	Description of Goal
Much more than expected	+2	80% of the 20 min observation session on-task; 1 or fewer verbal prompts from teacher
More than expected	+1	75% of the 20 min observation session on-task; 2 or fewer verbal prompts from teacher
Expected	0	70% of the 20 min observation session on-task; no more than 3 verbal prompts from teacher
Less than expected	-1	65% of the 20 min observation session on-task; no more than 4 verbal prompts from teacher
Much less than expected	-2	60% of the 20 min observation session on-task; 5 or more verbal prompts from teacher

These replacement behaviors to support the goal were explained in Yael's module lessons and there was a discussion around how these replacement behaviors addressed the function of Yael's challenging behavior, automatic. Provided the function of Yael's challenging behavior was automatic, the sensory tool and cue card with self-monitoring component (graphing points earned with goal of reaching 75% on-task in 2 out of 3 consecutive sessions) provided instruction in expected classroom behaviors and the opportunity to access a more discrete and consistent form of automatic reinforcement

using the tool with the opportunity to earn a movement break when the goal of 30 points was attained.

In addition to GAS scores, self-determination was measured using the SDI student and teacher reports. See Figures 8 and 9 below for Yael's pre- and posttest comparisons of self-determination. In the pretest SDI, the student rated self-determination higher (overall M = 39%; range = 11%–94%) compared to the teacher (overall *M* = 29%; range = 20%–47%). The teacher indicated strengths in self-initiation and psychological empowerment while pathways thinking, and control expectancy were weaker constructs. The student reported strengths in psychological empowerment and self-realization. In the posttest, student and teacher reports of the levels of student self-determination were equivalent as the student and teacher report indicated overall *M* = 50%, range = 44%–61% and overall *M* = 50%, range = 40%–59%, respectively. Overall levels of self-determination increased between pre and posttest SDI reports on student and teacher forms. Student and teacher scores consistently identified strengths in the Believe construct, while Decide and Act were slightly weaker according to posttest reports.

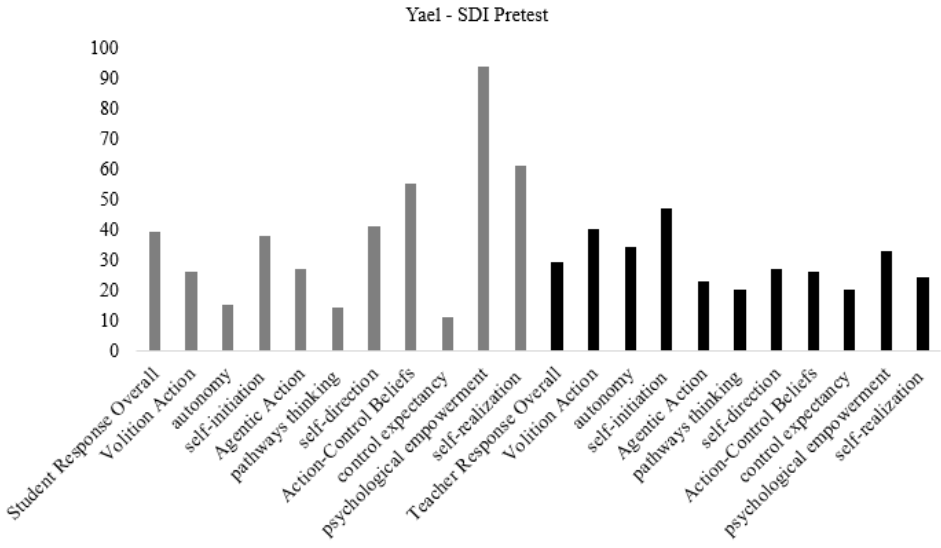

Figure 8. Yael's pretest results on the SDI (student and teacher report).

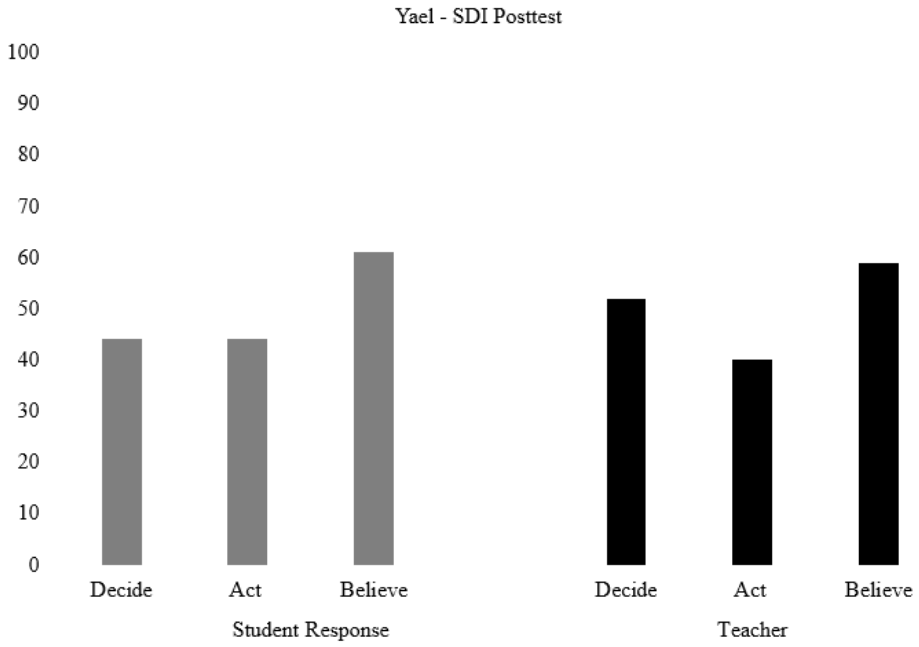

Figure 9. Yael's posttest results on the SDI (student and teacher report).

Figure 10 below highlights the overall self-determination levels provided on student and teacher pre- and posttest reports. Student-reported levels of self-determination decreased between pre- and posttest measures for two out of three students while teacher reported levels of self-determination increased for all three students between pre- and posttest.

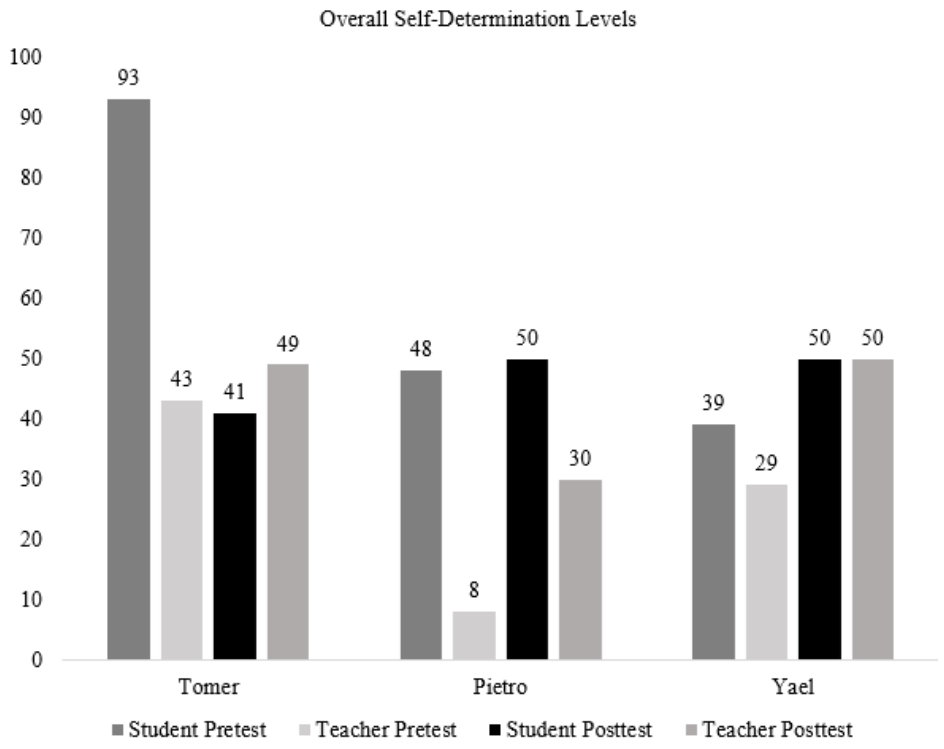

Figure 10. Overall self-determination levels.

Results for Research Question 4: To what extent do the effects of function-based, computer-assisted SDLMI generalize to a second, untrained setting (e.g., a job skill setting) for youth with extensive support needs?

See Figure 3 for the graph comparing intervals of on-task behavior in job skill settings during baseline (prior to instruction in goal setting) *vs*. maintenance (after instruction in goal setting). Generalization data indicated the intervention did not affect levels of on task behavior when completing job skills in the untrained job skill setting for two out of three participants. Generalization data consisted of a pre- and posttest measure of on task behavior when completing a job skill. Tomer completed a filing task in his classroom during baseline and an organizational task in a separate shared common space between both classrooms during maintenance maintenance. Data indicated he was on task 63.33% of intervals observed during baseline and on task 37.1% of intervals observed

during maintenance (*M* = 50.24%). Pietro completed a pen assembly task in a separate room within his classroom during baseline and a first aid kit assembly task in the same location during maintenance. Pietro was on task 75% of intervals observed during baseline and on task 72% of intervals observed during maintenance (*M* = 73.34%). Yael completed a pen assembly task in a separate room within her classroom during baseline and first aid kit assembly task in the same location during maintenance. Yael was on task 77.27% of intervals observed during baseline and on task 85.5% of intervals observed during maintenance (*M* = 81.39%).

Results for Research Question 5: What are students', teachers', and job skill supervisors' perceptions of using function-based, computer-assisted SDLMI to increase the on-task behavior for youth with extensive support needs?

After the intervention, students indicated their perceptions about the acceptability and effectiveness of the intervention. Student responded to social validity questions using visual 5-point Likert scale. 1 = *strongly disagree* (red frown face), 2 = *disagree*, 3 = *neutral*, 4 = *agree*, 5 = *strongly agree* (yellow happy face). See Table 5 below for results of student perceptions. All students strongly agreed the computer activities helped them learn to set goals for their behavior and indicated the computer activities taught them to use a specific tool to improve behavior. All students agreed that their behavior improved because of the goal they set. Two out of three students indicated they liked learning how to set goals and would continue using tools in the future.

Table 5:

Student Perceptions of the Intervention

Questions	Student Rating		
	Tomer	Pietro	Yael
1. The computer activities helped helped me learn to set goals for my behavior.	5	5	5
2. The computer activities were easy.	3	4	2
3. I liked learning how to set goals for my behavior.	4	5	5
4. My behavior improved because I set my goal.	4	4	4
5. The computer activities taught me to use a tool like using a self-monitoring checklist or cue card to help improve my behavior.	5	5	5
6. I will keep using these tools (cue cards, checklists, graphing) to meet my goals in the future.	5	5	2

Note: Based on a 5-point Likert scale. 1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral*, 4 = *agree*, 5 = *strongly agree*

Next, the perceptions of the acceptability of the intervention was solicited from teachers/job skill supervisors using the TARF-R (Reimers & Wacker, 1988). The TARF-R was based on a 5-point Likert scale where teachers/job skill supervisors indicated the degree to which they agreed with statements based on a 5-point Likert scale where 1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral*, 4 = *agree*, 5 = *strongly agree*. Ms. Penny completed the social validity form to offer her perceptions of the the intervention on behalf of Tomer, and Mr. Leonard completed the social validity form to offer perceptions of the intervention on behalf of Pietro and Yael. Since teachers were also job skill supervisors, they were asked to complete two forms, one as the classroom teacher, and

one as the job skill supervisor to provide their opinions of the intervention in both settings.

Table 6 below presents the results of teacher/job skill supervisor perceptions. Overall, Ms. Penny and Mr. Leonard indicated similar perceptions of the intervention use in the classroom and in the job skill setting. They both agreed the intervention plan as was acceptable, they would use the intervention in the future, they liked the procedures, other staff members would be willing to carry out the intervention, they would be willing to change routines, the intervention fit well into existing routines, and addressed the goal of increasing appropriate behavior. Ms. Penny and Mr. Leonard were neutral to the statement regarding disadvantages of implementing the intervention. Mr. Leonard indicated the intervention would be effective to use in the future and would make lasting improvements on behavior only for Yael. Mr. Leonard indicated that Pietro would likely feel discomfort during the behavior intervention plan.

