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Digital Behavior Intervention Plans: Effects on General Education Teacher fidelity of Implementation

Christopher G. Holcomb
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<http://dx.doi.org/10.34917/7048586>

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DIGITAL BEHAVIOR INTERVENTION PLANS: EFFECTS ON GENERAL
EDUCATION TEACHER FIDELITY OF IMPLEMENTATION

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A dissertation submitted in partial fulfillment
of the requirements for the

Doctor of Philosophy-Special Education

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December 2014

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Digital Behavior Intervention Plans: Effects on General Education Teacher Fidelity of Implementation

is approved in partial fulfillment of the requirements for the degree of

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ABSTRACT
**DIGITAL BEHAVIOR INTERVENTION PLANS: EFFECTS ON GENERAL
EDUCATION TEACHER FIDELITY OF IMPLEMENTATION**

By

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Students with disabilities often have behavior that interferes with classroom learning. Serious problem behaviors are identified as the most significant factor interfering with learning in the classroom. Unfortunately, chronic behaviors often lead to a student dropping out of school. Current research typically focuses on areas of intervention for these students with little attention towards teacher fidelity of implementation of these interventions. Because of this, student's behavior intervention plans may not show effectiveness (e.g., progress monitoring, data driven decisions). It is important that researchers begin to explore systematic improvements in fidelity of implementation of behavior intervention plan components for general education teachers teaching students with disabilities.

This study focused on improving the fidelity of implementation of intervention strategies within behavior intervention plans by general education teachers teaching individuals with disabilities. Currently, there are no prior studies published that have been conducted to evaluate the effects of a digital behavior intervention plan using multimedia anchored-instruction on teachers' fidelity of implementation of a behavior intervention plan. A multiple probe design was used to investigate the effects of a digital behavior intervention plan using multimedia anchored-instruction. Six teacher participants were

paired with six student participants to form six individual dyads. Data were compared across baseline, intervention and maintenance to determine the effects of a multimedia anchored-instruction digital behavior intervention plan on general education teacher's fidelity of implementation. The effects on student desirable and undesirable behavior were also examined across all phases of the study. Teacher opinions of digital behavior intervention plans using multi-media anchored-instruction in general education classrooms for students with disabilities were evaluated at the conclusion of the study.

Data for all six teacher participants demonstrated high levels of experimental control. The teachers' fidelity of implementation of the behavior intervention plans had a moderate to high effect on increasing desirable student behavior and neutralizing undesirable student behavior. Four out of the six teacher participants indicated that digital behavior intervention plans with multimedia anchored-instruction were acceptable upon completion of the study. The remaining two teachers remained undecided.

ACKNOWLEDGEMENTS

Most importantly, I would like to thank the faculty members who participated on my committee. I would like to thank Dr. Josh Baker for assisting me in the completion of my dissertation and focusing me on my writing. He provided me with knowledge and support throughout the process. I would like to thank Dr. Kyle Higgins for all the support and a wealth of knowledge over the years including critical questioning and feedback. Thank you for helping me focus on the direction of my research. I would like to thank Dr. Tom Pierce for his patience, expertise, and wealth of knowledge during this process. I would like to thank Dr. Randy Boone for his continuous patience and feedback during the development of my instrument. Your knowledge and expertise in this area is truly appreciated. I would like to thank Dr. Dick Tandy for his knowledge and enduring humor that kept the learning process so much fun. The support received from these committee members is greatly valued and appreciated.

Also, I would like to thank all the teachers, support staff, administrators, parents and students who participated in the implementation of this study. Thank you to my friends who provided continuous support and encouragement.

I would like Angel Kuntz for her assistance with the study and her continuous support. You have learned more than you ever wanted.

Thank you to my wonderful wife, Amy and our two fantastic children Laurel and Olivia. All of you have given me continuous support throughout this process. The constant encouragement and support was crucial during this endeavor. I love you all very much!

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CHAPTER ONE

INTRODUCTION

Serious problem behaviors are identified as the most significant factor interfering with learning within the classroom (Emerson, Kiernan, & Alborz, 2001). Many students considered at risk for poor academic achievements that exhibit problematic behaviors (e.g., talking out of turn, touching others, tantrums) impact their own learning as well as the learning of other students (Wagner et al., 2006). Unfortunately, chronic problem behaviors often lead to a student dropping out of school (U.S. Department of Education, 2012). Students who do not graduate from high school experience low employment, limited income, and patterns of persistent failure throughout adult life (U.S. Department of Education, 2012). Pindiprolu, Peterson, and Bergloff (2007) found that teachers need appropriate and effective interventions to deal with behavioral problems in the classroom. For educators, problem behaviors are often a factor in teacher dissatisfaction and may cause educators to leave the field of education (Liu & Meyer, 2005).

Many schools work to implement strategies that are evidence-based to reduce disruptive behavior. Educators primarily use reactive interventions that are not function based and tend to be punitive (e.g., verbal redirections, turning card to red) (Iovannone, Greenbaum, Wang, Kincaid, Dunlap, & Strain, 2009; Sprague & Horner, 2006). These strategies seldom encourage improved behavior and can actually strengthen the disruptive behaviors identified for remediation (Skiba & Rausch, 2006; Turnbull et al., 2002).

Individuals served under the *Individuals with Disabilities Education Act Part B* (IDEA)(PL 105-17, 1997; PL 108-446, 2004) are educated, for some portion of the day, in general education classrooms ninety-five percent of the time (U.S. Department of

Education, 2012). Fifty-four percent of these students are placed within the general education classroom for 80% or more of the school day. (McLeskey, Rosenberg, & Westling, 2010; U.S. Department of Education, 2012). Recent trends have required all educators to collect data to monitor the progress of interventions implemented (e.g., response to intervention, functional assessment, behavior intervention plans) (Sayeski & Brown, 2011). The success of various models (e.g., positive behavior support, applied behavior analysis), designed to promote the effective inclusion of students with disabilities, is associated with the ability of educators to collect these data (Dunlap et al., 2010). Unfortunately, teachers have expressed little to no experience with producing reliable behavioral data when implementing complicated intervention plans (Dunlap et al., 2010; Lee, Vostal, Lylo, & Hua, 2011).

It appears that a training gap exists between preservice and practicing teachers in the areas of aggressive, emotional, disruptive, and severe behaviors (Cook et al., 2007). Many believe that educators are not adequately prepared with the experience and abilities needed to meet the discipline obligations of IDEA (Gresham, 2003; PL 105-17, 1997; PL 108-446, 2004; Sasso, Conroy, Strichter, & Fox, 2001; Smith, 2000). Cook et al. found that 89% of the behavior support plans developed by teachers were inadequate and 35% of the plans created by well-trained teams of educators were of poor quality. Research indicates a gap between the necessary factors of a behavior support plan and what is written into the plan (Cook et al.). Unfortunately, it appears that educators are not trained adequately to write specific goals, monitor progress, implement the plan, and make decisions based on the data (Cook et al., 2007).

Inappropriate Behavior Defined

The term *behavior* is used in a variety of ways in the English language. The behavior of humans is characterized by measurable interactions with the environment, including other humans (Johnston & Pennypacker, 1980; Skinner, 1938). There are a variety of behaviors such as respondent behavior (e.g., eyes watering, changes in heart rate, eyes blinking), operant behavior shaped by contingencies (e.g., learning to ask for a cookie), cultural aggregate behavior (e.g., individual team members working together), and individual behaviors that benefit a group (e.g., leaders devise incentives for individual choices) (Malott & Glenn, 2006). Because behavior is multifaceted, the fields of psychology, sociology, and education define it differently.

Behavior as Defined by the Field of Psychology

In psychology, behavior is physical and consists of a functional component (Miller, 1997). According to psychologists, behaviors identified as causing a problem may be selected for change (Baer, Wolf, & Risley, 1968). These behaviors are targeted for improved social acceptability when the behavior occurs at a frequency that warrants intervention (Baer et al., 1968). Inappropriate behaviors are described operationally, indicating a relationship with the environment (e.g., locations within a school, individuals that serve as triggers) (Bourret, Vollmer, & Rapp, 2004; Cooper, Heron, & Heward, 2007; Linehan, 1977; Miller, 1997).

Behavior analysis evolved from behaviorism that was first introduced by Watson in the early 1900s to the science that studies behavior change and the surrounding environmental events (Baer, Wolf, & Risley, 1968). The field of psychology maintains that an accurate definition of a behavior is important for the selection of a functionally

equivalent behavior to teach as a replacement for the maladaptive behavior (Cooper, Heron, & Heward, 2007). Psychology defines behavior as the actions by which an organism adjusts to its environment (Gerrig & Zimbardo, 2002).

Behavior as Defined by the Field of Sociology

In the field of sociology, behavior is defined as deviant behavior when it diverges from the norm (Akers, 1968). Structural theory maintains that people, when encountering groups, positions, or pressures, may engage in inappropriate deviant behavior (Merton, 1957). These deviant or socially inappropriate behaviors are a theoretical emphasis in sociology and are explained by structures and environments that produce the deviant behavior (Akers, 1968; Sandaker, 2010). In sociology, deviant behavior is typically defined as behavior that is not consistent with societal values, norms, and interests (Akers, 1968).

Behavior as Defined by the Field of Education

In the field of education, behavior is considered inappropriate when it interferes with learning in the classroom because it interferes with a teacher's instructional effectiveness (Bambara & Kern, 2005; Stebbins, 1971; Dunlap, Carr, Horner, Zarcone, & Schwartz, 2008). Behavior is defined as student attention to task or desirable behavior and student inattention to task or undesirable behavior (Dunlap & Horner, 2006). Student desirable behavior is defined as student attention to the teacher or assigned work (e.g., eyes on teacher, eyes focused on worksheets) (Bambara & Kern, 2005). On-task behavior is either passive (e.g., looking at teaching materials, looking at teacher) or active (e.g., writing during a lesson, small group discussion) (Lannie & McCurdy, 2007). Off-task, disruptive, or problem behavior is defined as any behavior that does not fall within the

parameters of on-task behavior (e.g., talking out of turn, out of seat, spitting, hitting, throwing objects) (Lannie & McCurdy, 2007). Difficult behavior can also impact the development of positive relationships with peers (Dunlap, 2006).

For the purpose of this dissertation, behavior is defined as motoric, public, and observable movement within the educational environment (Johnston & Pennypacker, 1980). These behaviors have either on-task desirable characteristics or off-task undesirable characteristics (Lannie & McCurdy, 2007).

Educational Strategies to Deal with Inappropriate Behavior

Applied behavior analysis (ABA), a systematic extension of operant psychology, is used to address problem behaviors of social importance (Baer, Wolf, & Risley, 1968). Recently, Positive Behavior Support (PBS) and Response to Intervention (RTI) have evolved from ABA as complimentary approaches for dealing with disruptive classroom behavior (Dunlap, 2006; Cooper, Heron, & Heward, 2007; Sugai & Horner, 2009).

Positive behavior support uses the three-term contingency model (i.e., stimulus-response-stimulus, or antecedent-behavior-consequence) and adopts the concepts of setting events, establishing operations, focusing on generalization, and maintenance (Dunlap, 2006). Applied behavior analysis contributes to the educational development of prompting, shaping, fading, and reinforcement contingencies (Sugai & Horner, 2009). The use of positive behavior support focuses on intervening within the natural community (e.g., classrooms, playgrounds) (Sugai & Horner).

Positive Behavior Support

Positive behavior support (PBS) can be implemented individually or by an approach that is school-wide. A broad approach to positive behavior support (PBS) serves as an educational application of applied behavior analysis (ABA) to deal with disruptive classroom behavior that incorporates the entire campus, if needed, to teach appropriate student centered behavior goals (Dunlap, 2006; Cooper, Heron, & Heward, 2007; Sugai & Horner, 2009). School-wide positive behavior support (SWPBS) has its roots in: (a) applied behavior analysis, (b) person-centered values, and (c) the inclusion movement (Carr et al., 2002). The purpose of SWPBS is to increase the overall quality of a person's life who may struggle with problem behavior (Dunlap, 2006). Within the model, positive interventions for behavior are organized to promote careful consideration of individual needs and to provide increased support in the classroom (Fuchs & Fuchs, 1998).

Sugai and Horner (2009) suggest a continuum of support in SWPBS. They conceptualize SWPBS as a three-tier preventative approach. The three tiers are: (a) a first tier designed for all students and parents, (b) a secondary tier for students not responding successfully to the initial tier and who may need increased structure for intervention, and (c) the tertiary tier for individuals not responding to the first or secondary intervention tiers, thus requiring interventions that are individualized, intensive, and specialized. All three tiers require data collection, decisions related to the data, and revisions to interventions based on student performance (Fuchs & Fuchs, 2006).

Students without disabilities. A broad school approach that incorporates positive behavior support by using strategies that have been validated, and is organized

into a series that considers the needs of all students for support in school is called school wide positive behavior support (Sugai & Horner, 2009). School wide support is designed to address the needs of all children across various constructs: (a) the school, (b) the classroom, (c) the non-classroom, (d) at home, and (e) within the individual child/youth.

All students within general education typically receive primary-tier supports implemented directly in the classroom (Carr et al., 2002). Primary-tier support promotes desired behavior for the students within this environment (Algozzine et al., 2010; Bullock, & Gable, 2003; Hieneman, Dunlap, & Kincaid, 2005). A growing body of research supports primary-tier strategies to increase appropriate social behavior (Emmer & Stough, 2001; Evertson, Emmer, & Worsham, 2006; Kerr & Nelson, 2006; Lee, 2006; Marzano, 2003; Marzano, 2010; Sprick & Daniels, 2010; Sutherland & Wehby, 2001). When implemented appropriately, the results include: (a) high teacher expectations, (b) high levels of student engagement, (c) clearly communicated rules, (d) established routines, (e) positive rapport between teachers and students, and (f) effective use of class time (Emmer & Stough, 2001; Evertson, Emmer, & Worsham, 2006; Kerr & Nelson, 2006; Lee, 2006; Marzano, 2003; Marzano, 2010; Sprick & Daniels, 2010; Sutherland & Wehby, 2001).

Students often do not respond to the primary or initial tier of interventions and should receive the second tier of interventions (Anderson & Borgmeier, 2010). Students who need tier-two interventions continue to receive tier one interventions, but are given more structure and guidance in order to meet school expectations (Hawken, Adolphson, Macleod, & Schumann, 2009). Students receiving tier-two supports who do not exhibit dangerous behavior towards peers or themselves may benefit from small group

instruction. By receiving similar feedback and instruction, students improve responsiveness to tier-one supports (Anderson & Borgmeier, 2010). Generally, tier-two strategies are applied across groups of students with comparable behaviors (e.g., difficulty with social skills). Students in groups are likely to benefit from similar types of intervention (e.g., turn taking) (Anderson & Brogmeier, 2010). Research supports tier-two interventions that are packaged group interventions (Anderson, Christenson, Sinclair, & Lehr, 2004; Dunlap & Horner, 2006). Other effective strategies within small groups are: (a) activity schedules, (b) group contingencies, (c) increased supervision, and (d) social skills training (Bryan & Gast, 2000; Cook et al., 2008; Embry, 2002; Lewis, Colvin, & Sugai, 2000).

Tier-three interventions (e.g., prevent-teach-reinforce) are systematic, structured processes for supporting students with behaviors not resolved satisfactorily with school-wide and classroom behavior management systems (Dunlap et al., 2010; Sugai & Horner, 2009). Tier-three supports may be used with all students within the general education classroom with persistent challenging behavior or students who create serious barriers for learning (Sugai & Horner, 2009). Many students do not qualify for special education services because no disability is identified (IDEA, PL 108-446, 2004). However, some students, (e.g., individuals with attention deficit hyperactivity disorder) may need an intense specialized behavior intervention plan in order to be successful in general education (Burley & Waller, 2005).