Table 6:

Teacher/Job Skill Supervisor's Perceptions of the Intervention

Questions	Student Intervention Considered	Classroom Teacher Ratings	Job Skill Supervisor Ratings
1. Given this student's behavior problems, how acceptable did you find the behavior support plan?	Tomer	4	5
	Pietro	4	5
	Yael	4	5
2. How willing are you to carry out this behavior support plan in the future?	Tomer	5	5
	Pietro	4	5
	Yael	4	5

3. To what extent do you think there might be disadvantages in following this behavior support plan?	Tomer	3	3
	Pietro	3	3
	Yael	3	3
4. How much time will be needed each day for you to carry out this behavior support plan?	Tomer	2	2
	Pietro	5	5
	Yael	3	4
5. How confident are you that the behavior support plan will be effective for this student in the future?	Tomer	3	3
	Pietro	3	3
	Yael	5	5
6. How likely is this behavior support plan to make permanent improvements in this student's behavior?	Tomer	2	2
	Pietro	3	3
	Yael	5	5
7. How disruptive was it be to carry out this behavior support plan?	Tomer	1	1
	Pietro	2	1
	Yael	2	1
8. How much do you like the procedures used in the behavior support plan?	Tomer	5	5
	Pietro	5	5
	Yael	5	5
9. How willing will other staff members be to help carry out this behavior support plan?	Tomer	5	5
	Pietro	5	5
	Yael	5	5
10. To what extent are undesirable side-effects likely to result from this behavior support plan?	Tomer	3	3
	Pietro	4	3

	Yael	2	3
11. How much discomfort is this student likely to experience during this behavior support plan?	Tomer	3	3
	Pietro	1	4
	Yael	1	2
12. How willing would you be to change your routines to carry out this behavior support plan?	Tomer	5	5
	Pietro	5	5
	Yael	5	5
13. How well did carrying out this behavior support plan fit into the existing routine?	Tomer	5	5
	Pietro	4	4
	Yael	4	4
14. How effective was the intervention in teaching your student appropriate behavior?	Tomer	4	4
	Pietro	3	3
	Yael	5	5
15. How well did the goal of the intervention fit with the team's goals to improve the student's behavior?	Tomer	5	5
	Pietro	5	5
	Yael	5	5

Note: Based on a 5-point Likert scale. 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

CHAPTER 5: DISCUSSION

The purpose of this study was to analyze the effects of function-based, computer-assisted SDLMI on on-task behavior and knowledge of the SDLMI for three youth with ESN. A multiple-probe across participants design was used to examine the impact of the independent variable (i.e., function-based, computer-assisted SDLMI) on the dependent variables (i.e., on-task behavior and student's knowledge of the SDLMI). The technology-delivered intervention provided instruction and supports on the three parts of the SDLMI to teach three youth with ESN to set a behavior goal that would address the function of their challenging behavior according to a brief FBA. Student knowledge of SDLMI was measured by percent correct on SDLMI knowledge probes adapted based on the works of Fowler (2008), Mazzotti et al. (2012, 2013), and Palmer and Wehmeyer (2003). On-task behavior was measured by percent of whole intervals engaged in operationally defined on-task behavior. Results indicated a functional relation between the function-based, computer-assisted SDLMI and increased knowledge of the SDLMI and increased levels of on-task behavior. Two out of three students maintained levels of SDLMI knowledge for three weeks after the intervention. Two out of three students maintained knowledge of SDLMI while one student maintained levels of on-task behavior for two weeks after the intervention. The intervention had limited generalization effects on students' performance in an untrained job skill setting. The degree to which goals were attained according to GAS showed an increase directly following the intervention but decreased during maintenance. Student-reported levels of self-determination on the SDI decreased between pre- and posttest measures for two out of three students while teacher reported levels of self-determination increased for all three

students between pre- and posttest. Students and teachers agreed the intervention was acceptable to teach appropriate behavior and teachers agreed the intervention was effective in addressing challenging behavior for two out of three students. Results of the study are discussed in this chapter, organized by the five research questions.

Impact of the Intervention on Dependent Variables

Research Question 1: What is the effect of function-based, computer-assisted SDLMI on the knowledge of the SDLMI for youth with extensive support needs?

Research Question 2: What is the effect of function-based, computer-assisted SDLMI on on-task behavior in the classroom for youth with extensive support needs?

Knowledge of SDLMI

Visual analysis of results indicated a functional relation between function-based, computer assisted SDLMI and increased SDLMI knowledge for all three students. There was an immediate effect demonstrating a steady increase in SDLMI knowledge and on-task behavior for all three students after the intervention was implemented. This increase was most evident during the booster sessions. Two out of three students required booster sessions to supplement instruction provided in the Part One modules, and one student (Pietro) required boosters in all three parts of instruction in SDLMI to reach mastery. Boosters involved (a) explicit instruction provided through the module, overt connections between content in modules and the SDLMI probe questions, an opportunity for guided practice (e.g., “You will see a question like this later. Think back and remember what you are learning in your module.”) and (c) independent practice (i.e., students participated in a practice probe where correct answers were highlighted). Data suggest the intense level

of explicit instruction provided in the booster sessions had the strongest effects on student learning demonstrated in the SDLMI knowledge probes.

The need for boosters to ensure students reach mastery suggests the need for more developed modules to ensure mastery is reached without boosters. The design of the intervention adapted from Mazzotti et al. (2012, 2013) followed Coyne and colleagues' (2007) two suggested elements of instructional design including judicious review and mediated scaffolding. Judicious review is the "sequence and schedule of opportunities learners have to apply and develop mastery of new knowledge" (Coyne et al., 2007, p. 16). Mediated scaffolding is "temporary support for students to learn new material" (e.g., model-lead-test; Coyne et al., 2007, p. 13). Specifically, teaching shorter lessons more often (i.e., divide content into 16 lessons *vs*. 8) could help students reach mastery through module instruction without requiring booster sessions by providing more opportunities to practice probe questions. In addition, due to students with ESN deficits in expressive and receptive language skills (Turnbull et al., 1995), building in more supports such as supplementary visual aids (e.g., pictures, key word charts, videos) could be used to enhance the learning process (Rao & Gagie, 2006). For one student (Yael), an additional visual support highlighting key symbols discussed in the module and linked to probe questions was provided. This visual support would have also been appropriate to provide to Pietro as well, but it was not provided. To structure the modules, the lead researcher assessed the functional level and supports needed during classroom instruction for each student. Yael was the only student to require the additional visual support to accompany instruction through the modules; however, all students could have benefited from having the option of using this support, especially since this was a novel topic for all students.

In addition, student's on-task behavior increased most notably after Part Two, when they were provided with a tool and learned to self-monitor with graphing. A system of least prompts was not necessary after the first two baseline sessions as students completed modules and responded to probes independently.

Finally, the Tau-U ES for students' knowledge on SDLMI probes ranged from 0.57 to 0.91, with a large omnibus ES of 0.77 (CI95 = [0.40, 1.00]). These strong effects support the interpretation of visual analysis and the overall effectiveness of the intervention in increasing knowledge of SDLMI.

On-Task Behavior

Visual analysis of results indicated a functional relation between function-based, computer assisted SDLMI and increased on task behavior for all three students; however, there was variability in on-task behavior trends through the intervention and a decreasing trend in on-task behavior during maintenance. The functional relation between intervention and on-task behavior suggests the levels of on-task behavior resulted in response to the intervention for all three students. Essentially, students learned a replacement behavior for the function of their challenging behavior which led to increased on-task or expected classroom behavior. Overall, Tomer's average on-task behavior increased from 42.35% during baseline to 61.88% during the intervention. Pietro's average on-task behavior increased from 54.44% during baseline to 70.62% during the intervention. Yael's average on-task behavior increased from 66.03% during baseline to 73.12% during the intervention. While a functional relation was present and the effect sizes were moderate (Tau-U ranged from 0.40 to 0.60 (moderate effects), with a moderate omnibus ES of 0.50 (CI95 = [0.13, 0.88]), the margins of increased on-task

behavior between baseline and intervention were minimal. This was reflected in the teacher's perceptions of the effectiveness of the intervention.

Impact of the Intervention on Other Measures

Research Question 3: To what extent do teacher ratings of GAS change after Part One of function-based, computer-assisted SDLMI?

Goal Attainment Change

The degree to which goals were attained according to GAS showed an increase directly following the intervention but decreased during maintenance for all three students. This phenomena may be explained by the need for on-going explicit supports required for students with ESN (Wehmeyer & Shogren, 2017).

Additionally, student-reported levels of self-determination on the SDI decreased between pre- and posttest measures for two out of three students while teacher-reported levels of self-determination increased for all three students between pre- and posttest. In addition, the student posttest scores on the SDI were closer to the teacher ratings. The decrease in levels of self-determination in the student ratings and closer agreement with teacher ratings for the SDI posttest may suggest that students had a better understanding of self-determination and could more accurately respond to the questions measuring self-determination.

Research Question 4: To what extent do the effects of function-based, computer-assisted SDLMI generalize to a second, untrained setting (e.g., a job skill setting) for youth with extensive support needs?

Behavior Goal Generalization from Classroom to Job Skill Settings

Generalization data involved collecting data in job skill settings once during baseline and once during the intervention phases; thus, no functional relation could be established because of limited data collection (Cooper et al., 2020). For the purpose of this study, generalization probes were collected to determine if there was any transfer of goal-setting skills learned to the on-task behavior in an untrained job skill setting. There was a lack of generalization because behavior goals were not taught explicitly in the context of job skills. Modules discussed behavior expectations in the framework of the classroom only (comparison with classroom rules and expectations). There was no clear transfer between the behavior goal set in the classroom to the job skill setting as two out of three students did not generalize their replacement behavior, goal-directed tools, or self-management techniques to the untrained job skill setting which was reflected in levels of on-task behavior remaining unchanged or decreased after the intervention. Generalization of on-task behavior in the classroom requires programming for students to apply the skills learned to the job setting also (Cooper et al.; Stokes & Baer, 1997).

Research Question 5: What are students', teachers', and job skill supervisors' perceptions of using function-based, computer-assisted SDLMI to increase the on-task behavior for youth with extensive support needs?

Perceptions of Intervention and Outcomes

Social validity should measure (a) the social significance of goals, (b) the social appropriateness or acceptability of the procedures, and (c) the social importance of the effects or stakeholder's satisfaction with results (Wolf, 1978). To measure social validity, perspectives of the intervention were requested from students and teachers. First, student perceptions were mostly positive as students strongly agreed the intervention helped them

learn to set goals for their behavior through the use of a tool and self-monitoring, which speaks to the acceptability of the intervention. Students agreed their behavior improved because of goal setting and they liked learning how to set goals for their behavior, which speaks to the significance and importance of the intervention. The ease of use of the computer activities was rated lower as two out of three students agreed they would use the tool in the future.

Ms. Penny and Mr. Leonard completed the TARF-R (Reimers & Wacker, 1988) to provide perceptions as teachers and as job skill supervisors. Their responses were consistent from both perspectives. Overall, perceptions were positive for two out of three students (Tomer and Yael). They both agreed the intervention plan as was acceptable, they would use the intervention in the future, they liked the procedures, other staff members would be willing to carry out the intervention, they would be willing to change routines, the intervention fit well into existing routines, and addressed the goal of increasing appropriate behavior. Ms. Penny and Mr. Leonard were neutral to the statement regarding disadvantages of implementing the intervention. Mr. Leonard indicated the intervention would be effective to use in the future and would make lasting improvements on behavior only for Yael. Mr. Leonard indicated that Pietro would likely feel discomfort during the behavior intervention plan.

While a functional relation was present between the intervention and increased levels of on-task behavior, the margins of increased on-task behavior between baseline and intervention were minimal (i.e., Tomer's average on-task behavior increased from 42.35% during baseline to 61.88% during the intervention; Pietro's average on-task behavior increased from 54.44% during baseline to 70.62% during the intervention; and

Yael's average on-task behavior increased from 66.03% during baseline to 73.12% during the intervention). Tomer, Pietro, and Yael increased their on-task behavior 19.35 percentage points, 16.18 percentage points, and 7.09 percentage points respectively; however, teachers deemed the intervention acceptable and effective only for Tomer and Yael. This suggests although data indicated the effectiveness of this intervention for all three students, a larger change may have been necessary for the teacher to deem the intervention acceptable for Pietro.

Significance and Contributions

This study contributes to the field in two ways. First, the research base for using multi-component, computer-assisted instruction in SDLMI to address challenging behavior is limited. This study contributes to the research base by systematically replicating Mazzotti and colleagues' (2012, 2013) work which involved teaching SDLMI using CAI to decrease disruptive behavior and increase knowledge of the SDLMI for students with high-incidence disabilities. Function-based, computer-assisted SDLMI extended the findings from Mazzotti et al. (2012, 2013) using a similar adapted format to deliver goal setting instruction in SDLMI via video modules and expanded the research base to include students with low-incidence disabilities and made an effort to consider the function of challenging behavior.

Additionally, Shogren et al. (2017) explained that teachers can support all students through the SDLMI process of learning skills to promote problem-solving and goal-setting as a Tier 1 intervention with the option of providing increasingly intensive supports using explicit instruction in decision-making, problem-solving, self-management, or self-advocacy skills at the Tier 2 group or individual level (Shogren et

al., 2016). Function-based, computer-assisted SDLMI contributed to the literature as a successful Tier 3 support for students with low-incidence disabilities by incorporating a function-based approach to teach a specific replacement behavior through goal setting within the SDLMI framework to address challenging behavior for students with ESN.

Limitations

Like every study, this study was not without limitations. First, due to the design as a single-case multiple-probe study and the limited sample size of three participants, this study's findings lack generalizability. The findings of this study suggest the function-based, computer-assisted SDLMI intervention was effective for three youth between the ages of 15 and 16 years old with ESN. Additional systematic replications of this study will be needed to determine the extent to which these findings generalize across large samples of students with ESN.

Next, there were two possible threats to the validity of this study which included intervention implementation in an artificial environment and potential history effects. First, the study was implemented in an artificial environment, or a room separate from the classroom to eliminate distractions, which may be an external threat to validity. In future studies, the usefulness of this intervention could be considered in more inclusive settings which may directly impact relevant socially significant behavior. Additionally, potential history effects (Cooper et al., 2020) may have threatened the internal validity of this study. Cooper et al. (2020) explain that repeated measurement in baseline does not control for an extraneous event (i.e., history) that occurs between the last baseline point and the first intervention point. The longer the time periods between the two measurement points, the greater the possibility that an event might influence the student

performance. More certainty about the effects of this intervention will be provided through future replications.

Suggestions for Future Research

Findings from the study lead to the following recommendations for future research. First, this intervention should be implemented for more youth across wider ranges of ages and support needs. Since this intervention was effective for three youth with autism and intellectual disability in a rural high school, self-contained classroom in the southeast United States, it would be beneficial to compare these effects across other disability categories, ethnicities, ages, geographic locations, and more inclusive settings.

Next, replications across participants with same functions of challenging behavior should be considered. This study included three youth with ESN with three different functions of challenging behavior. For two students with challenging behavior maintained by automatic reinforcement and by obtaining attention, the intervention was more effective than for the student with escape-maintained behavior. Comparing the effects specifically for a single function of challenging behavior by conducting a series of multiple-probe studies across at least three youth with ESN with the same function of challenging behavior could provide more information on the effectiveness of the intervention.

Finally, emphasis should be placed on ensuring students' performance generalizes across settings. Since generalization data were collected only once in baseline and once in maintenance, it was not possible to determine a functional relation between function-based, computer-assisted SDLMI and on-task behavior in a generalized untrained job skill setting. Setting/situation generalization is important because the intervention should

produce generalized outcomes in other settings in order to produce socially significant behavior change (Cooper et al., 2020). Future research must make an effort to collect setting/situation generalization data repeatedly as a primary dependent variable across all study phases (i.e., baseline, intervention, maintenance) to determine if a functional relationship exists between function-based, computer-assisted SDLMI and on-task behavior. Programming for generalization is critical for future considerations. This study would fall into Stokes and Baer's (1977) category of "Train and Hope" as skills learned in function-based, computer-assisted SDLMI pertaining to challenging behavior in the classroom transferred to an untrained job skill setting. Future research should incorporate generalization programming techniques suggested by Stokes and Baer such as "Training Sufficient Exemplars" and "Mediating Generalization." This may involve specifically including overt examples and non-examples and structure explicit instruction around both classroom and job skill behavior expectations and applying the self-management tools to track progress in the behavior goal across settings.

Implications for Practice

Findings from this study suggest several implications for practice. Results indicated students with ESN can learn replacement behaviors to address the function of their challenging behavior through function-based, computer-assisted SDLMI.

First, interventions that aim to address the function of problem behavior have stronger effects in general (Filter & Horner, 2009; Ingram et al., 2005; Payne et al., 2007; Umbreit et al., 2007). Function-based interventions have an evidence-base demonstrating effectiveness for teaching a range of skills across preschool (Wood et al., 2011), elementary school (Burke et al., 2003; Lane et al., 2007), and at the secondary and

postsecondary levels (Turton et al., 2011; Whitford et al., 2013). Only two studies that sought to increase self-determined appropriate behaviors have considered the function of challenging behavior in workplace settings (Nittrouer et al., 2016; Mazzotti et al., 2020). Therefore, findings from this intervention may provide teachers with a method of increasing self-determined appropriate behavior in the classroom through a function-based, computer-assisted approach.

Next, CAI is considered an evidence-based practice for students with disabilities and provides opportunities for students to engage in self-directed learning to decrease reliance on prompts delivered by teachers or peers (Browder et al., 2014). The effectiveness of CAI-based intervention has been demonstrated as a supplemental learning tool (Schmidt et al., 1985-1986) across academic content (Dugan et al., 2007; Purrazzella & Mechling, 2013; Wajiuhullah et al., 2018) social and functional skills (Ramdoss et al., 2011; Mechling, 2011; Weng et al., 2014) employment skills (Gilson et al., 2017; Mazzotti et al., 2010; Richter & Test, 2011), and self-determination skills (Mazzotti et al., 2012, 2013; Mechling, 2007). CAI can be used to supplement teacher instruction (Sigafoos et al., 2014) specifically in self-management of their own behavior when provided with adequate supports (e.g. technology-based supports; Mechling, 2011). This evidence supports the use of CAI to teach students a replacement behavior using the SDLMI.

Research indicates positive outcomes across academic (Agran et al., 2005; Cihak et al., 2010; Gilberts et al., 2001; Hughes et al., 2002) employment (Nittrouer, et al., 2016; Woods & Martin, 2004) and social skills (Clemons et al., 2016) when components of self-determination (i.e., self-monitoring) is taught to individuals with intellectual

disability. In addition, this study is a systematic replication of Mazzotti and colleagues' (2012, 2013) studies that used computer-assisted instruction to teach goal setting and attainment to to address challenging behavior of students with high-incidence disabilities. Cobb et al. (2009) suggested that effects were stronger when students participated in multicomponent interventions that promote self-determination (e.g., goal-setting and self-management). Because self-determination is a predictor of post-school success (Mazzotti et al., 2016; Test et al., 2009), teachers have a responsibility to provide instruction targeted to increase skills in these areas. Therefore, this multi-component intervention may provide a method for teachers to provide instruction and supports for students to learn replacement behaviors to address the function of their challenging behavior through the SDLMI process and self-monitor their progress.

Summary

This study examined the effects of function-based, computer-assisted SDLMI on student knowledge of the SDLMI and on-task behavior in the classroom and in an untrained job skill setting. Overall, results indicated students increased their knowledge of the SDLMI and increased on-task behavior in the classroom. Effects showed limited generality to the untrained job skill setting for two out of three participants. Two out of three students maintained knowledge of SDLMI while one student maintained levels of on-task behavior for two weeks after the intervention. The degree to which goals were attained according to GAS showed an increase directly following the intervention but decreased during maintenance. Student-reported levels of self-determination decreased between pre- and posttest measures for two out of three students while teacher reported levels of self-determination increased for all three students between pre- and posttest.

Students and teachers agreed the intervention was acceptable to teach appropriate behavior and teachers agreed the intervention was effective in addressing challenging behavior for two out of three students. Implications of this study may provide teachers with a systematic method to teach self-determination skills through the SDLMI process while addressing the function of challenging behavior across settings using computer-assisted instruction. To conclude, this intervention promotes the development of self-determination skills by increasing student knowledge of the SDLMI as students learn to set goals that address the function of their challenging behavior, which may have long-term positive effects contributing to improved post-school outcomes for individuals with ESN.

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APPENDIX A

Consent Form for Teachers/Job Skill Supervisors

UNC CHARLOTTE
Department of Special Education and Child Development
9201 University City Boulevard, Charlotte, NC 28223-0001

Consent to Participate in a Research Study

Title of the Project: Function-based, computer-assisted SDLMI effects on SDLMI knowledge and on-task behavior for youth with extensive support needs
Principal Investigator: Charles L. Wood, Ph.D., BCAB-D; Valerie L. Mazzotti, Ph.D.; Fred Spooner, Ph.D.; Claudia Flowers, Ph.D.; and Wen-hsuan Chang {*co-investigators are from the Department of Special Education and Child Development or Department of Educational Leadership*}

You are invited to participate in a research study. Participation in this research study is voluntary. The information provided is to help you decide whether or not to participate. If you have any questions, please ask.

Important Information You Need to Know

- **Purpose:** Using function-based, computer-assisted SDLMI to improve self-determination skills through goal-setting, planning, adjusting a plan/goal to address the function (e.g., get a break from work, get attention from staff) of challenging classroom/job skill behaviors for students with extensive support needs.
- **Teachers:** Teachers who provide special education services/supports to students who follow the extensions of the general curriculum and students between the ages of 13-22 who require extensive support needs and have challenging behaviors in the classroom/workplace (e.g., difficulty staying on task or completing tasks) with the ability to respond verbally or respond through the means of technology when spoken to or asked a question.
- **Job Skill Coaches:** Workplace supervisors/job skill coaches who supervise students who receive special education services/supports or students who follow the extensions of the general curriculum and students between the ages of 13-22 who require extensive support needs and have challenging behaviors in the classroom/workplace (e.g., difficulty staying on task or completing tasks) with the ability to respond verbally or respond through the means of technology when spoken to or asked a question.
- **Procedures of the study for teachers:**
    1. Teachers will be interviewed to assist in pinpointing the function of the challenging behavior (e.g., escape from task demands or attention seeking behavior) and the time of day that most challenging for the student. This interview will take about 30 min and it will be audio recorded so that researchers can refer to your responses.

2. Your lessons/workplace activities will be observed by the research team (during the time you identified as most challenging for the student).
3. You will be asked to complete a 15-item social validity questionnaire that will take about 15 minutes to complete in order to provide your perspectives on the usefulness, feasibility, and effectiveness of the intervention.

- **Procedures of the study for job skill supervisors:**
    1. Workplace activities will be observed by the research team **twice**. Workplace supervisors will provide supports and coaching throughout the observation, nothing about job skills training will change due to the observations.
    2. You will be asked to complete a 15-item social validity questionnaire that will take about 15 minutes of your time in order to provide your perspectives on the usefulness, feasibility, and effectiveness of the intervention.
-
- By electing to participate in this study, you will be expected to follow protocol to maintain confidentiality which is expected of special education professionals. The research team will work diligently to ensure the confidentiality of all participants.
- Please read this form and ask any questions you may have before you decide whether to participate in this research study.

Why are we doing this study?

The purpose of this research study is to determine the effects of function-based, computer-assisted Self-Determined Learning Model of Instruction (SDLMI) intervention on challenging behaviors in the classroom. Specifically, the researchers will provide an interactive instructional tool that supports participants through the SDLMI process of setting a goal, making a plan, and adjusting the plan/goal as needed. Supported instructional techniques will be used to guide students to identify an area of need (e.g., addressing a challenging classroom behavior, remaining on task or completing tasks).

Why are you being asked to be in this research study.

You are being asked to to participate in this study because you are a special education/service provider for students with extensive support needs between the ages of 13-22, following extensions of the general curriculum and have challenging behaviors across settings (e.g., students can benefit from explicit instruction to address the function of their challenging behavior; appropriately asking for a break/obtaining attention). In addition, they use verbal speech or technology-assisted speech consistently.

What will happen if I take part in this study?

Your [student/s] will be asked to participate in daily social skills lessons during the regularly scheduled time allocated by you (the teacher), thus supplementing social skill instruction. The lesson will be based on the SDLMI and will incorporate components of direct instruction and research-based methods for teaching self-determination skills (goal-setting and self-monitoring) to students with disabilities. This will involve students participating in eight lessons delivered via computer (adapted to meet students' needs) corresponding to three SDLMI parts: (a) three lessons for setting a goal, (b) three lessons for making a plan, (c) and two lessons for adjusting the goal. Students will be provided with multiple means of responding to SDLMI probes (e.g., provided choices to point/verbally state responses).

Your contribution as a teacher will be collaborating with the research team. Prior to the study, you will be asked to complete a variation of a functional analysis to determine the function of students' challenging behavior. To do this, the research team will take 30 min of your time to

interview you and obtain your perspective of the controlling function of student's challenging classroom behavior (e.g., to obtain staff attention, escape from task demands). Your collaboration will be required during observations in the classroom. In addition, by providing responses to the teacher version of the social validity questionnaire at the end of the study (should take no more than 15 minutes of your time), you will offer insights into the feasibility and effectiveness of the intervention.

Your contribution as a workplace supervisor/job skills coach will be collaborating with the research team during observations. You will provide supports and coaching throughout the observation, nothing about job skills training will change due to the (2) observations. In addition, by providing responses to a social validity questionnaire at the end of the study (should take no more than 15 minutes of your time), you will offer insights into the feasibility and effectiveness of the intervention.

What benefits might I experience?

You will not benefit directly from being in this study. Benefits will more directly affect students with whom you are serving in special education. The benefits of participation in this study are providing your students with soft-skills (self-determination skills including goal-setting, self-monitoring, and self-regulation) which are predictors of positive post-school outcomes. Benefits for students include the potential to improve their self-determination skills (goal setting, self-management). Self-determination is a predictor of post-school success and is beneficial across all transition settings (educational, employment, and independent living). Students will learn skills that are transferrable to other goals which will enhance soft skills known to improve outcomes for students with disabilities.

What risks might I experience?

As a teacher in North Carolina, you are familiar with protocol for handling sensitive data and maintaining your own and your student/s confidentiality. Therefore, the risks of participating in this study are minimal. You are expected to follow protocol to ensure confidentiality of students. Failure to do so could result in termination of your job, loss of payment, etc. The research team will work diligently to ensure confidentiality. Data will remain coded and stored in locked filing cabinets/on password protected computers.

How will my information be protected?

We will not use your or your students' names. Instead we will use a pseudonym (fake name) and this fake name will be used on any work (i.e., responses to SDLMI probes) students create in class. The video recordings will be shared with the research team to ensure fidelity of implementation and accuracy of scoring. The video will record the student where only the [student/s] first name will be recorded. We will not record full names of any of the students or the teacher. Paper materials will be stored in a locked filing cabinet and electronic materials will be stored in a University Dropbox folder that the researcher team can access via password protected computers. Only the research team will have routine access to the study information. Other people with approval from the lead investigator (included in the IRB approval for this study), may need to see the information we collect including people who work for UNC Charlotte and other agencies as required by law or allowed by federal regulations. Your personal information will be maintained with confidentiality (e.g., your name, email address).

How will my information be used after the study is over?

By law, the data collected during this study must be stored for three years. This data will remain in locked filing cabinets/password protected in Dropbox. This data will only be used during the study to ensure that the investigators implement the intervention correctly and score the

participants' responses accurately. After this study is complete, study data may be shared with the research team and we will publish our results. The data we share will NOT include information that could identify you.

Will I receive an incentive for taking part in this study?
No incentives are provided to teacher/job skill supervisor/student participants.

What other choices do I have if I don't take part in this study?
Students, teachers, and job skill supervisors who do not take part in this study, will still take part in the routine classroom/job skill activities as they would on a typical day. The classroom teacher will still teach all students the daily lessons. Students would not be video recorded and no other information about them would be collected. Teachers may elect to continue collaborating with the research team following the study. At this time, all students in the classroom may participate in the computer assisted SDLMI intervention. No students would be video/audio recorded and no other information about them would be collected.

What are my rights if I take part in this study?
It is up to you to decide to be in this research study. Participating in this study is voluntary. Even if you decide to be part of the study now, you may change your mind and stop at any time. You do not have to answer any questions you do not want to answer.

Who can answer my questions about this study and my rights as a participant?
For questions about this research, you may contact [Ashley Voggt, ashley.voggt@uncc.edu, 336-688-4615; and Dr. Charlie Wood, clwood@uncc.edu, (704) 687-8395)].

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Office of Research Compliance at 704-687-1871 or uncc-irb@uncc.edu.

Consent to Participate

By signing this document, you are agreeing to be in this study. Make sure you understand what the study is about before you sign. You will receive a copy of this document for your records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

I understand what the study is about, and my questions so far have been answered. I agree to take part in this study.

_____
Name (PRINT)

_____
Signature Date

_____
Name & Signature of person obtaining consent Date

APPENDIX B

Consent Form for Parents

UNC CHARLOTTE
Department of Special Education and Child Development
9201 University City Boulevard, Charlotte, NC 28223-0001

Parent or Legal Guardian Consent for Child/Minor Participation in Research

Title of the Project: Function-based, computer-assisted SDLMI effects on SDLMI knowledge and on-task behavior for youth with extensive support needs
Principal Investigator: Ashley Voggt, M.A.T., A.B.D.; Doctoral Candidate in Special Education
Co-investigator: Charles L. Wood, Ph.D., BCAB-D; Valerie L. Mazzotti, Ph.D.; Fred Spooner, Ph.D.; Claudia Flowers, Ph.D.; and Wen-hsuan Chang {*co-investigators are from the Department of Special Education and Child Development or Department of Educational Leadership*}

Your [child/legal ward] is invited to participate in a research study. Your [child's/legal ward's] participation in this research study is voluntary. The information provided is to help you decide whether or not to allow your [child/legal ward] to participate. If you have any questions, please ask.