Students with disabilities. With the reauthorization of IDEA (PL 105-17 1997; PL 108-446, 2004), attention focused on scientifically based interventions. Typically, these supports are in place to prevent challenging behaviors and teach a replacement skill

for disruptive behavior (Sugai & Horner, 2009). Often, students with disabilities may not fully respond to either of the first two tiers of interventions within the general education classroom (Dunlap et al, 2010). These students require intervention that is individualized, intensive, and specialized in the tertiary stage of PBS (i.e., tier-three) (Sailor, Dunlap, Sugai & Horner, 2008; Sugai et al., 1999).

Tier-three behavioral supports are intensive, and planning must begin with a Functional Behavior Assessment (FBA) (Alter, Conroy, Mancil, & Haydon, 2008; Bambara & Kern, 2005; Blood & Neel, 2007; Dunlap & Horner, 2006; Gable, Quinn, Rutherford, & Howell, 1998). The purpose of the FBA is to focus specifically on the individual and function-based behavior (Carr et al., 2002). Tertiary support requires intense, individualized teaching strategies. These strategies are complex and involve time to set up, monitor, and adjust. They also require the use of data collection (Carr, 2006; Carr et al., 2002; Dunlap et al., 2010).

Functional Behavior Assessment and Behavior Intervention Plans

A Functional Behavior Assessment (FBA) is mandated under IDEA (PL 105-17,1997; PL 108-446, 2004) for students with disabilities who exhibit challenging behaviors (Bambara & Kern, 2005; Blood & Neel, 2007; Crimmins, Farrell, Smith, & Bailey, 2007). The FBA process facilitates the identification of the possible causes of student behavior as well as identification of a socially acceptable alternative behavior (Iovannone, et al., 2009; Killu, 2008).

The sole purpose of a functional behavior assessment is to create a behavior intervention plan that serves as an instructional guide to teach more socially acceptable and functional behavior in the classroom (Blood & Neel, 2007; Carr et al., 2002; Dunlap

& Horner, 2006; Gable et al., 2000). Functional behavior assessments generate strategies tied directly to the individual needs and profiled assessment of a student (Sayeski & Brown, 2011). Behavior intervention plans (BIPs) evolve out of the FBA and require data collection on the frequency of behavior change as well as fidelity of implementation of the task-analyzed components of the identified intervention (Bambara & Kern, 2005; Dunlap et al., 2010; Strain, Wilson, & Dunlap, 2011).

Students without disabilities. Section 504 of the *Rehabilitation Act of 1973* prohibits discrimination when an individual is identified as having a disability (34 C.F.R. § 104.33(b)). Many students do not qualify for special education services because no disability is identified (IDEA, PL 108-446, 2004). However, some students, without specific disabilities (e.g. attention deficit hyperactivity disorder) may need an intense specialized behavior intervention plan that is created through a functional behavior assessment in order to be successful in general education (Burley & Waller, 2005).

Once the function of a behavior is identified, students are taught prosocial behaviors that replace inappropriate behaviors, thus decreasing the frequency of the inappropriate behaviors by neutralizing the need to exhibit these behaviors (Higgins, Williams & McLaughlin, 2001; Jones, Drew, & Weber, 2000). Functional assessment and behavior intervention plans are effective tools on school campuses for students without a disability (Burley & Waller, 2005).

Students with disabilities. The *Individuals with Disabilities Education Act* (IDEA) (20 U.S.C. § 1400, 1997) mandated the use of a functional assessment (FBA) and a subsequent comprehensive intervention program to address challenging behavior in the classroom for students with disabilities. The FBA should lead to a comprehensive,

efficient, and effective intervention plan that enhances the learning of students with disabilities as well as provides more appropriate access to the social or academic environment (Sugai et al., 2000). Functional behavior assessments help educators identify and understand the specific behavior (e.g., operational definition), the triggers of behavior (e.g., antecedents), and the maintenance variables (e.g., consequences) to promote better access to curriculum (Carr et al., 2002).

Some researchers believe that behavioral assessment is a basic educational right (Van Houten et al., 1988). Thus, it is essential that an initial FBA be conducted before the construction of a behavior intervention plan and the implementation of progress monitoring (Harris, 2007). The FBA helps teachers to identify more appropriate, functionally equivalent behaviors so that a student receives the same reinforcement for exhibiting the socially appropriate behavior necessary to learn, as opposed to the inappropriate behavior (Algozzine et al., 2010; Bambara & Kern, 2005; Blood & Neel, 2007).

Fidelity of Implementation

Implementation fidelity is the level, degree, or percentage of implementation of a multistep procedure (i.e., the effectiveness of an intervention may be based on the number of steps delivered accurately in the procedure) (Dusenbury, Brannigan, Falco, & Hanson, 2003). Fidelity of implementation is a factor that affects intervention outcomes and must be determined when judging the level of success of an intervention strategy (Dane & Schneider, 1998; Mihalic, 2004). Because the degree of implementation can

determine intervention outcomes, evaluation of this process is necessary (Hulscher, Laureant, & Grol, 2003).

Fidelity of implementation is important not only for using the intervention, but for progress-monitoring of the behavior to enhance explicit decision-making procedures (Johnson, Mellard, Fuchs, & McKnight, 2006). Research supports fidelity of implementation, but practical challenges exist for high levels of fidelity in the school setting (Reschly & Gresham, 2006). Factors that may reduce fidelity are: (a) complexity of the intervention, (b) materials and resources required, (c) differences between actual effectiveness and perceptions of teachers, and (d) the number of individuals implementing the intervention (Reschly & Gresham, 2006). In school psychology, measuring the fidelity of implementation when evaluating an intervention is optimal (Roach & Elliott, 2008). However, in the school setting, fidelity of implementation is often ignored (Lane, Bocian, MacMillan, & Gresham, 2004).

Best practice for treatment fidelity suggests a multi-method approach (i.e., direct, indirect) to collecting the data (Roach & Elliot, 2008). Both direct and indirect methods should be used to collect treatment fidelity and determine whether the assessment of fidelity is accurate and consistent (Gresham et al., 2000).

Behavioral Intervention and Teacher Education

The use of assessment to determine learning differences, planning, implementation of research-based instructional strategies, ethical practice, and collaboration is critical to serve students with disabilities in inclusive settings (Fallon, Zhang, & Kim, 2011). Many teachers believe they are not prepared to provide

individualized instruction in the inclusive classroom and meet the needs of all students (Garriott, Miller, & Snyder, 2003). This indicates that teacher education programs should provide more extensive training in individualized instruction to work in inclusive classrooms (Hinders, 1995).

The goal of preservice teacher preparation programs is the provision of experiences that transform knowledge into personal experiences and expertise (Arthaud, Aram, Breck, Doelling, & Bushrow, 2007). This should result in classroom implementation of evidence-based practices learned (Blanton, 1992). Performance-based experiences coupled with specific feedback on appropriate implementation can facilitate learning and application (Arthaud, Aram, Breck, Doelling, & Bushrow, 2007). When educators practice teaching strategies and demonstrate the learned skill, the knowledge is transformed into personal knowledge that evolves through refinement (Berry, Montgomery, Curtis, Hernandez, Wurtzel, & Snyder, 2008).

Current research has identified a training gap in preservice education in the areas of assessment and intervention strategies for students who are aggressive, disruptive, or exhibit other severe behaviors (Cook et al., 2007). Because nearly 12% of students are identified as having a disability and approximately 54% of those identified spend the majority of their time in the general education classroom, educators must be trained to systematically assess and implement behavioral strategies. (McLeskey, Rosenberg, & Westling, 2010; U.S. Department of Education, 2012).

Teaching programs in special education have concentrated on preparing teachers for self-contained or resource rooms (Brownell, Sindelar, Kiely, & Danielson, 2010). Brownell, Sindelar, Kiely, and Danielson (2010) suggest special education teachers feel

displaced, as many do not have the consultation and collaboration skills necessary to work with general educators in the inclusive classroom. While special educators bring knowledge of assessment and behavioral interventions to the collaborative process, they may not apply the strategies with a high level of fidelity of implementation within the general education classroom (Brownell et al, 2010).

The literature recognizes the need to apply fidelity of implementation checks within positive behavior support plans because of the many detailed elements involved in the procedures (Burns & Gibbons, 2008; Jimerson, Burns, & VanDerHeyden, 2007; Roach & Elliot, 2008). However, the research indicates that general educators pay little attention to individual learning needs, are reluctant to make instructional adaptations for students with disabilities, and are unable to make significant academic modifications (McIntosh, Vaughn, Schumm, Haager, & Lee, 1993). Conversely, there are effective teachers within the inclusion movement who are knowledgeable about methods (e.g., differentiated instruction, collaboration) and willing to engage students with disabilities in their classrooms (Brownell, Sindelar, Kiely, & Danielson, 2010).

Multimedia Anchored-instruction in Teacher Education

Anchored-instruction is a technique used to improve instruction that is based in the cognitive sciences (Cognition and Technology Group at Vanderbilt University, 1990). Anchored-instruction is video based and presents instructional strategies, modeling, or additional information encompassed within rich real-world examples. These create a catalyst for problem solving and potential generation of new understanding (Brandsford, Sherwood, Hasselbring, Kinzer, & Williams, 1990; Schwartz, Brophy, Lin, &

Brandsford, 1999). Anchored-instruction allows the learner to access and build upon prior knowledge (Schwartz et al., 1999). The goal of anchored-instruction is the creation of a learning environment that facilitates accessing a new skill.

Teacher Education Using Anchored-instruction

Video models may be used as anchors to demonstrate multistep procedures through text and video-based examples so that the learner accesses a richer context than lecture or text alone (Brandsford et al., 1990). Within the anchored-instructional model, video allows the learner to repeatedly experience information more slowly, removing real time constraints (Hollingsworth, 2005). This learner-centered environment creates an opportunity for understanding the material as well as the development of problem-solving skills (Brandsford, Brophy, & Williams, 2000; Rieth et al., 2003). Video also provides both visual and auditory representations of the material being taught (Bagui, 1998). Currently, the majority of videos used in teacher education are inert (Thomas & Rieth, 2011). That is to say the viewer is passive, not active, when viewing a video. However, multimedia anchors encompass clear goals and promote specific engagement by the learner (Thomas & Rieth, 2011).

Anchored-instruction For Behavioral Instruction

The use of video improves learning (Brophy, 2003). Instruction that includes video anchors results in a significant increase in teacher knowledge (Anderson, 2002; Beck, King, & Marshall, 2002; Brundvand & Fishman, 2006). Hollingsworth (2005) found that video removes real-time constraints allowing teachers to revisit items for better understanding at a later time.

In the area of behavioral intervention, video models have been effective in

conducting reinforcement surveys with students as well as teacher acquisition of functional analysis (Lavie & Sturmey, 2002; Moore & Fisher, 2007). Anderson (2002) used video case-based anchors with teachers for the purpose of identifying problem behaviors and their contexts. Video-based models also have been used to train respite care workers to perform specific multilevel procedures in the healthcare field (Neef, Trachtenberg, Loeb, & Sterner, 1991).

In special education, preservice and inservice programs have adopted a range of case-based methods for training teachers (e.g., text-based and video-based) (Elksnin, 2001; McNaughton, Hall, & Maccini, 2001; Snyder & McWilliam, 2003). Wallace, Doney, Mintz-Resudek, and Tarbox (2004) used videotapes along with role-play and feedback to improve teacher understanding and use of functional analysis with students.

Research indicates that the improvement in the fidelity of implementation of behavior intervention plans allows for better progress monitoring and data-based decisions in the school setting (Dunlap, et al, 2010; Iovannone et al., 2009). However, the field needs specific evidence supporting the use of video models using multimedia Anchored-instruction to improve teacher implementation fidelity of behavior intervention plan components.

Statement of the Problem

With the implementation of the *No Child Left Behind Act* (NCLB) (P.L. 107-110, 2001), students with and without disabilities are being held to a higher standard (e.g., proficiency levels, state testing mandates). These children/youth must have access to the curricula and demonstrate improvement in the general education classroom (IDEA,

2004). The inclusion of special education students is becoming more accepted, but students with disabilities add to a growing number of duties for general education teachers (Buck, Polloway, Kirkpatrick, Patton, & Fad, 2000). Although a large body of literature has identified effective interventions for assisting students that engage in difficult behavior, implementation fidelity of behavior interventions has been compromised by limited teacher time, teacher training, and available resources (Adelman & Taylor, 2000; Noell & Gansle, 2009).

Since the reauthorization of IDEA (20 U.S.C. § 1400, 2004), teachers are mandated to complete a formal assessment and design plans to address behaviors that impede learning. However, many challenges persist for educators (e.g., time constraints, resources) (Buck, Polloway, Kirkpatrick, Patton & Fad, 2000). Along with school-based challenges, IDEA (2004) does not specify guidelines for the implementation of FBAs and behavior intervention plans (BIPs). Thus, individual states have established state-specific policies (Dunlap, Iovannone, & Kincaid, 2008). Because of this lack of specificity, it is critical to investigate possible fidelity of implementation improvement options. The literature supports the need for research concerning teacher usage of BIPs (Iovannone et al., 2009). Multimedia anchored-instruction may reduce teacher time constraints, and result in a decrease of the targeted behavior.

The purpose of this study was to investigate the effects of multimedia anchored-instruction on the fidelity of implementation of behavior intervention plan components by general educators working with students with disabilities. The goal was to ascertain the impact of digital behavior intervention plans that include video-anchored-instruction

designed to improve the fidelity of implementation of general educators as they implement behavior change programs. The specific research questions in this study are:

Research Question 1: Does a digital behavior intervention plan using multimedia anchored-instruction improve teacher fidelity of implementation of behavior change programs?

Research Question 2: Do teachers using digital behavior intervention plans maintain high levels of teacher fidelity of implementation of behavior change programs two weeks after training has ended?

Research Question 3: Do students with disabilities improve in learning a replacement targeted skill (i.e., increase desirable behavior and decrease undesirable behavior) following teacher implementation of a digital behavior intervention plan?

Research Question 4: How satisfied are teachers using a digital behavior intervention plan with multimedia anchored-instruction while teaching students with disabilities?

Significance of the Study

The most significant factor interfering with learning in the classroom is serious problem behavior (Emerson, Kiernan, & Alborz, 2001; Rose & Gallup, 2005). However, teacher education is often not contextually based and may be different than the interactive and dynamic environment found in schools (National Research Council, 1999). For teachers, problem behaviors may be a factor in teacher dissatisfaction and attrition (Liu & Meyer, 2005). Thus, addressing the need for the development and consistent

implementation of behavior intervention plans is imperative. Because difficult behavior negatively impacts the learning of all students in a classroom, educators (general and special) must be taught to systematically implement a behavior intervention plan with high fidelity.

One way to improve proactive teaching opportunities and reduce the need for reactive interventions may be to introduce the use of video-based multimedia anchored-instruction to teach multicomponent interventions. Video anchors of multistep instruction can provide examples that are individualized and proactive to improve fidelity of implementation of the behavior intervention plan (Thomas & Rieth, 2011).

Definitions

The following list is representative of terms used in this study. It is important to understand the use of these terms in education to clearly understand their meaning within the context of this study.

Anchored-instruction. An instructional strategy that uses anchored-instruction that incorporates technology-based learning, which was developed by the Cognition and Technology Group at Vanderbilt. It includes the development of an anchor or theme around a specific learning activity (Cognition & Technology Group, 1997).

Antecedent interventions. Antecedent interventions are behavior-change tactics based on contingency-independent antecedent events (i.e., motivation operations) (Cooper, Howard, & Heward, 2007).

Autism. A disability that (a) affects verbal and nonverbal communication. Autism is often characterized by repetitive and stereotyped movements, resistance to change in environment or daily routine, and responding to sensory experiences in an unusual manner; (b) is identified by the age of 3 years; and (c) affects the educational outcomes of a pupil causing significant delays in learning. (Nevada Administrative Code, 388.028, 2011).

Baseline logic. A powerful form of inductive reasoning consisting of three elements: (a) prediction, (b) verification, and (c) replication. It is used to help determine a functional relationship (Cooper, Heron, & Heward, 2007).

Behavior. A motoric, public, and observable movement by an individual within an environment (Johnston & Pennypacker, 1980).

Behavior intervention plan. A plan outlining the multistep teaching interventions needed to teach replacement behavior to promote learning within inclusive environments (Dunlap et al., 2010).

Charter school. A publicly funded elementary or secondary school that is not bound by the constraints of rules, regulations, and statutes applying to typical public schools. They are held accountable for producing results set forth in each charter school's individualized charter (National Education Association, 2013,).

Consequence. A stimulus that follows a behavior. Some consequences, especially those that follow immediately and have a motivation factor, have significant influence upon future behavior (Cooper, Heron, & Heward, 2007).

Desirable behavior. Appropriate classroom behavior that is either passive or active (Lannie & McCurdy, 2007). For the purpose of this study, desirable student behavior is defined as sitting with his/her bottom touching the chair, body is upright, eyes are looking at teaching stimuli and/or teacher, and not talking out of turn.

Differential reinforcement. A reinforcing stimulus that shapes only the responses within a response class and meets a specific criteria (i.e., a student sitting well), while simultaneously withholding previously delivered reinforcement (i.e., “Jimmy, stop moving!”). This withholding of previously delivered reinforcement may be negative attention that is maintaining inappropriate behavior (Cooper, Heron, & Heward, 2007).

Digital behavior intervention plan. A behavior intervention plan outlining proactive and reactive instructional components to teach more appropriate and alternative behavior. The digital plan will incorporate: (a) hypertext (Higgins, Boone, & Lovitt, 1996), (b) hypermedia (Mayer & Leone, 2002), and (c) multimedia (Banks & Coombs, 2005).

Dyad. For this study, a dyad is defined as a general education teacher paired with a student with a disability within an inclusive general education classroom.

Evidence based practice. Evidence based practice, or validated research in single-subject design research, is evidence based when: (a) it is operationally defined, (b) the context is defined, (c) fidelity of implementation is important, (d) a functional relationship exists indicating a dependent variable change, and (e) the effects are replicable across a number of studies, researchers, and participants suggesting similar findings (Horner, Carr, Halle, Mcgee, Odom, & Wolery, 2005).

Extinction. The discontinuation of reinforcement from a previously reinforced behavior (Cooper, Heron, & Heward, 2007).

Fidelity of implementation. Delivering a multi-step intervention as intended, and measuring how accurately it was implemented. This is calculated by assigning a percentage score determined by the number of steps accurately implemented divided by the total number of steps needed for the intervention (Gresham, MacMillan, Boebe-Frankenberber, & Bocian, 2000).

Functional behavior assessment. An assessment that enables a hypothesis to be made concerning environmental events and behaviors. The assessment helps obtain information about the possible function or purpose the behavior serves for an individual (Dunlap et al., 2010).

Functionally equivalent. Two or more behaviors serving the same function or purpose (i.e., different topographies of behavior are functionally equivalent if they produce the same consequences) (Cooper, Heron, & Heward, 2007).

General education. General education curricula refer to the goals and objectives defined by the public agency and include materials, equipment, and instructional strategies to educate all enrolled pupils (Nevada Administrative Code, 388.042, 2013).

Generalized behavior change. A behavior that changes in a new setting or under new circumstances and is observed to occur when the behavior has not been taught directly in that setting or situation (e.g., people, settings) (Cooper, Heron, & Heward, 2007).

Hypermedia. An extension of hypertext allowing for the linking of sound, graphics, and video (Boone & Higgins, 2005).

Hypertext. A type of data base system allowing words to be linked together such as a glossary or study guide (Higgins, Boone, & Lovitt, 1996).

Intellectual disability. A condition when an individual has difficulty with two or more of the following skills: (a) communication, (b) self-care, (c) home living, (d) socializing, (e) use of the community, (f) self-direction, (g) health and safety, (h) functional academics, (i) leisure, and (j) work. This disability demonstrates before the age of 18 years and negatively affects the educational performance of the individual. The intellectual functioning of the individual is at a level significantly below average. (Nevada Administrative Code, 388.055, 2012).

Learning disability. A condition that is chronic and characterized by a deficit in learning processes and when a discrepancy exists between predicted and actual academic achievement. This disability is not the outcome of another disability, or difficulty with hearing or vision. Learning disability is not the result of an environmental, cultural, or economic disadvantage (Nevada Administrative Code, 388.117, 2012).

Multimedia. Multimedia includes applications of text, graphics, audio, and video information in the design of instructional materials (Banks & Coombs, 2005).

Percentage of nonoverlapping data. The percentage of non-overlapping data (PND) determines the difference between baseline and treatment. The PND is a calculation of data that may overlap between baseline and successive intervention phases (Scruggs, Mastropieri, & Casto, 1987).

Positive behavior support. Positive behavior support focuses on the culture within a school and provides behavioral supports for those exhibiting problem behaviors (Sugai & Horner, 2009).

Positive reinforcement. Positive reinforcement occurs if a behavior is followed immediately by a stimulus that increases the frequency of the behavior in similar conditions (Cooper, Howard, & Heward, 2007).

Primary study. For this study, the primary study is defined as the first three teachers randomly assigned placement of participation within a multiple probe design.

Problem behavior. For this study, problem behavior is defined as any behavior that does not fall within the parameters of appropriate on-task behavior (e.g., talking out of turn, out of seat behavior, spitting, hitting, throwing objects) (Lannie & McCurdy, 2007).

Replication study. For this study, the replication study (i.e., last three teachers randomly assigned positions within a multiple probe design) will be conducted simultaneously to the primary study due to time constraints.

Serious emotional disturbance. A disability that is characterized by a person that unfavorably affects academic performance for three months or more and includes one or more of the following: (a) difficulty learning that is not caused by an intellectual or health-related condition, (b) an inability develop relationships, (c) inappropriate feelings, (d) depression, (e) an academic problem, or (f) the expression of problems (Nevada Administrative Code, 388.105, 2012).

Special education. Instruction designed to meet individual needs of a pupil. Instruction can be performed in any setting in the community (Nevada Administrative Code, 388.115, 2013).

Target behavior. A target behavior falls within a class of related behaviors, has been identified for remediation and be operationally defined (Cooper, Heron, & Heward, 2007).

Undesirable behavior. For the purpose of this study, undesirable behavior (i.e., problem behavior) is defined as: out of seat, talking out of turn, talking to peers, grabbing materials out of turn, grabbing materials that is not theirs, touching others, raising hand excessively, telling on peers, day dreaming, being overly emotional about non emotional topics, feeling sorry for himself/herself, spitting, hitting, throwing material or similar (Lannie & McCurdy, 2007).

Delimitations

The delimitations of this study were:

1. The limited sample size used to collect data makes generalization to the entire population of teachers difficult. A larger sample size may have shown different results.
2. The short length of time each teacher was exposed to the intervention may limit generalization.
3. Teachers were selected based on convenience. The findings of the study may not generalize to other teachers or classrooms.
4. Students were selected based on convenience. The findings of the study may not generalize to other students or classrooms.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

In education, a teacher's instructional effectiveness can be affected by a student's chronic off-task, disruptive, or problem behavior (Bambara & Kern, 2005; Lannie & McCurdy, 2007). Chronic problem behavior has been found to be a contributing factor to students dropping out of school, low employment and adult persistent failure (U.S. Department of Education, 2012).

Schools are working to reduce disruptive behavior, but are primarily using reactive interventions that are not function based (Sprague & Horner, 2006). Interventions can be punitive or may increase the frequency of the problem behavior that is identified for reduction (Blood & Neel, 2007). Although educators are required to collect data on disruptive behaviors, very little data are collected on the level of replacement skill behavior needed to neutralize problem classroom behavior (Dunlap et al., 2010).

The effects of various approaches to teach replacement skill behavior, manipulate antecedent variables, and shape behavior using motivational strategies on at risk children and children with disabilities have been conveyed in literature (Carr et al., 1999; Dunlap et al., 2010; Iovannone, Greenbaum, Wang, Kincaid, Dunlap, & Strain, 2009; Strain, Wilson, & Dunlap, 2011).

Educational Strategies for Inappropriate Behavior

Applied behavior analysis (ABA) has been used for over four decades to address problem behavior of social importance (Baer, Wolf, & Risley, 1968). Recently, Positive

Behavior Support (PBS) and Response to Intervention (RTI) have derived from ABA as complimentary approaches for dealing with disruptive classroom behavior (Cooper, Heron, & Heward, 2007; Dunlap, 2006; Sugai & Horner, 2009). Response to Intervention and Positive Behavior Support's multifaceted approaches are comprised of prompting, fading and reinforcement contingencies (Carr et al., 2002). These skills are essential to successful teaching of replacement skill behavior for individuals disrupting classrooms (Sugai & Horner, 2009).

Positive Behavior Support

Positive behavior support is recognized today as an educational application of ABA to deal with disruptive classroom behavior (Dunlap, 2006; Cooper, Heron, & Heward, 2007; Sugai & Horner, 2009). Fuchs and Fuchs (1998) suggest PBS promotes careful consideration of students' needs and promotes increases in support to prevent disruptive classroom behavior.

Sugai and Horner (2009) conceptualize PBS as a school wide approach consisting of a three-tier preventative approach. The three tiers are (a) a primary tier designed for all students and parents, (b) a secondary tier for students not responding successfully to the primary tier who may require increased structure and support for intervention, and (c) the third tier for individuals not responding to either the first or second intervention tiers thus requiring interventions that are individualized, intensive, and specialized. All three tiers require data collection, decisions based on collected data, and intervention variation based on student performance (Fuchs & Fuchs, 2006).

Students without disabilities. Positive behavior support uses evidence-based interventions that consider the needs of all students in schools (Horner, Carr, Halle,

Mcgee, Odom, & Wolery 2005). Evidence-based interventions have demonstrated experimental control with either randomized control-group designs or single subject research methodology (Horner et al.). PBS is a proactive approach of prevention, teaching, and shaping new behaviors that support all students across all constructs (e.g., classroom, playground, home) (Sugai & Horner, 2009).

Allday and Pakurar (2007) used a multiple baseline design that examined teacher greetings to on the on-task behavior of three middle school students in an urban city. The students were selected to participate based on teacher nomination that suggested difficulty with attention during the initial portion of class.

Student A was an eighth grade boy who displayed off-task behavior (i.e., incomplete assignments, not being prepared) and disruptive behavior (i.e., talking too loud, out of turn, bothering others). Data collection took place during Student A's first 10-minutes of class each day. Student B was a seventh grade girl that displayed off-task behavior (i.e., not paying attention, looking around the room, looking out the window). Student B was observed during her second period science class. Student C was a sixth grade boy who was disruptive (i.e., talking out of turn, making too much noise) and not attending (i.e., following directions inaccurately, sleeping). He was observed during his second period class.

Using momentary time sampling, the occurrences and nonoccurrences of off-task behavior were recorded within 15-second intervals. On-task behavior was determined if the student was actively listening, oriented towards the teacher or activities or was responding to instruction (e.g., nodding, responding questions, raising his hand). In momentary time sampling, intervals were coded as either on-task or off-task at the

precise ending of each interval. Interobserver agreement was determined by comparing two observers on 20% of the observations.

Students were uninformed that they were participating in the study. Students were observed two days per week for a total of 6 weeks. Teachers maintained their current routines during baseline. During intervention (i.e., teacher greetings) teachers were asked to greet the students by giving a positive comment and using their name (e.g., “I like your shirt, Tom” “I am glad you are here today, Jenny”). Teachers instructed normally after the initial greeting.

Teacher greetings appeared to increase student attention for all three students. Student A’s attention improved by 29%, Student B’s attention improved by 35%, and Student C’s attention improved by 19%.

Allday and Pakurar (2007) concluded that teacher greetings had a positive effect on on-task behavior, but suggested the effects were less clear due to overlapping data points when comparing baseline to intervention. Three possible interpretations of the results are (a) antecedent manipulation during the teacher-greeting phase reduced student desire for displaying inattentive behavior, (b) the greetings functioned to indicate the availability of attention for attentive behavior, or (c) programmed changes in reinforcement schedules for appropriate behavior during the greeting routine. Allday and Pakurar advocate for this manipulation of antecedents to increase attention. Future research is suggested in the area of evaluating antecedent interventions on student performances such as attendance and academic progress.

In a similar study promoting appropriate student behavior, Armendariz and Umbreit (1999) explored the effects of active responding on disruptive behavior within a

bilingual third grade math class by examining the effects of active responding (i.e., using response cards) when compared to hand raising as a way to actively respond during lecture. The student participants were 11 boys and 11 girls, all of whom were eight to nine years of age. The teacher had 15 years of experience and was female. The classroom was a third grade class in an urban public elementary school.

A reversal design (ABA) was used to contrast the two interventions. The first condition was the baseline phase in which five sessions took place using conventional raising of the hand. The second condition was active responding using response cards for a total of six sessions that was followed by another Condition A session of baseline. Two months later, another session was conducted. Sessions lasted 20 minutes each day. Any other class activity was not counted in the condition time for that day. In the baseline condition, teachers used a question-answer teaching format that was already conducted by the teacher and was an established routine within the classroom. Lecturing and asking questions to the entire class prompted students to raise their hands, at which point the teacher would select one of the students whose hand was raised. If the student answered the question correctly he/she would get praise. If the student missed the question by answering incorrectly, the teacher would ask another student for help. During the intervention (active responding) phase, the teacher presented questions the same way as during baseline, but each student was given a card on which to write an appropriate response, and all students were required to respond to the questions. All students were required to write the answer, cover it by placing it on their chests, and then simultaneously reveal the answer.

The teachers were trained to use the response card procedure. Appropriate procedures were modeled during the first two sessions by the first author. The teacher received guided practice and feedback during the last two sessions. No data were collected during this portion of the study. The teacher then applied the active responding procedure over the next six class meetings.

The only variable measured during the study was disruptive behavior. Noting disruptive behavior at the end of ten, 2-minute intervals, observers used a time sampling recording system. Every student was observed momentarily in a predetermined order and documented as having disruptive behavior if they displayed it. A complete scan of each seat position took 25 seconds. Students were asked after the study about their preference to responding (i.e., hand raising, response card). Interobserver agreement for baseline and intervention was 74% and 95% respectively.

Each student did substantially better during the active responding condition. Only one student was left out of the comparison, as he was absent for four of the five initial baseline days. Individual averages, when comparing the five days of baseline to the six days of response cards, revealed an average decrease in disruptive behavior for the whole class of 86%. When comparing the second baseline condition to the intervention, it demonstrated an increase in disruptive behavior for most of the students, while three students did not revert back to baseline levels and three others showed a further decrease when in the second baseline. When a comparison was made between the follow-up condition and the response card condition, means were similar to initial baseline averages.

Session means across intervals and using the line of best fit was conducted to determine variability differentially within sessions. This analysis showed that there was considerably more disruptive behavior in both baseline sessions as the session progressed through all ten intervals.

Armendariz and Umbreit (1999) concluded that active responding using response cards are an effective control against disruptive classroom behavior. Most students preferred active responding to the conventional system. Armendariz and Umbreit emphasized the importance of materials that can increase more on-task behavior that is targeted for better learning. Armendariz and Umbreit suggested that the high level of engagement did not particularly reinforce the teacher, and a teacher preference assessment was not performed. The active responding procedure requires time, and there was no school-wide effort to promote the teacher's determination to behavior.