Important Information You Need to Know

- **Purpose:** Using function-based, computer-assisted SDLMI to improve self-determination skills through goal-setting, planning, adjusting a plan/goal to address the function (e.g., get a break from work, get attention from staff) of challenging classroom/workplace behaviors for students with extensive support needs.
- **Student participants:** Your [child/legal ward] may participate in this study if they are between the ages of 13-22, following extensions of the general curriculum who require extensive support needs and have challenging behaviors in the classroom/workplace (e.g., difficulty staying on task or completing tasks) with the ability to respond verbally or respond through the means of technology when spoken to or asked a question.
- **Procedures of the study:**
    1. Students will be trained by the research team to use a computer-assisted function-based evidence-based intervention to build self-determination skills (i.e., goal-setting) called the Self-Determined Learning Model of Instruction (SDLMI). This intervention will be adapted to meet the needs of each student and students will be provided with multiple means of responding (e.g., dictation to scribe or speech-to-text using technology).
    2. The research team and teachers will guide students will identify an area of need based on the function of their challenging behavior (e.g., escape task demands or seeking attention) with the help of the classroom teacher and research team.
    3. The SDLMI intervention will be implemented by the research team and includes eight lessons corresponding to three SDLMI parts: (a) three lessons for setting a goal, (b) three lessons for making a plan, (c) and two lessons for adjusting the goal. These lessons will last about 20 minutes and will be audio/video recorded to ensure the research team scores student responses appropriately.

4. Students will be observed in the classroom during a time the teacher reports students tend to struggle the most. Teachers will provide supports during the lesson, nothing about the classroom instruction will change due to the observations.
5. Students will be observed in the workplace setting to determine if effects of the classroom intervention carry over to the workplace. Workplace supervisors will provide supports and coaching throughout the observation, nothing about job skills training will change due to the observations.
6. After the study, your child will be asked to complete a 6-item questionnaire, which should take about 10 minutes to complete. This will determine their perspective of the usefulness, effectiveness, and efficiency of the intervention.

- Your [child/legal ward] will still take part in normal classroom/workplace activities, even if you decide to not let them participate in this study. The purpose of this study is to supplement instruction in social skills that is currently implemented by the classroom teacher.
- Please read this form and ask any questions you may have before you decide whether to participate in this research study.

Why are we doing this study?

The purpose of this research study is to determine the effects of function-based, computer-assisted Self-Determined Learning Model of Instruction (SDLMI) intervention on challenging behaviors in the classroom. Specifically, the researchers will provide an interactive instructional tool that supports participants through the SDLMI process of setting a goal, making a plan, and adjusting the plan/goal as needed. Supported instructional techniques will be used to guide students to identify an area of need (e.g., addressing a challenging classroom behavior; remaining on task or completing tasks).

Why is your [child/legal ward] being asked to be in this research study.

You are being asked to allow your [child/legal ward] to participate in this study because they are between the ages of 13-22, following extensions of the general curriculum/occupational course of study and have challenging behaviors in the classroom (e.g., students can benefit from explicit instruction to address the function of their challenging behavior; appropriately asking for a break/obtaining attention). In addition, they use verbal or technology-assisted speech consistently.

What will students do in this study?

Your [child/legal ward] will be asked to participate in this study during daily social skills lessons during the regularly scheduled time allocated by the teacher; thus supplementing social skills instruction. The lesson will be based on the SDLMI and will incorporate components of direct instruction and research-based methods for teaching self-determination skills (goal-setting and self-monitoring) to students with disabilities. This will involve students participating in eight lessons delivered via computer (adapted to meet students' needs) corresponding to three SDLMI parts: (a) three lessons for setting a goal, (b) three lessons for making a plan, (c) and two lessons for adjusting the goal. Students will be provided with multiple means of responding to SDLMI probes (e.g., dictation to scribe/GoogleDocs).

Your [child/legal ward] will be observed in the classroom primarily and in their job skills setting (2 times). These observations will be recorded to measure student on-task behavior. The goal of the intervention is to measure the impact of the intervention on-task behavior and knowledge of the SDLMI.

The self-determination lessons will be video/audio recorded and these video recordings will be used of the purpose of this research study only. Your child's name will not be used in the videos. Data regarding participant performance will be viewed only by other members of this research team, and materials collected will be used to ensure we are implementing the procedures of the study correctly and scoring your child's responses correctly. Raw data will always be collected on paper first and locked in a filing cabinet or on a password protected computer when not being directly viewed. Raw data will be immediately de-identified (names blacked out with sharpies and coded according to pseudonyms) which will be kept on a laptop, backed up on thumb drives, and locked with secure passwords.

What benefits might students experience?

Benefits for students include the potential to improve their self-determination skills (goal-setting, self-management). Self-determination is a predictor of post-school success and is beneficial across all transition settings (educational, employment, and independent living). Students may learn skills that are transferrable to other goals which may enhance soft-skills (e.g.., self-determination skills including goal-setting, self-monitoring, and self-regulation) which are predictors of positive post-school outcomes. The information we learn may help us learn how to create lessons and tools to help students learn.

What risks might students experience?

We do not believe that your [child/legal ward] will experience any risk from participating in this study. The self-determination lessons will occur during class time and will supplement instruction in functional skills, adaptive behavior, and social skills. Your [child/legal ward] may benefit from participating in the computer-assisted SDLMI intervention to build self-determination skills, but we can't say this for sure.

There is minimal risk of frustration for the student during this study. During these sessions, the student will be asked to perform tasks that may be difficult for the student, but the student can request prompts or assistance at any time. Risks are minimal for students because this study will occur as part of routine classroom teaching to supplement instruction provided by classroom teachers.

How will information be protected?

We will not use your [child's/legal ward's] name. Instead we will use a pseudonym (fake name) and this fake name will be used on any work (i.e., responses to SDLMI probes) students create in class. The video recordings will be shared with the research team to ensure fidelity of implementation and accuracy of scoring. The video will record the student where only the [child's/legal ward's] first name will be recorded. We will not record full names of any of the students or the teacher. Paper materials will be stored in a locked filing cabinet and electronic materials will be stored in a University Dropbox folder that the researcher team can access via password protected computers. Only the research team will have routine access to the study information. Other people with approval from the Investigator, may need to see the information we collect including people who work for UNC Charlotte and other agencies as required by law or allowed by federal regulations.

How will information be used after the study is over?

By law, the data collected during this study must be stored for three years. This data will remain in locked filing cabinets/password protected in Dropbox. This data will only be used during the study to ensure that the investigators implement the intervention correctly and score the participants' responses accurately. After this study is complete, study data may be shared with the

research team and we will publish our results. The data we share will NOT include information that could identify you.

Will [children/legal wards] receive an incentive for taking part in this study?
Your [child/legal ward] will not receive any payment for being in this study.

What other choices are there if I don't want my [child/legal ward] to take part in this study?
If you decide not to let your [child/legal ward] take part in this study, they will still take part in the routine classroom activities as they would on a normal day. The classroom teacher will still teach all students the daily lessons. The workplace supervisor will still provide coaching and support at the job setting. Your [child/legal ward] would not be video recorded and no other information about them would be collected. Your [child's/legal ward's] teacher may elect to continue collaborating with the research team following the study. At this time, all students in the classroom may participate in the computer-assisted SDLMI intervention. No students would be video/audio recorded and no other information about them would be collected.

What are my [child's/legal ward's] rights if they take part in this study?
Participating in this study is voluntary. Even if you decide to allow your [child/legal ward] to be part of the study now, you or your [child/legal ward] may change your mind and stop their participation at any time. You and your [child/legal ward] will not lose any benefits to which you are entitled.

Who can answer my questions about this study and participant rights?
For questions about this research, you may contact Ashley Voggt, ashley.voggt@uncc.edu, 336-688-4615; and Dr. Charlie Wood, clwood@uncc.edu, (704) 687-8395.

If you have questions about research participant's rights, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Office of Research Compliance at 704-687-1871 or uncc-irb@uncc.edu.

Parent or Legally Authorized Representative Consent

By signing this document, you are agreeing to [your child's **OR** the person's named below] participation in this study. Make sure you understand what the study is about before you sign. You will receive a copy of this document for your records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

I understand what the study is about and my questions so far have been answered. I agree for [my child OR the person named below] to take part in this study.

_____
Participant Name (PRINT)

_____
Parent/Legally Authorized Representative Name and Relationship to Participant (PRINT)

_____
Signature of Parent/Legally Authorized Representative Date

_____
Name and Signature of Person Obtaining Consent Date

APPENDIX C

Consent and Assent Forms for Students

UNC CHARLOTTE
Department of Special Education and Child Development
9201 University City Boulevard, Charlotte, NC 28223-0001

**TO BE READ ALOUD TO STUDENTS:*

Study Title: Effects of function-based, computer-assisted SDLMI on SDLMI knowledge and on-task behavior for youth with intellectual disability

My name is Mrs. Voggt and I am a student at The University of North Carolina at Charlotte. I am doing a study to see if children can learn to set goals and track their progress.

I would like you to take part because you are between the ages of 14-22 with a disability who is able to respond verbally or through the means of technology when spoken to or asked a question. Your teacher and I think you would benefit to learn how to set goals and track your progress. Sometimes students have challenges in their classroom and this study will help students increase their self-determination skills by learning strategies for goal-setting, self-monitoring, and problem-solving.

If you decide you would like to be a part of the study, you will work with me five days a week for about three months. We will either go to a room different from your classroom or to a quiet place in your classroom, and you will use computer to work through a program called the Self-Determined Learning Model of Instruction (SDLMI). I will show you some ways to help you identify challenges you may have in the classroom then plan goals and actions to address the challenges. You will also learn to monitor your progress with the plan you made and adjust the plan as needed. This is not a test and you will not be graded. Your scores will be for the research team to make sure you understand goal-setting. Sessions will take about 20 minutes. Your teacher and I will work together to make sure you don't miss important things in the classroom.

There will be some questions for you about the SDLMI program that you will respond to the using the computer (verbally and captured in video). If you have trouble using the programs, you can raise your hand and ask for help at any time. Sometimes another student from UNCC will join me during our sessions. These sessions will be recorded to make sure the team scores your responses correctly. In addition, another student will collect data with me sometimes to make sure I don't make any mistakes. No one will see this data except my team members. You may also see the research team joining your

class for other activities to observe the class and watch the lesson. After the study, we will ask you seven questions and you can tell us what you thought about the study. You can give your honest opinion about if you liked the intervention, if you want to use it again, and if you felt that it helped you.

Your parents/guardians said it was ok for you to be in this study and have signed a form like this one. You do not have to say "yes" if you do not want to be in the study. If you say "no" or if you say "yes" and change your mind later, you can stop at any time and no one will be mad at you. Participating in this study will not hurt you, and you can ask questions at any time.

I hope that this new way of setting goals and tracking progress will help you and other students learn skills that will help you be successful in your classroom, jobs, and in the community, but I can't be sure it will.

When I am done with the study, I will write a report. I will not use your name in the report.

If you want to be in this study, please sign your name.

_____ _____

_____ _____

Participant Name/Signature Date

_____ _____

Signature of Investigator Date

Emancipated Minor (as defined by NC General Statute 7B-101.14) is a person who has not yet reached their 18th birthday and meets at least one of the following criteria: 1) has legally terminated custodial rights of his/her parents and has been declared 'emancipated' by a court; 2) is married, or 3) is serving in the armed forces of the United States.

APPENDIX D

Narrative of Function-Based, Computer-Assisted SDLMI

Slide Number	Part 1 – Lesson 1: Identify Strengths and Needs
1	Are you ready to learn to set goals? Let's begin! First, there are two rules. Number 1 – be sure your ears are ready to listen so you can hear the lesson and questions. Number 2 – be sure your thinking brain is turned on because when you see this symbol, you will need to **think** about a question and **say** your answer out loud **or point** to your answer on the choice card. There are 16 slides in lesson 1, not all slides will ask you a question. Find the slide number on your **choice card** to get ideas for your answer when you see **this** choice card picture in the lower left corner of the slide. Let's begin!
2	In this lesson you will learn about goal setting. Goal setting is important because you can learn to be independent and successful at school.
3	There are three parts to these goals setting lessons: Part 1 is Set a Goal, Part 2 is Make a Plan, and Part 3 is adjust the plan. Let's practice saying the three parts of goal setting lessons together. Listen, first it's my turn: Part 1 is Set a Goal – now say it with me: Part 1 is Set a Goal – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 2 is Make a Plan – now say it with me: Part 2 is Make a Plan – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 3 is Adjust the Plan – now say it with me: Part 3 is Adjust the Plan – your turn now, SAY IT LOUD! Great job!
4	For the next few days we will work on part 1 – set a goal. The question you ask when you are setting a goal is: What is my goal? Say it with me: What is my goal? Your turn, SAY IT LOUD! Great job!
5	What question do you ask when setting a goal? Is it A: What is my goal? or B: What is my Plan? Say your answer out loud or point to the answer on the choice card. If you said, A: What is my goal? You are exactly right! Nice work! If you said, B: What is my Plan, try again! The correct answer is A: What is my goal?
6	What is a goal? Let's define goal: A goal is something you want to achieve or a target to meet. As a student, some examples of goals you may set at school include: I will be a responsible student by following directions and doing my work quickly, quietly, and with good quality without disrupting the class. I will raise my hand to get someone's attention. I will speak respectfully to adults and peers.
7	Let's review: What is a goal? Listen, first it's my turn: A goal is something you want to achieve or a target to meet. Now say it with