Cote, Thompson, and McKerchar (2005) conducted a study to examine the effects of two antecedent strategies, a warning condition and a situation when children were granted access to toys to move from center to center by using a multiple element design. An extinction procedure was used for up to 20 seconds in conjunction with the antecedent strategies to allow the antecedent strategies to evoke appropriate behavior. The student participants were three typically developing children enrolled in a toddler full-day program and were identified due to non compliance while moving from highly preferred activities of play to the bathroom. The first child was a 14-month-old boy that followed some instructions and used simple sign language. The second child was a 22-month-old boy that followed instructions and used his voice to communicate. The third child was a 15-month-old girl that followed two-step instructions and used her voice to communicate.

If a child entered the bathroom within 20 seconds of the initial instruction without an additional prompt (i.e., extinction), compliance was recorded. Problem behavior was defined and recorded if the student hit, scratched, cried, screamed, or dropped on the floor when instructed to go to the bathroom.

Using a multi-element design (i.e., alternating treatments design), the researchers compared a warning, use of reinforcers, and planned ignoring. The intervention that demonstrated the greatest effect was used as an intervention alone. During baseline, an instruction was issued. Children either complied or were left to continue playing in the preferred area. In the warning phase, a two-minute warning was issued (e.g., “two minutes until potty”) before instruction. In the toy phase, the child was allowed to bring a toy to the bathroom. If the participant did not select a toy immediately, a toy was selected for them. In both the warning condition and the toy condition, the consequences were the same as in baseline. When extinction was administered, the instruction was followed by a physical prompt to initiate transitioning after three seconds.

All participants demonstrated near zero compliance across all phases of the toy condition, warning condition, and initial baseline. During the extinction phase, compliance increased immediately. The first two children had the highest levels of compliance and lowest levels of problem behavior during the toy plus extinction procedure. The third child, the girl, had the highest level of compliance during the extinction phase alone. When returning to baseline, all participants’ compliance decreased and improved again once intervention was reintroduced.

Cote, Thompson, and McKerchar (2005) concluded that extinction is an important intervention component. They noted that antecedent strategies might have little effect

without an escape extinction procedure. A limitation to this study was lack of functional analysis to determine stimuli maintaining non-compliance. Another limitation that was suggested was the lack of a preference assessment during the toy condition that may have increased the efficacy of toys alone.

Cushing and Kennedy (1997) used an ABAB withdraw design and a multiple baseline across settings design to examine the effects on students without disabilities serving as peer supporters for students with disabilities. Three dyads were selected for the study, each comprised of one student without a disability and one student with a moderate to severe disability. Peer selection was based upon identifying individuals that were often unengaged. A peer was identified in a classroom and paired with a student with a disability.

Cindy and Cathy agreed to work together. Cindy was the typical peer that had poor academic engagement. Kealoha and Karl were paired up in health class where Kealoha had difficulty attending to academics. Louie and Leila attended three academic classes together. Louie had difficulty attending during class and had occasional disruptive outbursts by talking to other students. The first dyads used a withdraw design (ABAB) to compare Cindy working alone and Cindy supporting Cathy. The same design was used for Kealoha and Karl to compare Kealoha alone and when he supported Karl. Louie and Leila participated in a multiple baseline design across three academic settings. The baseline was Louie alone, while the supporting Leila was the intervention across three academic classrooms. The dependent measure was engagement within the classroom. Academic engagement was determined by sampling a moment within an interval. Data were collected for the entire 55-minute class period.

During baseline, Cindy, Kealoha, and Louie participated in the same classrooms and class activities. Intervention was Cindy, Kealoha, and Louie helping the others with disabilities. The intervention had three elements: (a) peer participation, (b) training and supervision by special education staff, and (c) general education teacher supervision. Peers were taught how to adapt assignments by using verbal descriptions, modeling, and using praise for correct responses. If students had difficulty adapting material, special education staff stepped in to help. Special education staff gave brief daily feedback, and general education teachers gave Cindy, Kealoha, and Louie praise at least once per class period. During the return to baseline, all original baseline conditions resumed. Reinstating intervention, peer support intervention began again by simply telling Cindy and Kealoha that they would again be working with their student friend. A follow-up observation took place after one month for Kealoha and after two months for Cindy. Louie was unavailable for follow-up.

The data were analyzed by comparing mean percentage of engagement of both baseline and intervention. Cindy's mean percentage of engagement during baseline (alone) was 38% (range, 0% to 97%). During intervention, Cindy's engagement mean with Cathy was 86% (range, 46% to 97%). After two months, her average engagement when working with Cathy was 84%. For Kealoha, baseline mean in health class was 51% (range, 25% to 76%) for percentage of engagement. During intervention, Kealoha's percentage of engagement was 88% when supporting Kealoha (range, 73% to 98%). During the one-month follow-up observation, Kealoha's average percentage of engagement was 95% when supporting Karl. Leila's percentages of engagement time

while supporting Louie for the three different classes were English 90% (range, 84% to 97%), Science 92% (range, 84% to 98%), and Social Studies 96% (range, 93% to 98%).

Cushing and Kennedy (1997) concluded that students serving as a peer assistant for students with disabilities has a positive effect. Although there appears to be a positive effect, all three students that were sampled were highly selective; therefore systematic replication is needed over a variety of students. A number of maintaining variables within the study may contribute to improved social interactions and engagement. Positive and negative reinforcement may be occurring depending on the situation within the classroom. Students and teachers will have an influence on engagement, but this was not specifically observed in this study. It is possible that having peers assume academic roles requires them to actively listen and actively lecture back to their peers.

In a similar study also exploring improvement of on-task behavior, Riley, McKevitt, Shriver, and Allen (2011) utilized an ABAB withdraw design to explore using teacher attention to increase student attention. The study used an intervention of the teacher providing 5 minutes of sustained attention while engaging with students as normally as possible (i.e., normal reactions) between cued intervals. Two students and their teacher participated in the study. One boy and one girl were identified as displaying off-task behavior including getting out of their seats, touching peers, talking during quiet periods, disrupting peers, and calling out. This general education teacher had nine years of experience. Every five minutes, a device that vibrated in her pocket cued the teacher to give attention to the students. When the teacher was prompted, the teacher would provide attention to both students individually. Each student was reinforced verbally for increased attention and redirected for a lack of attention.

A withdraw design (ABAB) was used with both student participants to test the effects of fixed individual attention as it relates to on-task behavior. During condition (A), the teacher asked and responded to students normally. The teacher would react to the students the way she normally would during intervention between vibration cues, but when cued the teacher gave unconditional attention to the students. Verbal reinforcement and redirections were recorded.

Both a visual analysis and descriptive statistics were used to analyze the data. There was an immediate level change in on-task behaviors for both students relative to baselines. For both students there was an immediate return to baseline levels once teacher attention on a fixed ratio of 5-minutes was removed. For both students, on-task behavior returned to previous intervention levels once the intervention of fixed 5-minute teacher attention was reinstated. The average rate of praise statements increased during the intervention phase for both students. The redirections for both students also increased during the intervention phase.

Riley, McKeivitt, Shriver, and Allen (2011) concluded that teacher verbal reinforcement was effective in increasing attention for both students. There was an increase in attention, and conversely a decrease in off-task intervals of disruptive behavior. One limitation was that teachers maintained the ability to provide redirection during inattentive behavior, increasing the likelihood of being punitive that may have controlled much of the student behavior and could have functioned independently of the fixed 5-minute attention intervention. Another limitation suggested by Riley et al. was the length of the intervention that may have caused it to not have lasting effects. Future studies should identify intervention with durability. Often, students do not respond to

unspecialized interventions thus needing interventions that are specialized and intensive (Sugai & Horner, 2009).

Students with disabilities. Positive behavior support helps individuals with disabilities to improve their ability to learn from the general education curriculum by supporting individuals within normal inclusive environments (Sailor, Dunlap, Sugai & Horner, 2008). Attention has been focused on evidenced-based assessments and intervention procedures with the reauthorization of IDEA (PL 105-17, 1997; PL 108-446, 2004).

Cihak, Fahrenkrog, Ayres, and Smith (2010) using an ABAB withdraw design (Barlow, Nock, & Hersen, 2009), examined the use of video modeling and the system of least prompts to increase successful transitions for students with autism. Four participants with the diagnosis of autism took part in the study. The four participants, one-first grader, two-second graders, and one-third grader, were also tested by the school psychologist and subsequently qualified for special education under the eligibility of autism.

Four elementary schools were used in this study. Each participant attended his or her local elementary school. All four students were 100% included within the general education classroom. Each classroom had one general education teacher and one paraprofessional. Training occurred with both the teacher and the paraprofessional on using video modeling procedures and the iPod for supporting students during transitions.

Event recording was used to document transitions. Students either transitioned independently or needed assistance to be successful. Ten daily transitions were identified for each of the four students.

The ABAB design incorporated five conditions: (a) baseline, (b) hand-held video modeling, (c) no hand-held video modeling, (d) hand-held video modeling reinstated, and (e) maintenance. Before the onset of baseline, all four students participated in a training to be sure their attention would allow each student to follow the video models. In the first phase, students were required to demonstrate how to use the device. In phase two, students used the device similar to phase one, but were also taught to follow the instructions of the video. The performance video for training was a similar two-step activity within the class that would demonstrate how well each student could imitate the video. A least to most prompting hierarchy was implemented to teach and fade used prompts to promote independence with the iPod and videos.

In baseline, the number of independent transitions was recorded. A minimum of five sessions were recorded and stable rates of responding were achieved. In the hand-held video-modeled procedure (intervention), students arrived at school, were given the device, and told to use them. Once the device was being used, students watched the video. Each corresponding video matched the transition needed. Once the video was complete, teachers went through their transitioning routine. The prompting hierarchy from least to most used in training was also used in intervention. Independent transitions were reinforced. Students mastered transitioning before the next phase of the study could begin. In the no hand-held phase, intervention was withdrawn. Once the data reversed, hand-held devices were reinstated again.

Overall across all four students, independent transitioning was 7% across baseline. When using the handheld device with the video modeling, independent transitioning rose to 77%. When the intervention was withdrawn, a mean independent

score for transitioning dropped to 36% across the four students. Students maintained a mean of 98% after a 9-week follow-up maintenance probe. Students continued intervention until the maintenance probe.

Cihak, Fahrenkrog, Ayres, and Smith (2010) concluded that students with the disability of autism could be taught a new skill using technology such as a handheld device and a technological prompting procedure. Cihak, Fahrenkrog, Ayres, and Smith also included that the intervention had a small sample size. Also, due to use of video modeling along with the prompting hierarchy, the strategies could not be divided out.

McIntosh, Campbell, Russell-Carter, and Rossetto-Dickey (2009) investigated the efficacy of a behavior card strategy within a second tier school-wide positive behavior support (SWPBS) system and examined different outcomes in regards to the function of the behaviors. Effectiveness was assessed by comparing behavior functioning levels before and following an eight-week program of Check-In/Check-Out. Check-In/Check-Out is a commonly used strategy that helps students develop relationships with adult educators on the student's campus.

The participants of the study were nominated by their classroom teachers due to a lack of responding to tier one support in the classroom. Thirty-four students participated in the study ranging from first grade to fifth grade. There were 28 male and 6 female students.

The setting for the study was six elementary schools in the western region of the United States. The district and the six schools had participated in a 12-year SWPBS initiative. Each school had an 80% mean implementation of SWPBS.

Three measurements were taken in a pretest posttest fashion. The Functional Assessment Checklist (FACTS) is an interview form and was used to collect functional assessment information. The Behavior Assessment Scale for Children-2 (BASC-2) *Child Form* was used to assess current levels of behavior in schools. For the level of social behavior, the BASC-2 *Teacher Report Scale- Child Form* was used. Office discipline referrals (ODRs) are individual tracking forms designed to track student behavior that were also used in this study.

The function of each student participant was determined using the FACTS Training was provided with routine monthly reviews of the strategy reviewing individual steps of the intervention. Performing a mixed model multivariate analysis on behavioral function provided data analysis. Pretest and posttest scores were compared for all three variables: (a) adaptive scales, (b) a behavior symptoms scale, and (c) the extent of office referrals.

The results of the pretest, posttest measures were analyzed using repeated measures MANOVA to detect differences in function-based intervention between groups. The main effect was not interpretable because it was statistically significant. Simple effect analysis for each group was analyzed based on function. For the attention maintained behavior group, a significant difference was seen between pre and posttests. Office referrals were significantly reduced for the attention maintained behavior participants. A significant difference was identified on both prosocial behavior and ODRs. For the escape maintained behavior, there was no significant difference. Behavior problems decreased for the participants that sought adult attention, while there was an

increase of behavior that was maintained by escape. Both groups demonstrated increases in prosocial behavior.

McIntosh, Campbell, Russell-Carter, and Rossetto-Dickey (2009) concluded that school personnel should avoid using tier two intervention for all students. Overall, all students received positive effects from the intervention, but it did not reduce student disruptive behavior that was maintained by task avoidance, suggesting the need for another intervention for this function group.

Moore, Anderson, and Kumar (2005) explored the consequences of an antecedent manipulation that reduced task duration and broke the task down into small components within a general education classroom with a student with emerging deficits in mathematics. Moore et al. specifically explored breaking the curricular task into smaller blocks without reducing task difficulty alone. By using a functional behavior assessment and also a curriculum-based assessment, the researchers ensured that the student and the curriculum were appropriately matched.

The classroom mathematics lesson was 45-minutes in length each day. Of each lesson, 10-17 minutes were whole class verbal activities that were followed by independent or small group activities for the rest of the lesson. Data were collected four times per week for 20-minutes each day that was comprised of a 10-minute partial interval recording that was used during whole-class work, and 10-minutes of a partial interval recording that was used during independent work. Off-task behavior was monitored for 10-second intervals, as well as antecedent-behavior-consequence data were collected around all the inappropriate behaviors. Data were collected on the frequency of inattention.

An alternating treatments design (ATD; Kazdin, 1982) was used to compare the two different treatment conditions: (a) current instruction for baseline, and (b) reduction of task by breaking task up into 3-4 components that were applied easily. The student completed all class wide assignments. Random assignment was used to determine a nine-day intervention cycle (e.g., tasks broken up, baseline procedures). Data were graphed and analyzed to visually determine possible differences between baseline and intervention.

Task duration was manipulated while students had independent work periods. The participant's inattentive behavior occurred 45.8% of the time during baseline. While in treatment phases, inattentive behavior occurred only 14.5% of the time. Subsequent baseline treatments of traditional instruction were 51.9% of inattention on average. During the last phase of treatment, inattentive behavior was 15%.

Moore et al. (2005) concluded that the intervention decreased the percentage of inattention while not manipulating any teaching experiences for the student by simply reducing task demands. However, several limitations of the study were discussed, including a single subject and limited observations. Suggestions for future research include antecedent manipulation as a primary focus of evoking behavior change in classrooms.

Campbell and Tincani (2011) examined the effects of the Power Card strategy for instructing individuals with autism spectrum disorder (ASD) to follow directions more accurately. Lori, James, and Shawn were the students who participated in the study. They were all in the first grade and were diagnosed with the disability of autism. Each student

participated within their self-contained classroom and was observed during a daily 20-minute period.

The strategy is based on the student's intense interest to teach interactions, routines, and appropriate behavior. The strategy used the student's interest in a super hero within a story, and described how the hero behaved socially in a particular situation.

A functional assessment was performed on each student. Functional equivalent behavior was identified and taught through the Power Card story. Power Cards were specific, such as teaching a student to say, "When can I have another turn?" rather than exhibiting a non-compliant refusal.

A multiple baseline across participants design (Cooper et al., 2007) was used, first incorporating the story phase, then the Power Card phase, and finally a maintenance phase. Data collection was from 8:45 to 9:05 each morning for 20-minutes. The classroom assistant was responsible for data collection and was trained until interobserver agreement was 100%.

The results were averaged for each participant and phase of the study. Ranges were calculated to determine the variability of each phase. All data were graphed for visual inspection across phases. The three students averaged 48%, 58% and 35% for responding appropriately during baseline. During the scenario condition, Lori averaged 72% (range, 43%-86%) for following directions and met 80% criterion. James' percentage of direction following increased to an average of 88% (range, 62%-100%), while Shawn's direction following increased to an average of 97% (range, 94%-100%). During the card condition only, Lori had a high average of 80% (range, 50%-90%), James had 98% (range, 90%-100%), and Shawn's followed direction average was 99%

(range, 95%-100%). While within the maintenance period, Lori's average percentage of listening reverted back to baseline levels of 66% (range, 31%-90%). James maintained high levels of responding with an average of 94% (range 85%-100%), and Shawn continued to respond with an average of 95% (range, 93%-100%).

Sessions continued for both James and Shawn to determine continued effect. The intervention condition was reintroduced to Lori to once again look for benefit from the strategy. Lori once again averaged a high 86% (range, 73%-100%) appropriate response rate to following directions. James and Shawn both continued to respond appropriately with a 100% response rate and a 93% rate (range, 77%-100%) respectively.

Campbell and Tincani (2011) concluded that the Power Card intervention increased all students' appropriate following of directions with more of an effect upon James and Shawn. Although Shawn and James continued to respond well during maintenance, Lori reverted back to baseline levels ($PND = 21.4$).

Campbell and Tincani (2011) concluded as well that the absence of a generalization phase across settings was a limitation. Future studies should focus on Power Card strategies across settings to the focus person's relevant environments. A second limitation noted by the authors was that individuals with ASD exhibit communicative and social difficulties, and difficulty following directions, as an appropriate response is a limited focus for intervention.

Shogren, Lang, Machalicedk, Rispoli, and O'Reilly (2011) investigated and compared the effectiveness of a token economy teacher-directed intervention to a student-directed intervention on two individuals with the disability of Asperger's syndrome in a general education classroom utilizing an alternating ABACABAC design.

Both interventions were designed to teach appropriate classroom behavior in order to improve learning. There were eight students in total within a private kindergarten class in an urban city in Texas. Two five-year-old Caucasian boys, William and Allan were selected from this school for this study. Three additional students within the class had speech impairments, and the last three had no disability label. Both participants of the study had three rules regarding appropriate classroom behavior that were developed for them as part of a plan. Students must stay in their chair, not touch others, and listen to their teachers.

Data was collected on appropriate behavior during centers. An alternating treatment design was used to compare self-management and token economy interventions to effectively increase appropriate classroom behavior. In baseline, all normal routines were followed. In the token economy phase, a backup reinforcer was identified through a daily preference assessment. The token economy consisted of the three rules and three center activities running down the left side of the page. There was a box to the right of each activity where a token was placed determining if the participant appropriately participated and followed classroom rules. If the participant earned their tokens, a backup reinforcer was delivered. In the self-management phase, the same materials were used but the student was allowed to deliver his own token based on following the rules. The students were responsible for carrying their own token boards for the purpose of awarding themselves a smiley face token if they felt they followed the rules. Both participants were very accurate in their review of their own behavior, only requiring minimal prompting the first three days. A maintenance phase was implemented after the last self-management phase. The teacher was told to continue using the material by using

them as they had or by modifying the materials, as all the materials were left in the class for this purpose.

Visual inspection of the graphed data indicated the effectiveness of both the token economy implemented by the teacher and the self-management intervention. The data indicated that both students' behavior were improved to typical peer level within the class and was maintained throughout the maintenance periods.

Shogren et al. (2011) concluded that both interventions were effective, with the self-management intervention receiving higher scores on the social validity questionnaire due to its ease of use, but suggested limitations. First, there were numerous interventions already in place that could have had an impact on the participants' behavior. Second, peer involvement was observed and may have become an important component and contributed to the intervention outcomes. Future research should determine peer impact, student engagement, and student learning.

Functional Behavior Assessment and Behavior Intervention Plans

The intense planning for tier-three behavioral supports must begin with a functional behavior assessment (FBA) (Bambara & kern, 2005). Reasons for an assessment are to focus on the individual and to determine function-based behavior as well as form hypotheses about what may trigger and maintain their disruptive behavior (Carr et al., 2002). Intense intervention teaching strategies are derived from a FBA and require progress monitoring and adjustment when needed (Carr, 2006; Carr et al., 2002; Dunlap et al., 2010).

Students without disabilities. When students do not qualify for special education services or have not been identified with a specific disability, they may still need intense

specialized behavior intervention plans with appropriate functional behavior assessments being performed (Burley & Waller, 2005).

Some researchers have explored the utilities of functional behavior assessments (FBA) and behavior intervention plans (BIPs) within general education classrooms (Higgins, Williams & McLaughlin, 2001; Jones, Drew, & Weber, 2000). Janney, Umbreit, Ferro, Liaupsin, and Lane (2012) investigated the effect of the extinction procedure and behavior plan with three students within the general education setting using an ABACB reversal design. Three students from three different classrooms were selected who were elementary school aged and had difficulty maintaining on-task behavior. All three elementary classrooms were within the same elementary school.

Data were obtained via three descriptive functional behavior assessments including individual interviews with students and teachers, record reviews, and collection of A-B-C data through direct observation. Functions were identified as either being positively or negatively reinforced and what types of reinforcement were maintaining disruptive classroom behavior (e.g., attention, task/tangibles, sensory).

A comparison of a full versus partial intervention package consisted only of antecedent manipulations. A full intervention package consisted of (a) antecedent manipulations, (b) shaping of alternative behavior, and (c) removal of reinforcement used to maintain inappropriate behavior inadvertently. The primary dependent variable was on-task behavior.

Data were analyzed visually once it was graphed and also by using descriptive statistics. For all three-student participants, function based interventions demonstrated increased on-task behavior. When the extinction procedure was no longer used in the

partial intervention package phase, on-task behavior dropped precipitously consistently for all three student participants.

Janney, Umbreit, Ferro, Liaupsin, and Lane (2012) concluded that the use of an extinction procedure based on the behavior's function is necessary. Janney et al. noted several limitations to this study. This study included only three students participants that were selected by a convenience sampling. Janney et al. suggests that using a larger sample size and randomized to determine entrance within a group. They suggested that grade levels, instructional activities, and range of different functions and settings should be studied further.

In a related study concerning the benefits of function-based interventions, McLaren and Nelson (2009) investigated the effectiveness of a functional behavior assessment (FBA) and the goodness of fit between function-based interventions and Head Start classrooms using an ABAB withdrawal design, and an ABCAC design. Behavior interventions were developed for three Head Start students upon completion of a functional assessment collaboratively done in the classroom. Teachers were involved in all aspects of the assessment including the FBA, hypothesis development, intervention development and implementation of the teaching strategies.

The teachers selected three children on the basis of their display of external disruptive behavior. Two of the students were in the same class, while another student was located in an adjacent classroom. Two lead teachers participated in the study along with three assistant teachers.

Using structured interview forms, antecedent-behavior-consequence recording forms, individualized scatter plots, and frequency data sheets, functional assessments

were completed. Teachers were directly involved with the assessment procedures. The primary dependent variable was student inappropriate behavior. Inappropriate behavior was inappropriate touching for student A, aggressive behavior for student B, and out of seat behavior for student C. For student A, the intervention developed was to have the teacher invite the student to play with her and demonstrate appropriate interactions with others before asking him to clean up. For student B, the teacher would invite the student to play only after cleaning their center. For student C, the intervention consisted of three components: (a) immediately prompt student C with a hand lead if he hesitates from coming to circle time, (b) instruct student to sit in circle time, and (c) immediately provide a sensory toy as long as the student is sitting in circle time, and allow playing if he is in his seat.

A withdrawal design (ABAB) was used for two of the students to examine the effects of the training period to prepare the teacher to implement the intervention to reduce disruptive classroom behavior. For the third student participant, an ABCAC design was used to examine the effectiveness of the implementation of the teacher implemented intervention. For the third participant, phase A was baseline, phase B was the teacher training phase, and phase C was the teacher independently using the function-based intervention to reduce disruptive behavior.

Data were analyzed by visually examining changes in level, trend and slope following phase changes for all three students. The results indicated that decreased levels of inappropriate behavior were achieved due to classroom based functional assessment and intervention development within the classroom along with goodness of fit. High

scores on the social validity questionnaire in the area of willingness suggest a high willingness to continue and perform such interventions within the classroom.

McLaren and Nelson (2009) suggest several limitations including the lack of a comparison between function-based and non-function-based interventions. A high frequency of student absences may have caused discomfort with the antecedent manipulations of the study. McLaren and Nelson suggest investigating the impact of FBA-based interventions on identified replacement behaviors as well as the efficiency of interventions used by teachers with and without a functional behavior assessment.

In yet another study investigating the function of behavior and the need to have an intervention based upon its function within the classroom, Nahgahgwon, Umbreit, Liaupsin, and Turton (2010) used a reversal design to investigate the efficacy of interventions based on function for young children without disabilities, but who were at risk for a disability. The investigation took place in an elementary school. Three student participants were selected randomly whose teachers felt they may need further support and possibly a behavior plan. Student participants were identified as needing tier three supports that included a functional behavior assessment and individualized behavior intervention plan. All three students had disruptive classroom behaviors.

The study was to first conduct functional behavior assessments (FBAs) consisting of teacher interviews, student interviews, and structured observations for each of the participants, and use of the *Function Matrix* (Umbreit, Ferro, Liaupsin, & Lane, 2007). Next, systematic intervention construction took place. Finally systematic implementation of the intervention took place within the student's general education classroom during the

student's most problematic period of the day in order to examine the efficacy of the interventions within general education classrooms.

For intervention testing, a reversal design was constructed for each of the participants. On-task behavior was collected using intervals 30 seconds in length in which the students were required to maintain attention for the entire length of the interval in order to get credit for that interval. Each intervention had components consistent with (a) an antecedent manipulation, (b) a positive reinforcement procedure for targeted behavior, and (c) an extinction procedure. All three participants reverted back once intervention was withdrawn. For testing the intervention during the most difficult portion of the day, a multiple baseline across participants design was used.

Data were graphed and analyzed visually. All three student participants had changes in level, trend and slope. The first two students had all intervention data higher than baseline data. The third student had only one overlapping data point. Nahgahgwon et al. (2010) concluded that interventions produced improved behavior for each student, while each student's behavior was maintained by a different function, thus different intervention methods were required. Nahgahgwon et al. suggests that a limitation is the short duration of the study. Also, disruptive classroom behavior was not a dependent variable of the study. Future research should focus on extensive levels of intervention for months or even years.

In a similar study observing the use of interventions within the classroom, Dufrene, Doggett, Henington, and Watson (2007) examined the use of functional assessment procedures and individualized interventions for preschool and Head Start classrooms using a single case sequential design, as well as an ABAB¹ withdraw design.

Three preschool children, three Head Start teachers, and two preschool teachers participated in the study. All classrooms contained 19-21 typical students. None of the student participants had been evaluated previously. Teacher experience ranged from one to five years, with none having extensive behavior management training.

For two of the student participants, aggression was measured. For the third participant, non-compliance was recorded and targeted for reduction. An ABAB¹ or BABA withdraw design was used to examine effects of the intervention, and participants were randomly assigned to either start with the B phase or the A phase. The experimenter conducted either the A phases or the initial B phase. Teachers observed the experimenter implement during the B phase. The A condition included delivery of a reinforcer for target behavior. In the B phase, delivery of the reinforcer only during the absence of the target behavior was included, as well as withholding of the reinforcer during occurrence of an inappropriate target. During the second B¹ phase, teachers implemented the intervention with assistance from the experimenter. Prompting was delivered to teachers through a radio.

Data were collected on assessment and intervention sessions. Direct observation was used to collect the occurrences of the targeted behavior. Interobserver agreement was 90% across all session types as 34% of the sessions were randomly selected across children and sessions.

Results of the intervention analysis for all three students demonstrated a functional relationship as in all three students the initial baseline demonstrated high levels of targeted behavior identified for reduction. Upon the onset of the intervention phase, data reversed for all the students as targeted behavior dropped below 10%. As soon as the

second baseline was reintroduced and the intervention was withdrawn, the data reversed indicating a functional relationship between the intervention and the reduction of the problem behavior. Once again, as the second intervention was implemented with the teachers, data again reversed back to low levels of targeted behavior indicating a functional relationship.

Dufrene, Doggett, Henington, and Watson (2007) concluded that this study demonstrated the use of functional assessment for young students in classrooms with students that may be typically developing, but who also have extreme levels of difficult classroom behavior. This study also demonstrates direct assessment of behavior and offers effective strategies for young individuals in preschool who are at risk for disabilities. Implementing function-based interventions was also extended from this study to preschool and Head Start classrooms. Future research should be in the area of long-term treatment integrity of the classroom teachers, as this data does not suggest long-term use of the interventions.

Many students do not qualify for special education services or have not been identified. However, students without a specific disability may still need intense specialized behavior intervention plans with appropriate functional behavior assessments being performed (Burley & Waller, 2005).

Students with disabilities. Functional behavior assessments (FBA) were mandated by the Individuals with Disabilities Education Act (IDEA) (20 U.S.C. § 1400, 1997) along with a comprehensive intervention plan to address disruptive behavior in the classroom for student with disabilities. The purpose of the assessment is to lead to a

comprehensive, effective, and efficient intervention plan that enhances learning and increases access to social and academic environments (Sugai et al., 2000).

Carr et al., (1999) investigated an intervention using rapport building, functional communication training (FCT), reinforcement delay, choice making, and embedding (i.e., exposure to reinforcement in order to implement the Premack principal later). The first three participants that met criteria were selected to participate.

Val, Gary and Juan were selected because they had difficult behavior, were not allowed to participate due to behavior, and exhibited self-injurious behavior. The participants were 14, 17, and 38 respectively. All three students had an intellectual disability, but Gary and Juan also had autism characteristics.

Assessment procedures incorporated describing, categorizing, and verification to determine functions of behaviors. During the describe phase following a stakeholder interview, the describe section of the assessment involved an A-B-C recording format to identify antecedent (i.e., what happens before inappropriate behavior) and consequence variables (i.e., what happens directly after disruptive behavior) to begin to determine possible maintaining variables of disruptive behavior. This assessment procedure took place when needed over the six years that the study collected data. If any life changing events took place (e.g., change in work, residual problem behavior after intervention use, spontaneous recovery of problem behavior) another assessment was implemented using an A-B-C data collection method with interviews.

During the categorization phase of the assessment, stakeholders documented problem situations and categorized problem behaviors into function completed index

cards. Categorization consisted of hypothesis building, categorizing and determining overall themes.

The third phase, verification, was carried out in baseline. Contextual situations were purposefully manipulated to determine if antecedent variables evoked the problem behavior.

Intervention consisted of rapport building, FCT, delayed reinforcement tolerance, choice making, and embedding. A multiple baseline probe analysis across participants (Horner & Baer, 1978) was used to determine the effects of the intervention components on the frequency of disruptive behavior and communication level. Data that was collected on responsivity was collected as (a) no response, (b) acknowledged, or (c) reinforced.

During baseline, Val primarily received a no response score when spoken to, while Gary and Juan received acknowledged scores. Total responding scores were 0%, 22%, and 13% respectively for responding during baseline. During intervention, all three participants had levels exceeding baseline levels in the reinforcement category 55%, 70%, and 45% respectively.