	me: A goal is something you want to achieve or a target to meet. Your turn now: SAY IT LOUD! Excellent!
8	Now it is time to set your behavior goal based on your strength and needs. What is a strength? Let's define strength. Listen, strengths are tasks or actions you do well. Say it with me: strengths are tasks or actions you do well. Your turn SAY IT LOUD: strengths are tasks or actions you do well. Thumbs up for strengths! Great job!
9	Some examples of strengths include: I keep my hands to myself. I listen to my teacher and raise my hand to answer. I am a good friend. Do any of these examples match your strengths? Can you think of other strengths?
10	Now, what are your strengths, or tasks or actions you do well? You can use the examples provided or think of something new. Think first then say your strengths out loud or point to a choice on the choice card! Great job!
11	To set your behavior goal consider your strength and needs. What is a need? Let's define need. Listen, needs are tasks or actions you can improve on or get help with. Say it with me: needs are tasks or actions you can improve on or get help with. Your turn: needs are tasks or actions you can improve on or get help with. Arms up for needs! Great job!
12	Some examples of needs include: I need to stay in my area without being distracted by others or things. I need to speak respectfully to adults and peers. I need to be focused on my own actions and in control of myself. Do any of these examples match your needs?
13	Now, what are your needs, or tasks or actions you can improve on or get help with? You can use the examples or think of something new. Think first then say your strengths out loud or point to a choice on the choice card! Great job!
14	Let's review the parts of the goal setting lessons. There are three parts of goal setting lessons. Listen, Part 1 is Set a Goal – now say it with me: Part 1 is Set a Goal. Listen, Part 2 is Make a Plan – now say it with me: Part 2 is Make a Plan. Listen, Part 3 is Adjust the Plan – now say it with me: Part 3 is Adjust the Plan. Which part are we working on now? Part 1, 2, or 3? Say it loud. We are working on part 1 - Great job!
15	Let's review goals. Listen, a goal is something you want to achieve or a target to meet. Now say it with me: A goal is something you want to achieve or a target to meet. Your turn now: SAY IT LOUD! Nice job!
16	Let's review strengths and needs. Listen, strengths are tasks or actions you do well. Say it with me: strengths are tasks or actions you do well. Your turn SAY IT LOUD: strengths are tasks or actions you do well. Thumbs up for strengths! Great job! The opposite of a strength is a need. Listen, needs are tasks or actions you can improve on or get help with. Say it with me: needs are tasks or actions you can

	improve on or get help with. Your turn SAY IT LOUD: needs are tasks or actions you can improve on or get help with. Arms up for needs! Great work! You are finished with goal setting lessons for today – see you next time for lesson 2! Let's go back to class and get back to work.
Slide Number	**Part 1 – Lesson 2: Expected Classroom Behavior**
1	Are you ready to learn to set goals? Let's begin! First, there are two rules. Number 1 – be sure your ears are ready to listen so you can hear the lesson and questions. Number 2 – be sure your thinking brain is turned on because when you see this symbol, you will need to **think** about a question and **say** your answer out loud **or point** to your answer on the choice card. There are 20 slides in lesson 2, not all slides will ask you a question. Find the slide number on your **choice card** to get ideas for your answer when you see **this** choice card picture in the lower left corner of the slide. Let's begin!
2	Welcome back to your Goal Setting Lessons! There are three parts to these goals setting lessons: Part 1 is Set a Goal, Part 2 is Make a Plan, and Part 3 is adjust the plan. Let's practice saying the three parts of goal setting lessons together. Listen, first it's my turn: Part 1 is Set a Goal – now say it with me: Part 1 is Set a Goal – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 2 is Make a Plan – now say it with me: Part 2 is Make a Plan – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 3 is Adjust the Plan – now say it with me: Part 3 is Adjust the Plan – your turn now, SAY IT LOUD! Great job!
3	For the next few days we will work on Part 1 – Set a Goal. The question you ask when you are setting a goal is: What is my goal? Say it with me: What is my goal? Your turn, SAY IT LOUD! Great job!
4	What question do you ask when setting a goal? Is it A: What is my goal? or B: What is my Plan? Say your answer out loud or point to the answer on your choice sheet. If you said, A: What is my goal? You are exactly right! Nice work! If you said, B: What is my Plan, try again! When you are setting a goal, the question you ask yourself is: What is my goal?
5	What is a goal? Let's define goal: A goal is something you want to achieve or a target to meet. As a student, some examples of goals you may set at school include: I will work hard on my assignments. I will raise my hand to get someone's attention. I will speak respectfully to adults and peers.
6	Let's review: What is a goal? Listen, first it's my turn: A goal is something you want to achieve or a target to meet. Now say it with

<table>
<tr><td></td><td>me: A goal is something you want to achieve or a target to meet.
Your turn now: SAY IT LOUD! Excellent!</td></tr>
<tr><td>7</td><td>Last time, you identified two strengths – tasks or actions you do well.
*Display student responses</td></tr>
<tr><td>8</td><td>Last time, you also identified two needs – tasks or actions you need to improve. *Display student responses
Today, you will learn how to improve your needs.</td></tr>
<tr><td>9</td><td>When we talk about “getting better” or “improving” it means doing better than you did the last time on certain tasks or actions. Some examples include: Staying in your work area, completing your work quickly and with good quality, or using respectful language.</td></tr>
<tr><td>10</td><td>In order to get better at your “needs” you need to know the classroom expectations for behavior and compare them to your strengths and needs.

First, let’s compare your strengths to the class rules and expectations. Remember, you said your strengths are *Display student responses

The class rules and expectations are:

<table>
<tr><th>Respect Others</th><th></th></tr>
<tr><td>1. Respect yourself and others.
2. Talk only at appropriate times.
3. Use appropriate language and tone.
4. Keep hands, feet, and objects to yourself.
5. Leave room and materials ready for the next class.</td><td>1.
2.
3.
4.
5.
6.</td></tr>
</table>
*Highlight and point out matches in strengths and expectations.</td></tr>
<tr><td>11</td><td>Next, let’s compare your needs to the class rules and expectations. Remember, you said your needs are *Display student responses

The class rules and expectations are:

<table>
<tr><th>Respect Others</th><th>Accept Responsibilit</th></tr>
<tr><td>1. Respect yourself and others.
2. Talk only at appropriate times.
3. Use appropriate language and tone.
4. Keep hands, feet, and objects to yourself.
5. Leave room and materials ready for the next class.</td><td>1. Be on time.
2. Be prepared.
3. Listen to all instructions.
4. Complete assignm
5. Be engaged and participate.
6. Do your best.</td></tr>
</table>
*Highlight and point out matches in needs and expectations.</td></tr>
</table>

12	Function of behavior looks at why we do what we do or *our motivation* for behaving a certain way. In classroom observations by the researcher, Mrs. Voggt, and according to your teacher we think that the following functions may explain your areas of need or why you struggle to meet some classroom rules and expectations: 1. You may want attention from peers or teachers, this is why you are out of your seat or talking and acting silly sometimes. 2. You may want to escape or avoid less preferred work demands – or when your teacher asks you to get started with your work, you may not want to work right away. Your behavior to get attention from peers and teachers to avoid doing work may explain why you struggle with meeting the classroom rules and expectations, especially under the category of accepting responsibility (#4 complete assignments and #5 be engaged and participate).
13	To improve your needs and change your behavior, ask yourself two questions? 1. Do I need to change something that I do? (I'm pointing to myself) 2. Do I need to change something in my environment around me? (I'm pointing to my environment around me.)
14	To improve your needs and change your behavior, change **your behavior** or change **the environment around you**. **Example 1**: If I want to use respectful language to communicate my frustration with adults and peers, I can change something I am doing by purposefully using only polite and kind words. **Example 2**: If I cannot stay focused on my work, I can change my environment and move to a quiet place. You can set a goal to change your behavior!
15	Setting a behavior goal can help us improve our needs. Remember a goal is something you want to achieve or a target to meet.
16	Let's review: To improve your needs and change your behavior, ask yourself two questions? Listen, first it's my turn: 1. Do I need to change something that I do? (I'm pointing to myself) 2. Do I need to change something in my environment around me? (I'm pointing to my environment around me.) Now say it with me: 1. Do I need to change something that I do? (I'm pointing to myself)

	2. Do I need to change something in my environment around me? (I'm pointing to my environment around me.) Your turn now: SAY IT LOUD! Excellent!
17	You might answer the question: 1. Do I need to change something that I do? To **change my behavior** to complete assignments on time, I may need to change what I do by starting to work right away and trying my best.
18	You might answer the questions: 2. Do I need to change something in the environment around me? To **change something in my environment around me**, I may need to put my cell phone away so that I don't text during class.
19	Your turn to practice: I want you to identify two ways that you can change your behavior (Two examples will be provided on the choice sheet based on student needs; student will select changes verbally/pointing).
20	Let's review: 1. What can help us improve our behavior? Listen, first it is my turn: Setting goals can help us improve our behavior. Now, say it with me: Setting goals can help us improve our behavior. Your turn, SAY IT LOUD! 2. To improve our behavior, what may need to change? Listen, first it's my turn: 1. Do I need to change something that I do? (I'm pointing to myself) 2. Do I need to change something in my environment around me? (I'm pointing to my environment around me.) Now say it with me: 1. Do I need to change something that I do? (I'm pointing to myself) 2. Do I need to change something in my environment around me? (I'm pointing to my environment around me.) Your turn now: SAY IT LOUD! Excellent! Great work! You are finished with goal setting lessons for today – see you next time for lesson 3! Let's go back to class and get back to work.
Slide Number	**Part 1 – Lesson 3: Setting a Behavior Goal**
1	Are you ready to set a behavior goal? Let's begin! Remember, there are two rules. Number 1 – be sure your ears are ready to listen so you can hear the lesson and questions. Number 2 – be sure your thinking brain is turned on because you will need to think about a question and say your answer out loud or point to your answer. There are 20 slides in lesson 3, not all slides will ask you a question. Find the slide number on your **choice card** to get ideas for your answer when you

	see **this** choice card picture in the lower left corner of the slide. Let's begin!
2	Welcome back to your Goal Setting Lessons! There are three parts to these goals setting lessons: Part 1 is Set a Goal, Part 2 is Make a Plan, and Part 3 is adjust the plan. Let's practice saying the three parts of goal setting lessons together. Listen, first it's my turn: Part 1 is Set a Goal – now say it with me: Part 1 is Set a Goal – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 2 is Make a Plan – now say it with me: Part 2 is Make a Plan – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 3 is Adjust the Plan – now say it with me: Part 3 is Adjust the Plan – your turn now, SAY IT LOUD! Great job!
3	You are working on and have almost completed Part 1 – Set a Goal. The question you ask when you are setting a goal is: What is my goal? Say it with me: What is my goal? Your turn, SAY IT LOUD! Great job!
4	What question do you ask when setting a goal? Is it A: What is my goal? or B: What is my Plan? Say your answer out loud or point to the answer on your choice sheet. If you said, A: What is my goal? You are exactly right! Nice work! If you said, B: What is my Plan, try again! When you are setting a goal, the question you ask yourself is: What is my goal?
5	Let's review: What is a goal? A goal is something you want to achieve or a target to meet. Listen, first it's my turn: A goal is something you want to achieve or a target to meet. Now say it with me: A goal is something you want to achieve or a target to meet. Your turn now: SAY IT LOUD! Excellent!
6	What is a goal? Is it A: Something you like? or B: Something you want to achieve? Say your answer out loud or point to the answer on your choice sheet. If you said, B: Something you want to achieve - You are exactly right! Nice work! If you said, A: Something you like, try again! A goal is: Something you want to achieve.
7	As a student, some examples of goals you may set at school include: I will be a responsible student by following directions and doing my work quickly, quietly, and with good quality without disrupting the class. I will raise my hand to get someone's attention. I will speak respectfully to adults and peers.
8	You identified two strengths – tasks or actions you do well. **Display student responses*
9	You also identified two needs – tasks or actions you need to improve. **Display student responses* Today, you will learn how to improve your needs.
10	You learned that, in some ways, your behavior meets classroom rules and expectations. **Display student responses*

11	You also learned that, in some ways, your behavior does not meet classroom rules and expectations. This behavior must change to meet class rules and expectations. **Display student responses*
12	You also identified changes that need to happen, so you can meet class Expectations. **Display student responses*
13	Today, you will use your strengths, needs, and the changes you need to make to set a behavior goal!
14	Answer these questions to help you set your behavior goal. 1. What do you want to do to improve your behavior? Remember – setting a behavior goal will help you improve your behavior. **Provide relevant choices consistent with goals examples*
15	2. What do you know about your behavior now? Remember – your behavior does not always meet class rules and expectations. We will set a behavior goal to address your needs. **Display/highlight student responses*
16	3. What needs to change for you to improve your behavior? Remember – these changes may be changes you make or changes you make to the environment around you. **Provide relevant choices consistent with goals examples*
17	4. What can you do to make the changes happen? In the next few lessons, we will learn how to make a plan so that these changes will happen.
18	Time to set a behavior goal! Remember, a goal is something you want to achieve or a target to meet. What goal do you want to set to improve your behavior? Say your goal out loud or point to your goal on the choice sheet.
19	Let's review: What are the three parts of goal setting lessons? Listen, first it's my turn: Part 1 is Set a Goal – now say it with me: Part 1 is Set a Goal – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 2 is Make a Plan – now say it with me: Part 2 is Make a Plan – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 3 is Adjust the Plan – now say it with me: Part 3 is Adjust the Plan – your turn now, SAY IT LOUD! Great job!