Carr et al. (1999) concluded that the intervention demonstrated efficacy and increased communicative responses that had a strong inverse relationship. The multi-component intervention addressed the problem of increased communication and reinforcement with increases in reinforcement delay tolerance. Carr et al. suggested a limitation that their assessment procedures took an average of 36 hours per individual with over 100 index cards being produced per individual. This makes this type of assessment not readily feasible since there are so few expert personnel, although it was validated by the results. Carr et al. also concluded that in clinical practice, it might be

more appropriate to quickly assess and initiate interventions and adjust based upon data collection. Future research should focus on assessment, interventions, outcomes, and measurement.

Iovannone, Greenbaum, Wang, Kincaid, Dunlap, and Strain (2009) investigated whether an intervention based on function could be standardized, simplified and implemented by school personnel that were aligned with positive behavior support by using a randomized group design. Students between the grades of K-8 participated in the study for two years in the states of Florida and Colorado.

Students who elected to participate in the study were recruited through teacher nominations. Each teacher could be involved with only one student at a time during the study. Of the 245 students, 82% were male, and the majority of the teachers were female at 83%. Of the 218 teachers, 63% were regular education teachers and 35% were special education teachers.

The PTR intervention consisted of being issued a PTR consultant and going through a five-step process: (a) a teaming process, (b) goal setting for the student, (c) a functional behavior assessment, (d) intervention, and (e) an evaluation process. The comparison group received the usual interventions with no restrictions on the interventions they could use. Forty percent of the control group students had a behavior intervention plan and were receiving behavioral strategies to remediate difficulties in the classroom. The authors suggested that the majority of these plans were reactive in nature consisting of reprimands, reinforcement, time-out and other response costs.

Student outcomes were measured by the *Social Skills Rating System* (SSRS; Gresham & Elliott, 1990) and *Academic Engaged Time* (AET) adapted from Walker and

Severson (1990). Measurements were taken for baseline, posttest, and follow-up. The mean PTR intervention time among the students was 71 days from baseline to posttest assessments. Follow-up ensued six to eight months after posttest.

Measures for the teachers were a social validity questionnaire and fidelity of implementation measure that was taken for the intervention accuracy once the teachers began to implement the behavior intervention for their students. Both an adherence score (i.e., implementing component) and a quality score (i.e., implementing completeness and competence of the intervention) for fidelity was taken daily.

For reducing problem behavior, increasing academic engagement time, and increasing social skills, a two way repeated measures ANOVA was used to determine if a significant difference existed. Social skills for the students receiving the PTR intervention package group were significantly higher. Problem behaviors for students were significantly lower. Academic engagement time of students within the PTR group was significantly higher as well. The fidelity of the teachers in the PTR group received an average adherence score of 88% and a quality mean of 78%.

Iovannone, Greenbaum, Wang, Kincaid, Dunlap, and Strain (2009) concluded that preliminary results suggest that PTR assessment and interventions improved social skills and reduced problem behaviors of students. Iovannone et al. noted that the control group had minimal gain between baseline and posttest scores in regards to social skills improvements and reduction of difficult classroom behavior, suggesting the services that are usually used in behavior intervention plans or tertiary supports generally are not resulting in improved outcomes. Since the control group was a no-treatment comparison, they were receiving a treatment with little to no effect.

There were several limitations to this study. Foremost, there may be difficulty in replication. The study used university personnel that were highly skilled in consultation and behavioral training. The level of training needed to facilitate the PTR model and ensure proper fidelity of implementation of suggested intervention components was very high. Next, there was the possibility of interaction effects between mediators and modulators that could affect fidelity of implementation of the interventions. Sustainability of the intervention is another limitation and is unknown since there is always the possibility of a teacher discontinuing implementation of intervention that remains a challenge in schools. Finally, the lack of fidelity of implementation measures for the control group. Since most of the intervention plans contained reactive measures (e.g., reprimands, redirects), time-out, and response cost procedures, there was no reporting of the intervention plan package (i.e., specific components) of the control group.

Strain, Wilson, and Dunlap (2011) used a multiple baseline across participants design to examine the effects of Prevent-Teach-Reinforce (PTR) protocol within the general education setting with three students with the disability of autism and difficult classroom behavior. Three students with the disability of autism were selected for this study. Student A was in kindergarten and was described as being high functioning with normal to average communication and cognition. Student B was in the second grade, participating in the general education setting the majority of the time, and was also identified as having the disability of autism. Student B was describe as having some verbal language but language was judged by his teacher to be ineffective when he became anxious. Student C was enrolled in the fourth grade and was also participating within the

general education setting. Student C was identified as high functioning with language and cognition, but had extreme difficulty communicating with peers using appropriate interactions, social initiations and responses. This study took place in a large urban city.

A multiple baseline across participants design was used to examine the effects of the standardized PTR protocol on three students with autism within the general education setting. Each team was assembled and went through the five-step process: (a) teaming, (b) goal setting, (c) functional assessment, (d) intervention, and (e) evaluation. Each person-centered team began baseline and started intervention in a staggered fashion. Each behavior intervention plan followed the process outlined within the PTR manual and facilitated by one of the PTR researchers. Two primary dependent measures were used to assess in the study: (a) problem behaviors, and (b) task engagement. Fidelity checks were developed by the PTR consultant to determine the level of implementation of the strategy per component of the intervention. Intervention occurred after three to four sessions, then was removed for three to four follow-up sessions.

The graphed data were analyzed visually. Strain, Wilson, and Dunlap (2011) concluded that the data demonstrated an effective procedure for rapidly improving behavior for the three students while also improving task engagement. The magnitude of the intervention was extensive with all of the intervention data higher than all of the baseline data. Follow-up data determined durability of the intervention after the PTR consultant was withdrawn.

Limitations exist even though the data is encouraging in establishing improvements for students with the disability of autism participating in general education

classrooms. First, the study included only three students. Next, all of the students were relatively high functioning.

The purpose of the assessment is to lead to a comprehensive, effective, and efficient intervention plan that enhances learning and increases access to social and academic environments (Sugai et al., 2000). As functional assessment and behavior interventions have demonstrated efficacy, the attention on implementation fidelity is also an important component to decreasing difficult classroom behavior and improving students' classroom performance (Reschly & Gresham, 2006).

Fidelity of Implementation

Dusenbury, Brannigan, Falco, and Hansen (2003) suggest that implementation fidelity is the level, degree or percentage of implementation of a multistep procedure. The effectiveness of an intervention may be based on the number of steps delivered accurately in the procedure (Dusenbury, Brannigan, Falco, & Hansen, 2003). Fidelity of implementation is important not only for using the intervention correctly, but also for monitoring progress of the behavior change intervention to enhance explicit decision-making procedures (Johnson, Mellard, Fuchs, & McKnight, 2006). Research supports fidelity of implementation, but a practical challenge exists for high levels of fidelity in the school setting (Reschly & Gresham, 2006).

Noell et al. (2005) compared three follow-up strategies as they relate to implementation of intervention plans following school consultations. Forty-five teachers implemented strategies for 45 students in six elementary schools. Participants were selected once teachers referred students for psychological intervention who were

experiencing academic or behavior difficulty. Then, 45 dyads (i.e., teacher-student) were created out of the participants.

Treatment integrity was the primary dependent variable used to compare the three follow-up strategies to consultation. Intervention plans were constructed for each student with an identified series of permanent products that would be scored each day to determine implementation accuracy.

A factorial analysis (i.e., 3-by-2 split-plot) was used to compare within participant factors involving of pre and post-treatment. The varying factors between the participants were levels of follow-up: (a) weekly follow-up, (b) weekly follow-up with a commitment emphasis, and (c) performance feedback (e.g., providing positive feedback, corrective feedback, importance of steps).

Analysis was conducted to examine time effects and the three levels of consultation on treatment integrity. ANOVA revealed that performance feedback had a significant main effect with higher treatment integrity. Time was also a main effect for treatment integrity. There was no difference between the other two consultation procedures.

Noell et al. (2005) concluded that this study provides support for performance feedback as it is used to improve treatment integrity. Substantially higher treatment integrity levels were observed following feedback on teachers' performance of the plans as compared to the other two consultation procedures, yet limitations were noted. First, a limited number of consultants were used, and second, would teachers respond similarly in different areas of the United States? Also, the performance feedback group had more contact in follow-up. Lastly, Noell et al. suggests that allowing teachers to mark their

own permanent products may have led to higher integrity scores. A line of future research would be to combine performance feedback with the other consultation models.

Kelleher, Riley-Tillman, and Power (2008) compared the outcome of a collaborative team approach to an expert determining assessment and intervention on the fidelity of implementation of a reading intervention associated with phonological awareness. In the partnership-based collaborative approach, consultants and teachers are observed as equivalent (Kelleher, Riley-Tillman, & Power, 2008).

The participants in the study were community partners (e.g., tutors) that had a personal relationship with students, a close proximity to the school or had personal interest in the students' success at the target school. Seven community partners (CPs) participated in the study, and all were African American woman that were aware of the study and its purpose to improve student reading through a specific reading intervention (e.g., skills associated with phonological awareness). Seven kindergarten students with low phonological awareness proficiency participated in two different schools. The two schools were 99% African American. Nearly 95% of the participants in both schools qualified for reduced or free breakfast and lunch programs.

The study involved two experiments that ran simultaneously, each in their respective schools. A multiple baseline across participants was used in each school to determine the results of a partnership-based intervention on treatment integrity. The community partners were trained to use the reading strategy (e.g., phonological awareness) using the traditional expert-driven consultation model. The second phase was an intervention used to improve treatment integrity by providing feedback. Lastly, CPs participated in the partnership-based model of consultation. In the other school, the initial

phase was the collaborative partnership, followed by the expert-driven model and lastly the CP was provided the intervention designed to improve treatment integrity. Checklists highlighted critical components of both experiments. Data collection was conducted independently using both direct observation and videotaping. All sessions were measured for integrity. Interrater observers coded for reliability during 30% of the sessions.

Visual analysis was completed once data were graphed. Effect sizes were calculated, although stable patterning was not achieved in the first phase of the first experiment.

Kelleher et al. (2008) concluded that the community partners' (CPs) involvement in design of intervention appears to have a positive effect over the expert-driven model. During the partnership phase, all CPs achieved higher levels of treatment integrity. However, several limitations were discussed, including treatment integrity variance caused by differences in the two intervention strategies. Another limitation was only using reading as the student learner outcome. A positive relationship between the CP and the student was expected but was not directly discussed during consultation.

Kelleher et al. (2008) suggest scaling up with more participants to further identify outcomes of collaborative partnerships. Another suggestion was to allow for more stable trends that would be helpful in determining internal validity.

Codding, Livanis, Pace, and Vaca (2008) explored the effects of using performance feedback, and specifically examined the role of observer reactivity when using direct observation techniques to measure treatment integrity. Three teachers participated in this study that was conducted in a self-contained classroom on a general education school campus. The classroom was located next to the psychologist's room that

had audio monitors and a one-way mirror allowing the observer to enter the room without being seen. The primary teacher had a graduate degree in special education while one aid had an undergraduate degree, and the other aid had nine years of experience. Six seventh grade students ranging in diagnoses (e.g., attention deficit, bipolar, conduct disorder, anxiety disorder) participated in the study.

The classroom had a behavior management plan that consisted of three general procedures: (a) a level system for students to earn positive reinforcement for rewards, (b) neutral statements that were to be used when students were not complying with requests, and (c) time-out. Data collection was collected on a 14 component measurement sheet where each component would be checked as either implemented as written, not implemented as written, or there was no opportunity to implement due to the situation in the classroom. Observations were 45-minutes in length with 50% of the observations behind the one-way glass.

A multiple baseline design across staff members utilizing an alternating treatment design was used to evaluate the effects of observer presence and observer absence. Performance feedback was only provided during the treatment phase while both observer-presence and observer-absence were both used across the study.

Codding, Livanis, Pace, and Vaca (2008) concluded that performance feedback leads to increases in implementation accuracy of a multi-component behavior intervention plan. The study also extended the application to a self-contained classroom to a general education campus. Codding et al. (2008) found that there was no difference between observer-presence and observer-absence during all phases of the study. Codding et al. (2008) suggested there were a few limitations, such as the observer-present and

observer-absent conditions were not independent, therefore carryover effects could have been present. Another limitation was that neither the observer nor the teachers were blind to the purpose of the study. When the teachers knew they were going to be observed it might have contributed to baselines that were variable and undifferentiated.

Some researchers have explored the use of multimedia (e.g., text, video, voice) for modeling intervention to improve treatment integrity. Digennaro-Reed, Coddington, Catania, and Maguire (2010) examined the results of video modeling and performance feedback on treatment integrity. Three teachers were recruited during their initial orientation at a school that provides residential services and educational services. Student participants had autism, traumatic brain injury or a related disability.

A concurrent baseline design across participants was used to evaluate the effects of individualized video modeling and individualized video modeling plus performance feedback on treatment integrity. The baseline consisted of intervention put in place following a descriptive functional assessment. Teachers were given a detailed written protocol outlining the steps of the intervention for their respective student. In the video model treatment phase prior to the observation period, each participant viewed the individualized instructional video that modeled the intervention. In the video model plus performance feedback phase, the experimenter provided verbal feedback about the prior session before watching the video model. During the video model, the experimenter would stop the video and prompt the participant to attend to the next segment due to errors of the previous session. A follow-up probe was conducted one week following intervention. The participants did not watch the video or receive any performance feedback.

Data collection on the percentage of intervention steps implemented accurately across phases was graphed to determine any change in level, trend or variability. Digennaro-Reed, Coddington, Catania, and Maguire (2010) concluded that video modeling with performance feedback resulted in even higher levels of treatment integrity. Several limitations existed such as participant reactivity to being observed. Second, not answering questions about intervention during baseline may have created a deprived environment compared to normal situations. Lastly, participants did not always view videos before the observations. An area for future research should be examining the duration period following the viewing of the models.

Behavior Intervention and Teacher Education

Many teachers believe they are not adequately trained to provide individualized behavior interventions (Garriott, Miller, & Snyder, 2003). The use of assessment, determining learning differences and planning are critical in determining intervention strategies using ethical tactics and collaborating with peers to ensure appropriate inclusion within the general education setting (Fallon, Zhang, & Kim, 2011). Today a variety of problematic and commonly experienced barriers exist prohibiting individualized behavior supports and interventions (Bambara, Goh, Kern, & Caskie, 2012).

Bambara, Goh, Kern, and Caskie (2012) conducted a study to examine the degree to which educators faced barriers and enablers, and surveyed their interpretive level of hindrance or support of individualized positive behavior interventions and supports (IPBIS) in schools.

Nearly three hundred professionals (i.e., teachers, behavior interventionists) participated in this study with experience implementing IPBIS.

Questionnaires were completed consisting of four parts. Part one was basic demographic information. Part two asked about experience and training. Specifically, they were asked if they had participated in a student-centered team. Parts three (barriers) and four (enablers) were lists of factors that could impact implementation of IPBIS in schools. Participants were asked to identify items as a barrier or enabler by checking either a box (e.g., yes or no) along with the level of impact by indicating on a four-point Likert-type scale.

Bambara, Goh, Kern, and Caskie (2012) identified trained individuals in IPBIS. The recruitment process began with identifying state level technical assistance teams who consult and train in their states. They sought three criteria: (a) maintained active training lists of at least three years, (b) willingness to provide contact information and (c) provided school training.

For barriers, each participant was asked about the level of experience with a barrier and to rate it on a scale. Respondents experienced all barriers listed. In School Practice: Culture and Beliefs, there were two barriers to implementing IPBIS: (a) school philosophy restricts inclusion, and (b) principals are not understood. Of the top 10 barriers, 80% of the respondents reported the barriers were either moderately or severely impacting the implementation of IPBIS. In the domain Administrative/Organizational Structure there were time related barriers: (a) insufficient time to implement, and (b) no time for staff to meet. In regards to the Administrative/Organizational Structure domain, five domains were among the overall top ten barriers: (a) basic principles not understood,

(b) resistance among personnel, (c) belief that behavior should be punished, (d) belief that students are better served segregated or in special schools, and (e) belief that intervention should result in quick reductions. Three barriers among the top ten were within the Professional Development domain: (a) limited training, (b) the amount of time required developing and implementing, and (c) unsatisfactory trained personnel.