	What question do you ask when you are setting a goal? Listen, my turn first, What is my goal? Say it with me: What is my goal? Your turn, SAY IT LOUD! Great job!
20	What behavior goal did you set for yourself? Say your goal again out loud or point to the choice sheet. Great work! You are finished with goal setting lessons for today – see you next time for lesson 4! Let's go back to class and get back to work.
Slide Number	**Part 2 – Lesson 4: Setting a Behavior Goal**
1	Are you ready to learn how to plan for your behavior goal? Let's begin! Remember, there are two rules. Number 1 – be sure your ears are ready to listen so you can hear the lesson and questions. Number 2 – be sure your thinking brain is turned on because you will need to think about a question and say your answer out loud or point to your answer.
2	Welcome back to your Goal Setting Lessons! There are three parts to these goals setting lessons: Part 1 is Set a Goal, Part 2 is Make a Plan, and Part 3 is adjust the plan. Let's practice saying the three parts of goal setting lessons together. Listen, first it's my turn: Part 1 is Set a Goal – now say it with me: Part 1 is Set a Goal – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 2 is Make a Plan – now say it with me: Part 2 is Make a Plan – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 3 is Adjust the Plan – now say it with me: Part 3 is Adjust the Plan – your turn now, SAY IT LOUD! Great job!
3	Let's review: What question do you ask when setting a goal? Is it A: What is my goal? or B: What is my Plan? Say your answer out loud or point to the answer on your choice sheet. If you said, A: What is my goal? You are exactly right! Nice work! If you said, B: What is my Plan, try again! When you are setting a goal, the question you ask yourself is: What is my goal?
4	You just finished Part 1 of your goal setting lessons. For the next couple of days, we are going to focus on Part 2 – Make a Plan. The question you ask when you are making a plan is: What is my plan? Say it with me: What is my plan? Your turn, SAY IT LOUD! Great job!
5	What question do you ask when you are making a plan? Is it A: What is my plan? or B: What is my task? Say your answer out loud or point to the answer on your choice sheet. If you said, A: What is my plan? You are exactly right! Nice work! If you said, B: What is my task, try again! When you are making a plan, the question you ask yourself is: What is my plan?

6	Remember: a goal is something we want to achieve or a target to meet. Last time you set your behavior goal: **Display student responses* Sometimes things get in the way of reaching your goal – those things are called barriers.
7	Let's define barrier. Listen, my turn first: A barrier is something that gets in the way of reaching a goal. Now say it with me: A barrier is something that gets in the way of reaching a goal. Your turn, SAY IT LOUD! Great job!
8	Barriers that may get in the way of your reaching your behavior goal may be: **Display relevant examples*
9	Let's talk about some ways to remove barriers. **Display relevant examples*
10	Some more examples of barriers and ways to remove those barriers may be: **Display relevant examples*
11	Remember your behavior goal? Say your goal out loud or point to the goal on your choice sheet.
12	Plan for your goal by answering these two questions: 1. What is going to get in the way of your behavior goal? – What are the barriers? **Display relevant examples – options on the choice sheet to match the function*
13	2. What are you going to do about it? – How can the barriers be removed? **Display relevant examples – options on the choice sheet to match the function*
14	Today we talked about removing barriers to meet your behavior goal. Next time, we will think about steps to take so that you can meet your behavior goal. Say your goal out loud or point to the goal on your choice sheet. Great work! You are finished with goal setting lessons for today – see you next time for lesson 5! Let's go back to class and get back to work.

Slide Number	Part 2 – Lesson 5: Identifying Supports to Achieve Goals
1	Are you ready to learn about tools to help you achieve your behavior goal? Remember, there are two rules. Number 1 – be sure your ears are ready to listen so you can hear the lesson and questions. Number 2 – be sure your thinking brain is turned on because you will need to think about a question and say your answer out loud or point to your answer.
2	Welcome back to your Goal Setting Lessons! There are three parts to these goals setting lessons: Part 1 is Set a Goal, Part 2 is Make a Plan, and Part 3 is adjust the plan. Let's practice saying the three parts of goal setting lessons together. Listen, first it's my turn: Part 1 is Set a Goal – now say it with me: Part 1 is Set a Goal – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 2 is Make a Plan – now say it with me: Part 2 is Make a Plan – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 3 is Adjust the Plan – now say it with me: Part 3 is Adjust the Plan – your turn now, SAY IT LOUD! Great job!
3	Let's review: What question do you ask when setting a goal? Is it A: What is my goal? or B: What is my Plan? Say your answer out loud or point to the answer on your choice sheet. If you said, A: What is my goal? You are exactly right! Nice work! If you said, B: What is my Plan, try again! When you are setting a goal, the question you ask yourself is: What is my goal?
4	We are working on Part 2 – Make a Plan. The question you ask when you are making a plan is: What is my plan? Say it with me: What is my plan? Your turn, SAY IT LOUD! Great job!
5	What question do you ask when you are making a plan? Is it A: What is my plan? or B: What is my task? Say your answer out loud or point to the answer on your choice sheet. If you said, A: What is my plan? You are exactly right! Nice work! If you said, B: What is my task, try again! When you are making a plan, the question you ask yourself is: What is my plan?
6	Remember, a goal is something you want to achieve or a target to meet. Let's review your behavior goal: **Display student responses* Say your goal out loud or point to your goal on your choice sheet. Today, we are going to make a plan so you can achieve your goal!
7	You identified 2 barriers – things that get in the way of your goal. The 2 barriers you identified were: **Display student responses*
8	You also identified 2 ways to remove barriers, so you can achieve your goal.

	The 2 ways to remove barriers were: **Display student responses*
9	Let's think about when you want to achieve your goal.
10	By making a timeline, you can plan for when you want to start working on a goal and when you will achieve your goal. For example, you might say, "I will start working on my goal today and I want to reach my goal in 2 weeks." (calendar of month provided, so student can identify dates to start and dates to reach goal). Say/point to the day you want to start working on your goal. Say the day you think you might want to reach your goal.
11	Now that you have identified a timeline to achieve your goal, we are going to review some tools to help you achieve your goal. Tool #1 is a cue card reminder. A **cue card** is a symbol of something that has a special meaning for us placed where we can see it frequently. **Provide relevant examples*
12	Tool # 2 is a self-monitoring checklist: A **behavior self-monitoring checklist** is list of tasks with rewards if goals are met.
13	Your turn: Choose a tool to meet your goal! Which tool did you like best? Tool #1 cue card reminder or Tool # 2 self-monitoring checklist? Say your tool out loud or point to your tool on your choice sheet.
14	Let's review: 1. Say your goal out loud or point to your goal on the choice sheet. 2. What tool will you use to help you achieve your goal? Tool #1 cue card reminder or Tool # 2 self-monitoring checklist? Great work! You are finished with goal setting lessons for today – see you next time for lesson 6! Let's go back to class and get back to work.
Slide Number	**Part 2 – Lesson 6: Finalize Your Plan**
1	Are you ready to finalize your plan to achieve your behavior goal? Remember, there are two rules. Number 1 – be sure your ears are ready to listen so you can hear the lesson and questions. Number 2 – be sure your thinking brain is turned on because you will need to

	think about a question and say your answer out loud or point to your answer.
2	Welcome back to your Goal Setting Lessons! There are three parts to these goals setting lessons: Part 1 is Set a Goal, Part 2 is Make a Plan, and Part 3 is adjust the plan. Let's practice saying the three parts of goal setting lessons together. Listen, first it's my turn: Part 1 is Set a Goal – now say it with me: Part 1 is Set a Goal – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 2 is Make a Plan – now say it with me: Part 2 is Make a Plan – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 3 is Adjust the Plan – now say it with me: Part 3 is Adjust the Plan – your turn now, SAY IT LOUD! Great job!
3	Let's review: What question do you ask when setting a goal? Is it A: What is my goal? or B: What is my Plan? Say your answer out loud or point to the answer on your choice sheet. If you said, A: What is my goal? You are exactly right! Nice work! If you said, B: What is my Plan, try again! When you are setting a goal, the question you ask yourself is: What is my goal?
4	We are working on Part 2 – Make a Plan. The question you ask when you are making a plan is: What is my plan? Say it with me: What is my plan? Your turn, SAY IT LOUD! Great job!
5	What question do you ask when you are making a plan? Is it A: What is my plan? or B: What is my task? Say your answer out loud or point to the answer on your choice sheet. If you said, A: What is my plan? You are exactly right! Nice work! If you said, B: What is my task, try again! When you are making a plan, the question you ask yourself is: What is my plan?
6	Today we are going to finalize your plan so you can achieve your goal. Let's review your behavior goal: **Display student responses* Say your goal out loud or point to your goal on your choice sheet. Today, we are going to make a plan so you can achieve your goal!
7	You have done a lot of work to meet your goal! So far you have: Set a goal, identified barriers in the way of reaching your goal, thought of ways to overcome those barriers, made a timeline for reaching your goal, and chosen a tool that will help you reach your goal. Nice work!
8	Now, you will use what you have done so far to finalize your plan to achieve your goal by answering 4 questions.
9	Question 1: What can you do to improve your behavior? **Provide relevant examples/choices* Say/point to your selection on the choice sheet - What you can do to improve your behavior?

10	Question 2: Which barriers could keep you from improving your behavior? **Provide relevant examples* Say/point to your selection on the choice sheet - Which barrier could keep you from improving your behavior?
11	Question 3: What can you do to remove barriers? **Provide relevant examples* Say/point to your selection on the choice sheet - What can you do to remove barriers?
12	Question 4: When will you begin? **Provide relevant examples* Say/point to your selection on the choice sheet - When will you begin?
13	Let's review: 1. What is your goal? Say/point to your selection on the choice sheet. 2. What is one barrier in the way of reaching your goal? Say/point to your selection on the choice sheet. 3. What tool will you use to remove barriers? Say/point to your selection on the choice sheet. 4. When will you begin working on your goal? Say/point to your selection on the choice sheet. Great work! You are finished with goal setting lessons for today – see you next time for lesson 7! Let's go back to class and get back to work.
Slide Number	**Part 3 – Lesson 7: Progress Monitoring**
1	Are you ready to track your progress toward your goal? Remember, there are two rules. Number 1 – be sure your ears are ready to listen so you can hear the lesson and questions. Number 2 – be sure your thinking brain is turned on because you will need to think about a question and say your answer out loud or point to your answer.
2	Welcome back to your Goal Setting Lessons! There are three parts to these goals setting lessons: Part 1 is Set a Goal, Part 2 is Make a Plan, and Part 3 is adjust the plan. Let's practice saying the three parts of goal setting lessons together. Listen, first it's my turn: Part 1 is Set a Goal – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 2 is Make a Plan – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 3 is Adjust the Plan – your turn now, SAY IT LOUD! Great job!
3	Let's review: What question do you ask when setting a goal? Is it A: What is my goal? or B: What is my Plan? Say your answer out loud or point to the answer on your choice sheet. If you said, A: What is my goal? You are exactly right! Nice work! If you said, B: What is my Plan, try again! When you are setting a goal, the question you ask yourself is: What is my goal?

4	What question do you ask when you are making a plan? Is it A: What is my plan? or B: What is my task? Say your answer out loud or point to the answer on your choice sheet. If you said, A: What is my plan? You are exactly right! Nice work! If you said, B: What is my task, try again! When you are making a plan, the question you ask yourself is: What is my plan?
5	You have worked so hard and completed parts 1 and 2. Now, it's time to work on Part 3: Adjust Your Plan! The question you ask when you are adjusting your plan is: What have I learned? Say it with me: What have I learned? Your turn, SAY IT LOUD! Great job!
6	What question do you ask when you are adjusting your plan? Is it A: What have I done? or B: What have I learned? Say your answer out loud or point to the answer on your choice sheet. If you said, B: What have I learned ? You are exactly right! Nice work! If you said, A: What have I done, try again! When you are adjusting your plan, the question you ask yourself is: What have I learned?
7	In Part 3 of the Goal Setting Lessons, you will learn to ***analyze*** your progress to see how close you are to meeting your goal and determine if your plan is working. You will learn how to graph your data for ***analysis***.
8	Let's review: Say or point to your behavior goal. Say or point to your timeline.
9	Today, you are going to learn how to graph your behavior as it improves, so you can reach your goal. This is a graph of your behavior since I have been working with you. This helps me see how you're doing with learning how to set and meet your behavior goal and how you are doing in class. This part of the graph represents your behavior ***before*** you started goal-setting lessons. The open circles represent on-task behavior and closed circles represent knowledge of goal-setting. This part of the graph represents your on-task behavior and knowledge of goal-setting ***after*** you started goal setting lessons. The dots have increased or moved higher on the graph (like climbing a mountain). This means your on-task behavior and knowledge of goal-setting has improved since you started working on the computer and using your tool to monitor your behavior. Nice work!
10	Now you are going to get to graph your own behavior using your tool with a graph. You are going to record your information every day. We will review

	your performance every day, and I will give you feedback and help you with monitoring your behavior. (graph for student to record behavior; instruction will be provided)
11	Let's review: 1. What is your goal? Say or point to your answer. 2. What is one barrier in the way of reaching your goal? Say or point to your answer. 3. What tool will you use to remove the barrier? Say or point to your answer. 4. When will you begin your goal? When will you try to meet your goal? Say or point to your answer. Great work! You are finished with goal setting lessons for today – see you next time for the lesson 8 – our final lesson! Let's go back to class and get back to work.
Slide Number	**Part 3 – Lesson 8: Progress Monitoring**
1	Are you ready to learn about adjusting your plan? Remember, there are two rules. Number 1 – be sure your ears are ready to listen so you can hear the lesson and questions. Number 2 – be sure your thinking brain is turned on because you will need to think about a question and say your answer out loud or point to your answer.
2	Welcome back to your Goal Setting Lessons! There are three parts to these goals setting lessons: Part 1 is Set a Goal, Part 2 is Make a Plan, and Part 3 is adjust the plan. Let's practice saying the three parts of goal setting lessons together. Listen, first it's my turn: Part 1 is Set a Goal – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 2 is Make a Plan – your turn now, SAY IT LOUD! Great job! Listen, first it's my turn: Part 3 is Adjust the Plan – your turn now, SAY IT LOUD! Great job!
3	Let's review: What question do you ask when setting a goal? Is it A: What is my goal? or B: What is my Plan? Say your answer out loud or point to the answer on your choice sheet. If you said, A: What is my goal? You are exactly right! Nice work! If you said, B: What is my Plan, try again! When you are setting a goal, the question you ask yourself is: What is my goal?
4	What question do you ask when you are making a plan? Is it A: What is my plan? or B: What is my task? Say your answer out loud or point to the answer on your choice sheet. If you said, A: What is my plan? You are exactly right! Nice work! If you said, B: What is my task, try again! When you are making a plan, the question you ask yourself is: What is my plan?
5	Time to work on Part 3: Adjust Your Plan!