For enablers, the respondents reported much fewer enablers than barriers. The most experienced enabler was that the team, family and professionals outside the school have a good working relationship, and the least experienced enabler was that the entire team understands basic principles.

The MANOVA results indicated that there was no difference between teachers and administrators in identifying barriers and their impact in all but one domain. There was a significant difference in belief in the domain of Professional Development and Practice. A post hoc analysis established contrasts of perceived impact between team members and team leaders.

Bambara, Goh, Kern, and Caskie (2012) concluded that barriers perceived to hinder the behavior intervention process the most were pervasive across the school experiences of the participants. The survey was conducted with a convenient sample. Also the respondents may have responded differently to the survey questions than intended. Lastly, the design of the survey did not reveal differential context variables with students with specific behavioral difficulties.

Simonsen, MacSuga, Fallon, and Sugai (2013) examined the efficacy of tally, count, and rate on self-monitoring to improve classroom management by teachers. Simonsen et al. also looked at the effect of no self-monitoring at all for comparison

purposes. Five female teachers volunteered for the study with experience ranging from 2 to 28 years.

All five of the teachers were certified in their area of instruction. One of the five teachers was a special education teacher. All teachers identified a time of day when classroom management was the most difficult. Fifteen minutes were selected each day for data collection and the focus of the intervention. The school was in the Northeastern portion of the United States. Approximately half of the student body was below proficiency level in reading, writing and math the year previous to the year the study took place. The majority of the students qualified for free or reduced-priced meals.

An alternating treatments design (Barlow, Nock, & Hersen, 2009) was used to compare baseline, alternating treatments, the optimal treatment for each individual teacher and a follow-up phase. The two options for a follow-up phase were dependent on being stable with either a clear trend upwards or downwards. Intervention condition order was randomly assigned. Conditions were rotated daily. Data collection was implemented for fifteen minutes per day over the length of the study.

Four alternating interventions of self-monitoring were examined. In the tally intervention, teachers were trained to tally the frequency of self-monitoring (e.g., post-it, clip board). During the count intervention, teachers were instructed to count the number of specific praises given with a counter that was held in the hand. During the rating intervention, each teacher estimated their performance at the end of the observation on a rating scale estimating the number of praises per minute during the observation. On their day off, no data was collected.

The optimal treatment phase was selected by determining the best intervention of self-monitoring, and continued the intervention associated with that teacher's optimal performance. Follow-up phases were daily, or weekly maintenance probes, updates and suggestions (e.g., feedback) depending on level and trend of the optimal treatment phase.

The systematic data observations (e.g., teacher praise rates) were visually analyzed. Standard deviations were determined. Teacher 1 showed increases across all conditions, with the count condition having the highest praise level. Teacher 1 showed a further increase in trend during the optimal phase, and then transitioned to the maintenance phase.

Teacher 2 showed variability across all conditions, so the count condition was selected because it was associated with high accuracy rates. Teacher 2 stayed in the count phase because of a continued variability throughout the optimal phase.

Teacher 3 demonstrated an immediate change in level in all alternating treatment conditions, but showed a decreasing trend across alternating treatment conditions. The tally condition was selected for the optimal phase due to the high praise rate. Teacher 3 continued to deliver a high specific praise rate, but continued to be variable with levels slightly lower than the alternating treatments phase. Since lower levels occurred, teacher 3 once again was given feedback on performance in follow-up sessions.

For Teacher 4, both tally and count phases had high levels of praise rates. Tally was selected for the optimal phase. The data in the optimal phase demonstrated an increase in rate, but then trended downward throughout phase. Feedback was provided due to the descending trend.

Teacher 5 demonstrated high levels for both count and tally during the alternating treatment phase. The count intervention was selected for the optimal performance phase. Data were variable, and follow-up phases resulted in performance feedback.

Simonsen et al. (2013) concluded that teachers maintained high levels of treatment integrity during all conditions, but praise rate recording was variable due to accuracy. The teachers' specific praise was higher than baseline, with no self-monitoring conditions with count and tally being the best. Teachers preferred the count strategy to the other strategies, and this may be a self-monitoring strategy that shows potential. Simonsen et al. concluded that an effective tool of self-monitoring could increase teachers' use of specific-praise. This study highlights the need for continued research in simple strategies that are evidenced based and can be easily used in the classroom.

Matheson and Shriver (2005) investigated the effects of effective command training with teachers with three students on academic engagement and following instructions. The three students had compliance that was judged to be substantially below that of their peers. All three student participants were boys, with two students in the second grade and the third being in the fourth grade. The three teacher participants were selected based upon the principal's recommendations. All teachers had less than five years of experience. The study took place in three general education classrooms. Each classroom was arranged in rows with instructions including lecture, independent seatwork, and small group work.

Participants were videotaped throughout the class period of either of reading or math. Each videotaped session was coded: (a) compliance, and (b) an academic behaviors/competing behaviors. A compliance code was given based on the type of

teacher command given (e.g., effective command, ineffective command), number of repetitions of the command, negative verbal response by the teacher, or verbal praise. For coding academic behaviors, the Mainstream Version of the Code for Instructional Structure and Student Academic Response (MS-CISSAR) taxonomy of the Eco-Behavioral Assessment Systems Software (EBASS: Greenwood et al., 1995) was used. A 15-second momentary time-sampling procedure was used to code academic engagement percentage.

Two different independent variables were taught to the teachers in two different training sessions. The first training session purposed to train teachers in effective commands. The second training taught teachers the use of effective commands and the use of verbal praise. Effective commands were taught. Teachers were trained to deliver praise contingent on compliance and verbal appropriateness. Written feedback was delivered to each teacher about effective command and what needed to change. Coaching continued until effective commands were 80% or greater on two consecutive observations. If the teachers' fidelity of implementation fell below 80%, coaching and corrective feedback were again implemented.

A multiple baseline across participants design was used. In phase 1 baseline data were collected on student compliance. Effective commands were phase 2, and phase 3 was effective commands and verbal praise. Results were visually analyzed comparing changes in level, trend and slope between baseline and intervention.

All three teachers had immediate changes in level once the effective commands phase began. Small decreases in fidelity of implementation of effective commands and effective commands with verbal praise triggered coaching sessions lasting no more than

two days for any of the teachers. Student compliance was considered stable during baseline before the onset of effective commands. Visually, none of the students had a remarkable step up in level from baseline, to effective command, to effective command with praise. All effect sizes indicated a moderate to good treatment effect.

Matheson and Shriver (2005) concluded that should teachers learn to provide commands that are useful to increase classroom compliance. However, limitations included small sample size, limited generalization to other students, and no generalization to others teachers' classrooms. There was no peer data collected to determine the level of peer improvement in compliance. The authors determined that if peer data had been collected, a peer comparison would assist in determining if teacher behavior changes affected the peers.

Duchaine, Jolivet, and Fredrick (2011) examined the effects of teacher coaching with written feedback to increase behavior specific praise statements (BSPS) by teachers within high school inclusive classrooms. Three teachers were selected to participate in three different ninth grade math classrooms. Two teachers were general education teachers and the third was a special education teacher.

Behavior specific praise statements (BSPS) and on-task behavior were measured for change across the study. Event recording was used to measure behavior specific praise statements across a 15-minute observation period. Momentary time sampling was used to measure on-task behavior with one-minute intervals across fifteen minutes. Fifteen students were randomly selected per one 15-min observation. Every minute another random student was selected and observed at a momentary time to determine if the student was on-task.

To examine the effects of coaching with written feedback, a multiple baseline design across teachers was used. Coaching was provided every third intervention session just before the session began. Teachers were reminded of the goal that was set on the number of BSPS to be delivered in the session. Written feedback was placed in an envelope after each session, regardless if there was coaching provided before the session.

Data were analyzed visually and by using descriptive statistics by comparing data across baseline, treatment, and maintenance of three different teachers. All three teachers demonstrated differences in the number of BSPS being provided in relation to their baselines (Teacher 1: baseline $M = 0$, intervention $M = 9.7$, maintenance $M = 9$), (Teacher 2: baseline $M = .33$, intervention $M = 8.5$, maintenance $M = 9.5$), and (Teacher 3: baseline $M = 0$, intervention $M = 3.75$, no maintenance data). Student on-task behavior showed no difference between baseline, intervention and maintenance.

Duchaine, Jolivette, and Fredrick (2011) concluded that teachers can learn from coaching when given specific performance feedback. However, several limitations of the study were discussed including the use of a momentary time sampling procedure that was not sensitive to changes across phases. Suggestions for future research include examining individual students using a shorter partial interval rather than a one-minute time sample.

Hill and Flores (2014) examined the effects of modeling for preservice teachers on how to perform specific procedures when providing positive behavior interventions and supports (PBIS) within a summer program using a reversal design. Twenty-six graduate and undergraduate level special education preservice teachers participated by enrolling in a university practicum summer program.

Fifty elementary students were being provided extended school year services by the preservice teachers. The students had a variety of developmental disabilities. Student participants were ages 3-11 years. The following eligibilities were serviced. Thirty students with the disability of autism, twelve students with developmental delay, five students with intellectual disabilities, one student with orthopedic impairment, one student with emotional disturbance, and one student with other health impairment.

A variety of teaching strategies were used including direct instruction, discrete trial teaching, manding interventions such as picture exchange systems, individualized working systems, and supporting students with a focus on the visual modality. Three levels of supports were utilized within the classrooms: (a) primary supports (e.g., clearly posted classroom rules, bulletin boards with desirable classroom behaviors posted, token economy tickets for students demonstrating appropriate behavior), (b) secondary supports (e.g., group activities and supports), and (c) tertiary plans.

Data were collected on three different dependent variables: (a) peer recognition, (b) peer satisfaction, and (c) frequency of positive statements shaping completion of work with students. A reversal design was implemented beginning and ending in the treatment phase. Throughout the study, teachers were taught to recognize their peers for the amount of positive comments delivered to students. Sticky notes were used in the shape of stars and placed in a bucket that the University supervisors would use for a drawing within the treatment phases of the study. The four stars were drawn daily and were exchanged for a variety of low-cost backup reinforcers the preservice teachers selected earlier from a preference assessment. During baseline, the preservice teachers themselves drew four stars and stapled them to a bulletin board for recognition. Intervention on the first day

consisted of modeling for the preservice teachers by the University staff with subsequent drawing and backup reinforcement delivery. Each phase of the study consisted of four days each.

The data were graphed and analyzed visually. The data suggests that the modeling and backup reinforcers quickly increased the teachers' use of positive reinforcing comments about students. When baseline was introduced, the writing of positive comments quickly reduced over the four days of baseline. Hill and Flores (2014) concluded that positive behavior supports, tokens, backup reinforcers, and corrective feedback combine to create a positive environment. Hill and Flores noted some limitations: limited intervention time, and the use of untrained teachers.

Multimedia Anchored-Instruction in Teacher Education

Anchored-instruction is a strategy used to instruct using video and sound based in the cognitive sciences (Cognition and Technology Group at Vanderbilt University, 1990). The anchor is video based and presents instructional strategies, modeling, or additional information encompassed within rich real-world examples (Beck, King, & Marshall, 2002; Brunvand & Fishman, 2007; Koehler, Yadav, Phillips, & Cavazos-Kottke, 2005). The anchor incorporates video that models and includes information broken down for the learner to create a catalyst for problem solving and potential generation of new understanding (Brandsford, Sherwood, Hasselbring, Kinzer, & Williams, 1990; Schwartz, Brophy, Lin, & Brandsford, 1999). Anchored-instruction allows the learner to access and build upon prior knowledge (Schwartz et al., 1999). The goal of anchored-instruction is the creation of a learning environment that facilitates accessing a new skill.

Anchored-Instruction for Teacher Education

Brunvand and Fishman (2007) examined how the availability of a variety of scaffolds (e.g., shadow effects, voice over, text, highlighting) could prompt specific content within video to guide individual attention towards important content. A sample of 41 preservice teachers was randomly drawn from three science methods classes offered at a Midwestern University. The sample was spread across three sections of the class with 12, 13 and 16 participants.

The first section was labeled the Non-Integrated Scaffolds (NIS) group because the videos that were assigned included scaffolds, but the scaffolds were not purposefully integrated within the video (e.g., static text summaries, teacher commentary). The next treatment group was the Integrated Scaffolds (IS) group because the scaffolds were specifically incorporated (e.g., hyperlinks, onscreen text, titles, voice-over). The third group was the comparison group that was structured like a traditional education course where students enacted during the entire investigation (e.g., no video).

Each group participated in a content lecture to review a specific science method to determine a baseline by having the participants respond to questions to complete an analysis of lesson plans. The baseline measure captured content knowledge (CK), pedagogical knowledge (PK), and pedagogical content knowledge (PCK) with regard to lever investigation methods. Twelve questions were developed from the three viewpoints. The questions were designed to assess specific teacher knowledge contained in the video. The post-treatment lesson plan analysis included all of the questions in the pretest and questions that focused explicitly on teaching strategies and student misconceptions during learning.

Video was taken from a fifth grade classroom of a teacher and students carrying out steps necessary for a science lever investigation. This video was later edited to the purpose of embedding scaffolds. Coding was established and compared to determine the effect of the availability of scaffolds on teacher learning. An analysis of variance was used with repeated measures to compare pre and posttest results within groups. The repeated measures ANOVA was used to determine that the groups differed significantly in regards to identified teaching strategies and student misconceptions. If there was significance, a Fisher's Exact test was computed or the Kruskal-Wallis test was used for comparing all three groups. The Mann-Whitney test was used to compare any two groups.

Brunvand and Fishman (2007) concluded that the integrated scaffolding group took more notes because of the integrated onscreen text prompts. There was no effect for the hyperlink scaffold within the IS group where 6 of the 13 participants in the IS group did not use a hyperlink at all. The change over time between the pre and posttest responses revealed that the IS group significantly recognized teaching strategies and misconceptions of students better than the other groups. This effect appears to be due to the scaffolds integrated for the IS participants. Integrating the teacher commentary within classroom practice video and modeling was more likely to prompt the IS participants to comment on teaching strategies in their notes. Brunvand and Fishman suggest that the placement of the onscreen prompt and commentary might have an impact on when participants stop to take notes. Furthermore, the authors suggest that scaffolds arranged in the current fashion could be successful in teaching preservice teachers about pedagogical concerns.

Brunvand and Fishman (2007) suggest a limitation of this study was a short duration for video use and data collection. Future research is suggested with longer video length and more extensive classroom observations.

In a related study examining the effects of media on preservice teachers, Koehler, Yadav, Phillips, and Cavazos-Kottke (2005) investigated the impact of two media (e.g., text, video) and varied types of stories on preservice teachers. Differences were compared between equivalent video and text versions and how participants were impacted. This investigation focused on identifying how text and video improve interaction levels with different content.

Eighty-four undergraduate students participated in the study. Seventy-one of the participants were female and thirteen were male. Four different types of stories were taken from their original video sources and used in the study: (a) a story of interest, (b) an informational/persuasion story, (c) a poetry reading, and (d) a lecture. The text versions were created as closely as possible to match the video. Instruments were surveys using Likert-type ratings, open-ended questions, and paragraph form responses to elicit how the students were impacted.

The participants completed the study from a computer. Participants were randomly assigned one of the 48 possible orders of the four story types with two of the stories being video and two of the stories being text.