	The question you ask when you are adjusting your plan is: What have I learned? Say it with me: What have I learned? Your turn, SAY IT LOUD! Great job!
6	What question do you ask when you are adjusting your plan? Is it A: What have I done? or B: What have I learned? Say your answer out loud or point to the answer on your choice sheet. If you said, B: What have I learned ? You are exactly right! Nice work! If you said, A: What have I done, try again! When you are adjusting your plan, the question you ask yourself is: What have I learned?
7	Let's review: 1. What is your goal? Say or point to your answer. 2. What is one barrier in the way of reaching your goal? Say or point to your answer. 3. What tool will you use to remove the barrier? Say or point to your answer. 4. When will you begin your goal? When will you try to meet your goal? Say or point to your answer.
8	Now, let's analyze your graph. We hope to see the dots high on the graph, that would mean your tool is helping you reach your goal. Is your tool helping your reach your goal? **discuss relevant outcomes*
9	Remember: 1. What is your goal? Say or point to your answer. 2. What is one barrier in the way of reaching your goal? Say or point to your answer. 3. What tool will you use to remove the barrier? Say or point to your answer. 4. When will you begin your goal? When will you try to meet your goal? Say or point to your answer.
10	Now, we are going to answer four final questions to see if we should adjust the plan.
11	Question 5: What have you done to improve your behavior? **Provide relevant examples about tool and goal* What have you done to improve your behavior? Say or point to your answer.
12	Question 6: Which barriers have been removed to improve your behavior? **Provide relevant examples* Which barriers have been removed to improve your behavior? Say or point to your answer.
13	Remember this graph? This part of the graph represents your behavior ***before*** you started goal-setting lessons. The open circles

	represent on-task behavior and closed circles represent knowledge of goal-setting. This part of the graph represents your on-task behavior and knowledge of goal-setting ***after*** you started goal setting lessons. The dots have increased or moved higher on the graph (like climbing a mountain). This means your on-task behavior and knowledge of goal-setting has improved since you started working on the computer and using your tool to monitor your behavior. Nice work!
14	Remember your graph? Was your tool helpful in reaching your goal?
15	Question 7: What has changed about your behavior? **Provide relevant examples based on graphs.* What has changed about your behavior? Say or point to your answer.
16	Question 7: Have you met your goal? **Provide relevant examples based on graphs.* Have you met your goal? Say or point to your answer. Maybe you haven't reached your goal yet, so you will need to continue to work hard to achieve your goal.
17	Congratulations! You completed all three parts of the Goal Setting Lessons! You will still work on your behavior goal by using your tool and graphing your behavior each day until the end of your set timeline. We will meet briefly each day to talk about your progress. Thanks for participating and keep working on your behavior goal! Great Job! Let's go back to class and get back to work.

APPENDIX E

Samples of Function-Based, Computer-Assisted SDLMI PowerPoint© Slides

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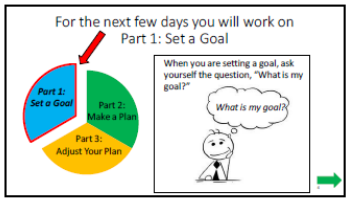

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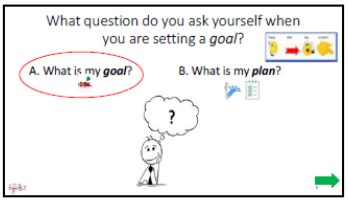

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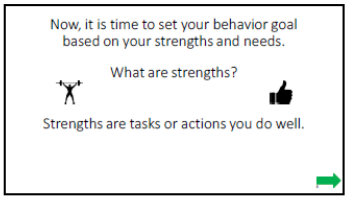

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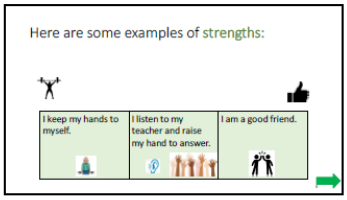

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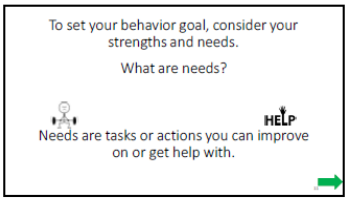

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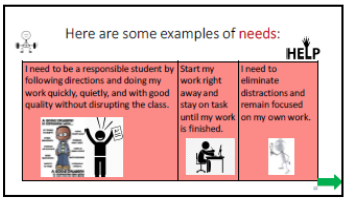

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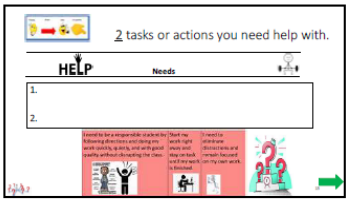

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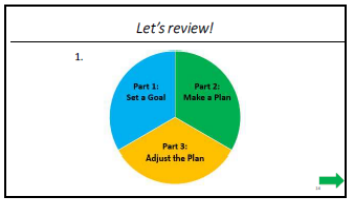

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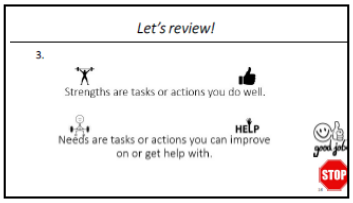

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APPENDIX F

Data Sheet for SDLMI Knowledge Probe

Participant: x x x x Date: _____ Session: _____

Correct responses will be based on choices provided individually to students in probes and indicated with their color code.

Part 1: Set a Goal		
Probe Questions	**Possible Responses**	**Levels of Prompting**
1. What question do you ask yourself to set a goal?	A B C	I 1 2 3 NR I = 1 point; 1= .5 points; 3/NR = 0 points
2. What do you want to do to improve your behavior?	A B C	I 1 2 3 NR I/1 = 2 points; 2 = 1 point; 3/NR = 0 points
3. What do you know about your behavior now?	A B C	I 1 2 3 NR I = 1 point; 1= .5 points; 3/NR = 0 points
4. What needs to change for you to improve your behavior?	A B C	I 1 2 3 NR I/1 = 2 points; 2 = 1 point; 3/NR = 0 points
5. What can you do to improve your behavior?	A B C	I 1 2 3 NR I/1 = 2 points; 2 = 1 point; 3/NR = 0 points
Part 1 = _____ / 8 *(6/8 = mastery)*		
Count and type of prompt (V, G+V, P):		

Part 2: Make a Plan		
Probe Questions	**Possible Responses**	**Levels of Prompting**
1. What question do you ask yourself to make a plan?	A B C	I 1 2 3 NR I = 1 point; 1= .5 points; 3/NR = 0 points
2. What can you do to improve your behavior?	A B C	I 1 2 3 NR I/1 = 2 points; 2 = 1 point; 3/NR = 0 points
3. What barriers get in the way of reaching your goal?	A B C	I 1 2 3 NR I/1 = 2 points; 2 = 1 point; 3/NR = 0 points

4. What can you do to remove barriers?	A	B	C	I 1 2 3 NR I/1 = 2 points; 2 = 1 point; 3/NR = 0 points
5. When will you begin?	A	B	C	I 1 2 3 NR I = 1 point; 1= .5 points; 3/NR = 0 points
Part 2 = _____ / 8 *(6/8 = mastery)*				
Count and type of prompt (V, G+V, P):				

Part 3: Adjust the Plan or Goal				
Probe Questions	**Possible Responses**			**Levels of Prompting**
1. What question do you ask yourself when you are adjusting your plan?	A	B	C	I 1 2 3 NR I = 1 point; 1= .5 points; 3/NR = 0 points
2. What have you done to improve your behavior?	A	B	C	I 1 2 3 NR I/1 = 2 points; 2 = 1 point; 3/NR = 0 points
3. Which barriers have been moved out of the way?	A	B	C	I 1 2 3 NR I/1 = 2 points; 2 = 1 point; 3/NR = 0 points
4. What has changed about your behavior?	A	B	C	I 1 2 3 NR I/1 = 2 points; 2 = 1 point; 3/NR = 0 points
5. Did you reach your goal?	A	B	C	I 1 2 3 NR I = 1 point; 1= .5 points; 3/NR = 0 points **depends on data*
Part 3 = _____ / 8 *(6/8 = mastery)*				
Count and type of prompt (V, G+V, P):				

APPENDIX G

Data Sheet for On-Task Behavior Observations

Operational Definition of On-Task Behavior:

- Visibly and auditorily engaged in the learning environment by looking at/talking to the instructor, other students, or classroom materials (eyes on teacher/lesson/materials, ears focused on lesson, body in appropriate area with posture signaling focus on lesson, voice low or off – meeting classroom expectations as specified by the teacher)
- Talking related to current activity/lesson when permitted to instructor or classmates
- Remains in control of body, in designated area, hands/feet/objects away from other students or things

Operational Definition of Off-Task Behavior:

- Disengaged from the learning environment by distracting the instructor, other students, or self; inhibiting engagement in classroom materials (e.g., not looking at materials for more than 3s), head down, on computer when not necessary
- Talking unrelated to current activity/lesson for more than 3s
- Bothering other students/instructor by touching, kicking, poking, making noises for more than 3s
- Out of seat/learning area without permission for more than 3s

Whole Interval Recording for On-Task Behavior – rotating between participants
Circle or highlight – On or Off ***20-min observation – 10s Observe 5s Record***

Observer: _____ Date: _____

Interval	Behavior	Interval	Behavior	Interval	Behavior	Interval	Behavior
1	On Off	21	On Off	41	On Off	61	On Off
2	On Off	22	On Off	42	On Off	62	On Off
3	On Off	23	On Off	43	On Off	63	On Off
4	On Off	24	On Off	44	On Off	64	On Off
5	On Off	25	On Off	45	On Off	65	On Off
6	On Off	26	On Off	46	On Off	66	On Off
7	On Off	27	On Off	47	On Off	67	On Off
8	On Off	28	On Off	48	On Off	68	On Off
9	On Off	29	On Off	49	On Off	69	On Off
10	On Off	30	On Off	50	On Off	70	On Off
11	On Off	31	On Off	51	On Off	71	On Off
12	On Off	32	On Off	52	On Off	72	On Off
13	On Off	33	On Off	53	On Off	73	On Off
14	On Off	34	On Off	54	On Off	74	On Off
15	On Off	35	On Off	55	On Off	75	On Off
16	On Off	36	On Off	56	On Off	76	On Off
17	On Off	37	On Off	57	On Off	77	On Off
18	On Off	38	On Off	58	On Off	78	On Off
19	On Off	39	On Off	59	On Off	79	On Off
20	On Off	40	On Off	60	On Off	80	On Off

____ Total "ON" / ____ Total intervals = ____% of on-task behavior

APPENDIX H

Goal Attainment Scale

Level of Expected Outcome	**Rating**	**Description of Goal –** ***Operationally Defined***
Much more than expected	+2	
More than expected	+1	
Expected outcome	0	
Less than expected	-1	
Much less than expected	-2	
Comments:		

(adapted from Sharp, 2006)

APPENDIX I

Teacher Social Validity Questionnaire

Please score each item by circling the number that best indicates how you feel about the behavior support plan intervention(s).

1. Given this student's behavior problems, how acceptable did you find the behavior support plan?

1	2	3	4	5
Not at all acceptable		Neutral		Very acceptable

2. How willing are you to carry out this behavior support plan in the future?

1	2	3	4	5
Not at all willing		Neutral		Very willing

3. To what extent do you think there might be disadvantages in following this behavior support plan?

1	2	3	4	5
None likely		Neutral		Many likely

4. How much time will be needed each day for you to carry out this behavior support plan?

1	2	3	4	5
Little time needed needed		Neutral		Much time

5. How confident are you that the behavior support plan will be effective for this student in the future?

1	2	3	4	5
Not at all confident		Neutral		Very confident

6. How likely is this behavior support plan to make permanent improvements in this student's behavior?

1	2	3	4	5
Unlikely		Neutral		Very likely

7. How disruptive was it be to carry out this behavior support plan?

1	2	3	4	5
Not at all disruptive		Neutral		Very disruptive

8. How much do you like the procedures used in the behavior support plan?

1	2	3	4	5
Do not like them at all much		Neutral		Like them very

9. How willing will other staff members be to help carry out this behavior support plan?

1	2	3	4	5
Not at all willing		Neutral		Very willing

10. To what extent are undesirable side-effects likely to result from this behavior support plan?

1	2	3	4	5
No side-effects likely likely		Neutral		Many side- effects

11. How much discomfort is this student likely to experience during this behavior support plan?

1	2	3	4	5
No discomfort at all discomfort		Neutral		Very much

12. How willing would you be to change your routines to carry out this behavior support plan?

1	2	3	4	5
Not at all		Neutral		Very willing

13. How well did carrying out this behavior support plan fit into the existing routine?

1	2	3	4	5
Not at all well		Neutral		Very well

14. How effective was the intervention in teaching your student appropriate behavior?

1	2	3	4	5
Not at all effective		Neutral		Very effective

15. How well did the goal of the intervention fit with the team's goals to improve the student's behavior?

1	2	3	4	5
Not at all		Neutral		Very much

Comments:

(*adapted from the TREATMENT ACCEPTABILITY RATING FORM—REVISED; TARF-R, Reimers & Wacker, 1988*)

APPENDIX J

Job Skill Supervisor Social Validity Questionnaire

Please score each item by circling the number that best indicates how you feel about the behavior support plan intervention(s).

1. Given this worker's behavior problems, how acceptable did you find the behavior support plan?
   1 Not at all acceptable — 2 — 3 Neutral — 4 — 5 Very acceptable

2. How willing are you to carry out this behavior support plan in the future?
   1 Not at all willing — 2 — 3 Neutral — 4 — 5 Very willing

3. To what extent do you think there might be disadvantages in following this behavior support plan?
   1 None likely — 2 — 3 Neutral — 4 — 5 Many likely

4. How much time will be needed each day for you to carry out this behavior support plan?
   1 Little time needed needed — 2 — 3 Neutral — 4 — 5 Much time

5. How confident are you that the behavior support plan will be effective in the future?
   1 Not at all confident — 2 — 3 Neutral — 4 — 5 Very confident

6. How likely is this behavior support plan to make permanent improvements in behavior?
   1 Unlikely — 2 — 3 Neutral — 4 — 5 Very likely

7. How disruptive was it be to carry out this behavior support plan?
   1 Not at all disruptive — 2 — 3 Neutral — 4 — 5 Very disruptive

8. How much do you like the procedures used in the behavior support plan?
   1 Do not like them at all much — 2 — 3 Neutral — 4 — 5 Like them very

9. How willing will other staff members be to help carry out this behavior support plan?
   1 Not at all willing — 2 — 3 Neutral — 4 — 5 Very willing

10. To what extent are undesirable side-effects likely to result from this behavior support plan?
    1 No side-effects likely likely — 2 — 3 Neutral — 4 — 5 Many side- effects

11. How much discomfort is the worker likely to experience during this behavior support plan?
    1 No discomfort at all discomfort — 2 — 3 Neutral — 4 — 5 Very much

12. How willing would you be to change your routines to carry out this behavior support plan?

1	2	3	4	5
Not at all		Neutral		Very willing

13. How well did carrying out this behavior support plan fit into the existing routine?

1	2	3	4	5
Not at all well		Neutral		Very well

14. How effective was the intervention in teaching appropriate behavior to the worker?

1	2	3	4	5
Not at all effective		Neutral		Very effective

15. How well did the goal of the intervention fit with the team's goals to improve the worker's behavior?

1	2	3	4	5
Not at all		Neutral		Very much

Comments:

(*adapted from the TREATMENT ACCEPTABILITY RATING FORM—REVISED; TARF-R, Reimers & Wacker, 1988*)

APPENDIX K

Student Social Validity Questionnaire

Participant: _____ Date: _____

Questions	Responses
16. The computer activities helped helped me learn to set goals for my behavior.	
17. The computer activities were easy.	
18. I liked learning how to set goals for my behavior.	
19. My behavior improved because I set my goal.	
20. The computer activities taught me to use a tool like using a self-monitoring checklist or cue card to help improve my behavior.	
21. I will keep using these tools (cue cards, checklists, graphing) to meet my goals in the future.	
Key: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree	

(adapted from Mazzotti et al., 2012, 2013)

APPENDIX L

Data Sheet for Procedural Fidelity

Step	Description	Yes or No
1.	Researcher sets up the equipment (GoPro is set up and on)	YES NO
2.	Interventionist prompts: "*Log in to your computer and Gmail. Find the email from me. Click the link. When you are ready click the play button to watch the video; listen carefully to the questions first then tell me your answer out loud*."	YES NO
3.	Interventionist will sit/stand near the participant to help with technology ("doing work" until asked for help/sees that the student is skipping steps).	YES NO
4.	If the participant requires help, the interventionist will employ a system of least prompts (gesture + verbal; model + gesture + verbal; physical prompting).	YES NO
5.	If the participant requires additional supports on a step, the participant will also be given an opportunity to practice independently.	YES NO
		Number of Yes = / 5 *Required: 80% or more*
Count and type of prompts: (G, G+V, P):		

APPENDIX M

Sample Tool – Attention

Tomer – Behavior Checklist Date:					
Goal: *I will be a responsible student by following directions and doing my work quickly, quietly, and with good quality without disrupting the class.*					
Checklist Items	**1st**	**2nd**	**3rd**	**Daily Total**	**Notes**
• I am prepared with all materials needed for the lesson. • I have cleared my desk of unneeded materials and removed things that may distract me.	3 2 1	3 2 1	3 2 1		
• I am sitting up straight, • sitting quietly, • looking at the teacher or at your assignment, • paying attention, and • following directions - to show I'm ready to learn.	3 2 1	3 2 1	3 2 1		
• I am not talking to other students. • If other students try to distract me, I ignore them and stay focused on my work. • I find effective ways to manage conflicts. • I respect my teachers and peers.	3 2 1	3 2 1	3 2 1		
• I raise my hand and wait to be called on to comment, ask a question, or leave my work area.	3 2 1	3 2 1	3 2 1		
• I ask questions if I don't understand what is being taught. • I start right away and complete assignments when they are given.	3 2 1	3 2 1	3 2 1		
Total Per Class Period					

Checklist Items	**Description**
• I am prepared with all materials needed for the lesson. • I have cleared my desk of unneeded materials and removed things that may distract me.	• You follow directions and have the things out and ready that your teacher said you need (computer or pencil/paper). • Put things away that you don’t need.

• I am sitting up straight, • sitting quietly, • looking at the teacher or at the assignment, • paying attention, and • following directions - to show I'm ready to learn.	• You show you are ready to learn by demonstrating these simple listening cues. • When you are paying attention, you are making progress through the assignment. The teacher can tell you are progressing based on your productivity.
• I am not talking to other students. • If other students try to distract me, I ignore them and stay focused on my work. • I find effective ways to manage conflicts. • I respect my teachers and peers.	• You are on-task and most productive when you are quiet and working – unless it is a group activity. • Your responsibility as a student is to get your work done. If other students bother you, find effective ways to manage the conflict (tell the teacher, ignore). • Being respectful means not letting your behavior interfere with your workflow or the workflow of others. • Maintain a respectful work environment to avoid disrupting the class.
• I raise my hand and wait to be called on to comment, ask a question, or leave my work area.	• You are in your assigned work area. • To get your teacher's attention, raise your hand to maintain that respectful work environment to avoid disrupting the class.
• I ask questions if I don't understand what is being taught. • I start right away and complete assignments when they are given.	• You ask the teacher to clarify things you don't understand. • Start working on a task immediately. Don't put things off to have to do during lunch or for homework • You are at school to learn from the assignments given by the teacher. • Get things done quickly, quietly, and with good quality.

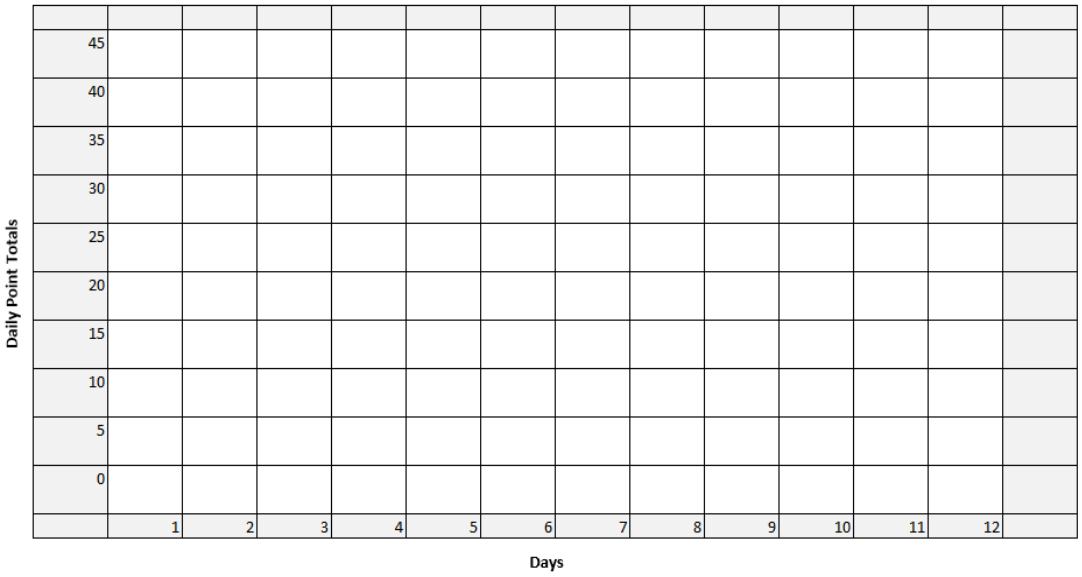
Key:

3 = **better than expected behavior**, you are doing this task independently, the teacher may have to tell you **less than three times** to do the task

2 = **expected behavior**, you are doing this task independently, the teacher may have to tell you **three times** to do the task

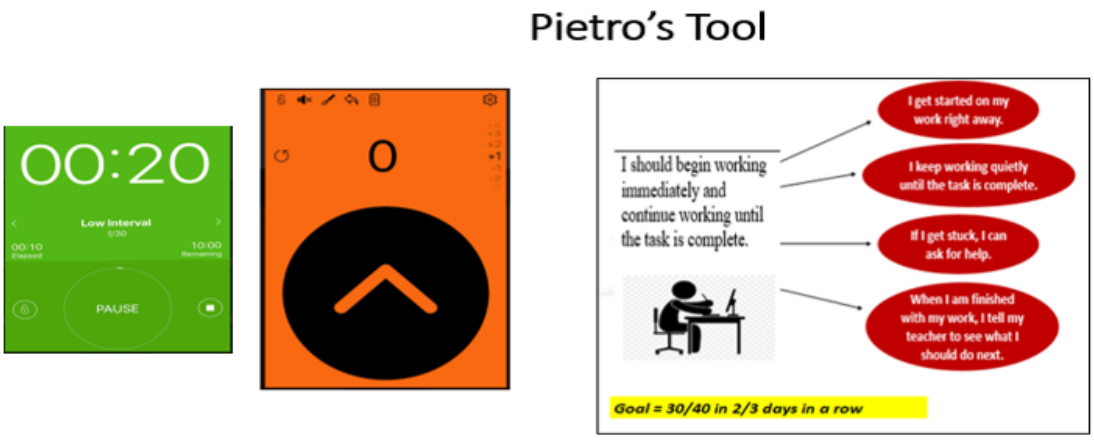
1 = **less than expected behavior**, you are not doing task independently, the teacher may have had to tell you **more than three times** to do the task

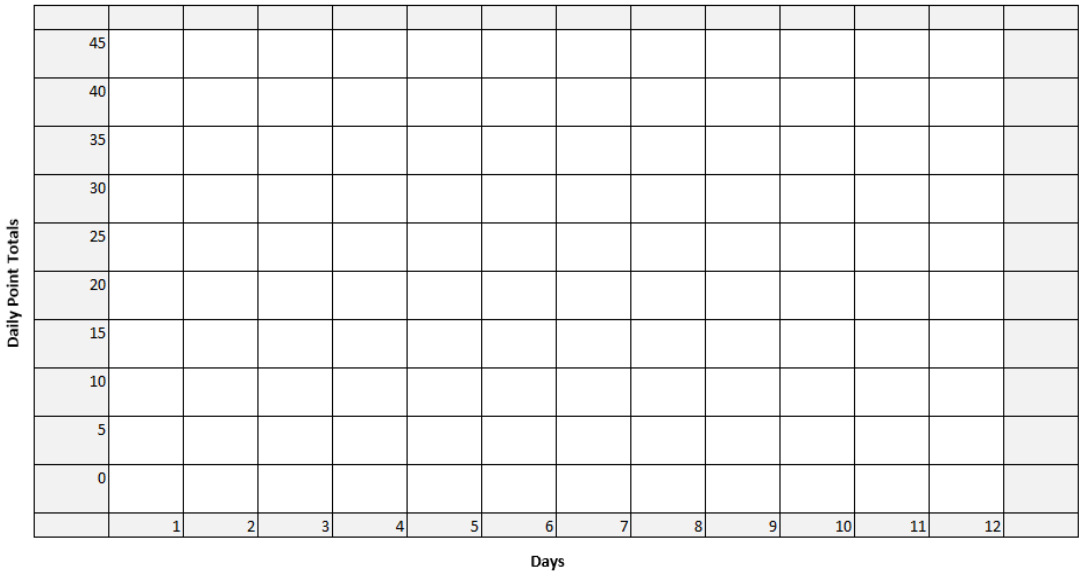
- You have the opportunity to earn 15 points per class period, 45 points per day (if you score all 3's).
- Your goal is to get AT LEAST 30 points (score all 2's).


Daily Point Totals
45
40
35
30
25
20
15
10
5
0
1
2
3
4
5
6
7
8
9
10
11
12
Days

APPENDIX N

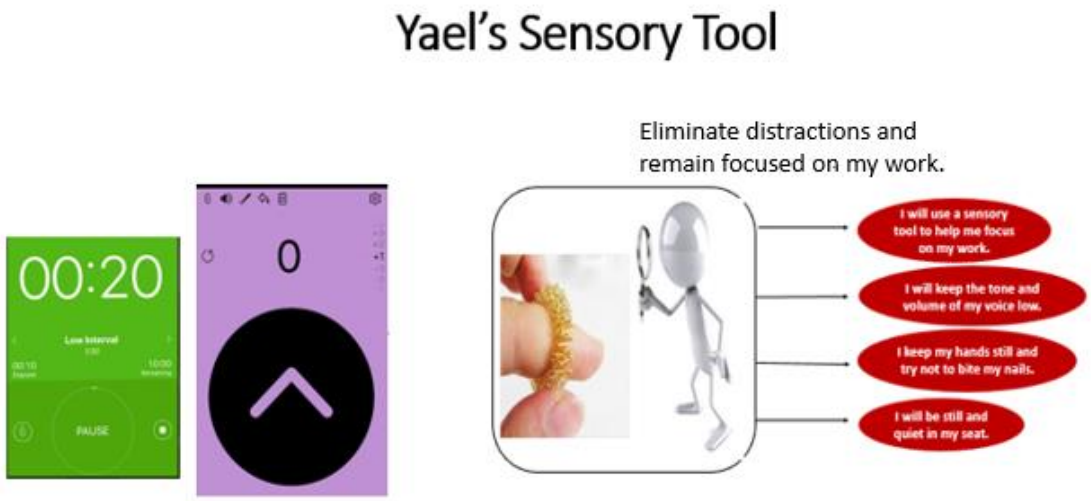
Sample Tool – Escape





APPENDIX O

Sample Tool – Automatic



45													
40													
35													
30													
25													
20													
15													
10													
5													
0													
	1	2	3	4	5	6	7	8	9	10	11	12	

Daily Point Totals

Days