The results indicated that student *interest engagement* was significant for the HUMAN INTEREST story and the COLLEGE story, and were more interesting than the POETRY and the LECTURE story according to a three-way ANOVA. In two of the four narratives (HUMAN INTEREST-COLLEGE), videos was rated as more engaging, but in

one video (Lecture), it was less engaging than what was strengthened by the ANOVA with a significant interaction (Media-Story). The result of the positive affect factor indicated that although the College narrative indicated high student engagement, it had a negative effect on the mood of the students in regards to both video and text. The main effect of media in regards to affect reveals no significant difference. The result of the *emotional engagement* factor indicated a significantly high emotional attachment to POETRY and significantly low *emotional engagement* to LECTURE. In regards to recalling information, no effect was noted, but for POETRY, there was a significant interaction effect.

Koehler, Yadav, Phillips, and Cavazos-Kottke (2005) concluded that video is not always effective. The benefit of video depends on the context of the story being conveyed. Koehler et al. suggest the relationship between attention and video is challenging to determine. Mood and affect were only influenced by POETRY. There were no differences in medium of presentation that significantly influenced the ability to summarize the stories. Video may be beneficial for encouraging emotional response and may impact students for longer periods of time.

Beck, King, and Marshall (2002) investigated the effects of a technology supported construction practice in observation (TSPO) on preservice teachers' observations of their mentor teachers. Sixty-two preservice teachers participated in either the technology supported group plus standard classroom placement observation, or the standard classroom placement observation only (control) group.

The control group experienced a traditional technology lab that consisted of standard applied activities, while the TSPO group experienced making their own

technology supported video cases and engaging in email discussions with the peers within their group. Each member of the TSPO group recorded classroom lessons of their mentor teacher and edited out specific sections that needed to be repeated and reviewed. Preservice teachers reviewed 2 to 7 minute sequences of video. Videocase makers included components of the lesson that represented features of teaching, learning, or understanding. Observational sections were included in the final versions of the edited tape (i.e., teacher strategies, learning, interactions with students, students interacting with each other, and standards).

Videocase makers (e.g., students in the TSPO group) viewed video of mentors and documented how the video was related to technology frames. Students were able to write their reflections of the video on computers with an onscreen box for the video. The TSPO group members were also assigned to an e-mail group to participate in discussions about experiences and coursework.

All participants in both the control group and the TSPO group completed the video clips with prompts to elicit responses. The purpose of the test was to determine effective elements observed in the videocases related to teaching.

Data analyses involved a series of two-tail t tests comparing the two groups. The data revealed a statistically significant difference between the TSPO condition and control condition on all three video tests. The results suggest that the preservice teachers that created videocases and changed their classroom observations outpaced their peers significantly. Beck, King, and Marshall (2002) concluded that videocase construction is effective when teaching preservice educators better understanding of teaching and learning.

There were several limitations to the study. First, practice effects may have had an effect on the videocase makers' performances. Video makers spent several lab sessions making their own videocases. Videocase makers may have had more cognitive processing due to the related group email discussions. Finally, the makers of the videos decided the selection and focus for analysis (e.g., learner autonomy). Future research should separate this variable by comparing one condition of videocase making to preservice teachers that videocases are provided for.

In a related study, Thomas, Hassaram, Rieth, and Soundara-Raghavan (2012) examined the effects of teachers' instructional changes on student outcomes when working collaboratively in a three-year university professional development between the university and teachers. The nonparametric Wilcoxon signed rank test was used to compare variables between baseline and treatment of single subjects. The exploratory analysis Spearman correlation coefficients for pairs of variables were also used to determine possible associations between variables.

Participants were eight middle-school language arts teachers ranging with experience from one to sixteen years. The school was in a semi-rural area in the United States.

The Instructional Activity Observation system created by the first researcher was used to collect data in duration and frequency per class period of the following variables: (a) teacher lecture duration, (b) discussion-large group, (c) discussion-small group, (d) technology level (i.e., computers), and (e) teacher/student question development levels. Teachers received professional development support that they sought themselves through one-on-one sessions with researchers. Outcomes of multimedia-anchored instruction on

observations were compared using the Wilcoxon signed rank test due to possible violations in the assumptions.

In regards to professional development, when using multimedia-anchored instruction, all teachers had a decrease in professional development use between baseline and intervention. Time increased using computers by 217% across all teachers. The time used in small group activities increased 1,044% ($Z = -2.52$, $p = .012$, $\alpha = .017$). There was also a change in the number of questions asked by teachers during large group discussions. The mean number of low-level questions asked by teachers was significantly different between baseline and intervention ($Z = -2.310$, $p = .021$, $\alpha = .025$). Students also asked more high-level questions. The mean number was significantly higher during the multimedia anchored-instruction phase ($Z = -2.666$, $p = .0008$, $\alpha = .01$).

Thomas, Hassaram, Rieth, and Soundara-Raghavan (2012) concluded that teachers change by using multimedia anchored-instruction in professional development to integrate technology into their teaching curriculum. Researchers also concluded that quality of questions change in small group instructions. Thomas et al. suggest a limitation of practice because of the level of support needed collaboratively to support implementation of anchored instruction. Administrators should also consider time and funding requirements to develop multimedia anchored-instruction.

Anchored-Instruction for Behavior Instruction

In the area of behavior interventions, video models and performance feedback have been used effectively to improve treatment integrity or fidelity of implementation (Digennaro-Reed, Coddington, Catania, & Maguire, 2010). In the area of improving teacher

identification of problem behaviors and their contexts, video-based case models have been used (Anderson, 2002).

Research indicates that the improvement in the fidelity of implementation of behavior intervention plans allows for appropriate progress monitoring and use of data based decisions within the school setting (Dunlap, et al, 2010; Iovannone et al., 2009). To date, the field needs specific evidence supporting the use of video models using multimedia anchored-instruction to improve the implementation fidelity of behavior intervention plans within the general education setting.

Summary

Teacher instructional effectiveness is often affected by problem, disruptive behavior (Bambara & Kern, 2005). Schools continue to primarily use reactive interventions that are not function based and do not necessarily teach a replacement behavior that promotes learning within the classroom (Sprague & Horner, 2006). The literature indicates that the use of proactive strategies, manipulation of antecedent variables, and the process of shaping new behavior are viable and effective approaches to dealing with disruptive classroom behavior (Allday & Pakurar, 2007; Armendariz & Umbreit, 1999; Carr et al., 1999; Cote, Thompson & McKerchar, 2005; Dunlap et al., 2010).

Researchers suggest planning for individualized behavior intervention plans must begin with a functional behavior assessment (FBA) (Bambara & Kern, 2005; Carr et al., 2002; Dunlap et al., 2010). Determining maintaining variables for disruptive classroom behavior allows teachers to systematically program proactive teaching strategies to

neutralize disruptions in the classroom (Sugai et al., 2000). Teachers have been successful in conducting functional assessments and choosing interventions that would teach replacement skill behavior (Dunlap et al., 2010).

Researchers found that performance feedback significantly improved treatment integrity of intervention components (Noell et al., 2005). When teachers were engaged in a collaborative approach model versus an expert-driven model, there appeared to be a higher level of treatment integrity and fidelity of implementation (Kelleher, Riley-Tillman, & Power, 2008). Using performance feedback leads to improvement in implementation accuracy of multi-component behavior intervention plans and demonstrates that there was no difference between observer-presence or observer-absence during the data collection process (Coddling, Livanis, Pace, & Vaca, 2008). Video modeling with performance feedback resulted in higher levels of fidelity of implementation (Digennario-Reed, Coddling, Catania, & Maguire, 2010).

According to the literature, many barriers exist in regards to appropriate implementation of behavior intervention plans on school campuses (e.g., philosophy restricts inclusion, insufficient time, basic principles not understood, interventions should result in quick reductions) (Bambara, Goh, Kern, & Caskie, 2012). Researchers found that most teachers believe that barriers are much greater than enablers (e.g., good working relationship between members of the team) (Bambara et al., 2012).

Based on the literature, there appears to be a need for additional research into multimedia anchored-instructions for teacher education. Researchers found that using a variety of scaffolds (e.g., shadow effects, voice over, text, highlighting) could prompt

content within video to guide individual attention to important content (Brunvand & Fishman, 2007).

This review suggests that research-based improvements in achieving higher levels of fidelity of implementation are necessary for progress monitoring of behavior intervention (Dunlap et al., 2010; Ionannone et al., 2009). Research has found that teachers' fidelity of implementation is affected by video models, coaching, and performance feedback (Digennario-Reed, Coddling, Catania, & Maguire, 2010; Hill & Flores, 2014). This study will investigate the effects of digital behavior intervention plans with multimedia anchored-instruction on teacher fidelity of implementation.

CHAPTER THREE

METHODOLOGY

Overview

The purpose of this study was to investigate the effects of multimedia anchored-instruction on the fidelity of implementation of behavior intervention plan components by general educators who are teaching students with disabilities. The focus was on improving the fidelity of implementation, teacher satisfaction, and child behavior. All teachers were taught the principles found in positive behavior support plans (Carr et al., 1999) using multimedia anchored-instruction (Thomas & Rieth, 2011). Hollingsworth (2005) found that video removes real-time constraints allowing teachers to revisit the video for better understanding of the material presented. Some research indicates that the use of video along with role-play and feedback can improve teacher fidelity of implementation and use of functional analysis with students (Digennario-Reed, Coddling, Catania, & Maguire, 2010; Wallace, Doney, Mintz-Resudek, & Tarbox, 2004). However, the use of video modeling using multimedia anchored-instruction to improve fidelity of implementation of behavior intervention plan components is absent from the literature (Thomas & Rieth, 2011).

This study examined the effects of multimedia anchored-instruction on teachers' fidelity of implementation in general education classrooms. This study also examined the effects of conditions on student desirable and undesirable behaviors. Students were video taped and reviewers scored behavior during the three conditions of the study (i.e., baseline, treatment, maintenance). Data were collected on teacher fidelity of implementation of the behavior plan components 10-minutes a day per teacher on a

consistent time basis during the study. Data from the baseline, treatment, and maintenance conditions were compared to determine differences. The participants of this study were teachers working with students for whom a behavior intervention plan (BIP) is necessary. One teacher and one student formed a dyad. Three dyads (teacher and a student) worked together throughout the study. A replication study took place simultaneously to the first study. The study was implemented in three phases: (a) pre-study, (b) treatment, and (c) maintenance.

Teachers were reminded prior to the start of the intervention phase on access the multimedia anchors of the behavior intervention plan frequently using an Apple iPad. All teachers were trained to access the multimedia anchored-instruction each morning before class. Teachers also received training on camera setup and use.

Research Questions

This research study was designed to address four questions. They were:

Research Question 1: Does a digital behavior intervention plan using multimedia anchored-instruction improve teacher fidelity of implementation of behavior change programs?

It was hypothesized that a digital behavior intervention plan would result in increased teacher fidelity of implementation.

Research Question 2: Do teachers using digital behavior intervention plans maintain high levels of teacher fidelity of implementation of behavior change programs two weeks after training has ended?

It was hypothesized that teachers would maintain a high level of fidelity of implementation two weeks after the conclusion of the study.

Research Question 3: Do students with disabilities improve in learning a targeted-replacement skill (i.e., increase desirable behavior and decrease undesirable behavior) following teacher implementation of a digital behavior intervention plan?

It was hypothesized that students would improve in the targeted replacement skill after teacher implementation of a digital behavior intervention plan.

Research Question 4: How satisfied are teachers using a digital behavior intervention plan with multimedia anchored-instruction while teaching students with disabilities?

It was hypothesized that teachers would have a high level of satisfaction when using the digital behavior intervention plan.

Participants

The teacher participants of this study and the replication study were six elementary general educators who work with students with disabilities in inclusive classrooms. Three teachers were selected to participate in the primary study and three teachers were selected to participate in a replication study that took place simultaneously. The educators were employed at a charter school in a southwestern city of the United States. Teachers who participated in the study signed an informed consent form (see Appendix A). Six students with an identified disability and receiving special education services also participated in this study. Parents of students in the study signed an

informed consent form agreeing to allow their child to participate (see Appendix B). In addition, each student signed an informed assent form to participate in the study (see Appendix C). The six teachers worked with one of the six students and formed six dyads (i.e., teacher and student). Each teacher worked with the same student throughout the study.

Teachers

Specific selection criteria were applied to identify the eligibility of the six teachers (see Table 1). All teachers were required to meet the following criteria to participate: (a) agreement to work one-on-one with students when needed within the general education classroom, (b) teach in an inclusive classroom, (c) teach students with disabilities, (d) have access to an Apple iPad with internet access both at school and home, (e) be a certified general education teacher, (f) agree to implement the digital behavior intervention plan intervention for the study, and (g) sign written consent to participate.

Students with Disabilities

There were six students who participated in this study (see Table 2). Each student was paired with their general education teacher to form six separate dyads that participated in the primary (three dyads) and replication studies (three dyads). The student participants were required to: (a) have an identified disability determined by the students' multidisciplinary team, (b) have undesirable behavior identified for remediation, (c) have a current behavior intervention program, (d) have parental agreement that their child needed behavior intervention (as indicated in the student's

Table 1
Demographics of Teachers

Teacher	Gender	Age	Education	Years Teaching	Grade Level
A	Female	30	M.A.	8	3
B	Female	29	B.A.	6	5
C	Female	38	B.A.	2	6
D	Female	32	M.A.	7	3
E	Male	29	M.A.	1	6
F	Female	40	B.A.	2	6

IEP), (e) have parental informed consent for their child to participate in the study, (f) have student assent to participate in the study, (g) be between the ages of 5-to-15 years old, (h) have a current Individualized Education Program (IEP), and (i) participate in a general education classroom for some portion of the school day. Parents of children signed an informed consent form (see Appendix B). Students signed an informed assent form (see Appendix C).

Consent. The consent forms were generated and delivered to schools, teachers, parents of students, and students. All other students in a class, who were not participating in the study, received a letter explaining the purpose of the study and acquired consent to be video taped. Students for whom consent was not obtained were placed in another area of the room for instructions in order to prevent the students from being video taped (see Appendix D).

Table 2
Demographics of Students

Student	Gender	Grade	Disability	Undesirable Behavior
A	Male	3	Health Impairment	Arguing, Tattling
B	Male	5	Emotional Disturbance	Not following directions
C	Male	6	Autism	Frequent questions
D	Male	3	Health Impairment	Attention off of teacher or instructional material
E	Male	6	Emotional Disturbance	Yelling and Arguing Crying unexpectedly
F	Male	6	Autism	Seeking inappropriate teacher or peer attention

Parents were assured that their child's participation was completely voluntary and that strict confidentiality would be kept concerning their identity. Parents were encouraged to ask questions about intervention strategies and components.

Setting

This study was conducted in one charter school in a southwestern city in the United States. The school is chartered by the state and is open to any student within the boundaries of the local school district that serves over 305,000 students. The school provides public education to students both with and without disabilities and is certified through the Northwest Association of Accredited Schools. The school's emphasis was on arts integration, increasing literacy, cognition, and social development. The school selected for this study represents the economic, cultural, ethnic, and linguistic diversity of the local school district and is thus open to all public elementary and middle school students. The principal provided an access agreement to conduct the study in the school (see Appendix E).

Classrooms

This study was conducted in six general education classrooms in which students with disabilities were included. Six licensed general education teachers participated in the study. The six educators were on one campus that provides general and special education services for kindergarten through ninth grade students. The school was selected based on availability, permission from the administration, and teacher need for intervention in the area of student disruptive behavior.

Teacher/student dyads were observed for the same 10-minute time period each day (i.e., approximately 12:25-12:35) during the baseline, treatment and maintenance probes of the study. All observation start times were within two minutes of the originally scheduled start time for each specific dyad (i.e., teacher-student pair). All classrooms had groups of four desks within which each individual student was situated to face another

desk, while being adjacent to another pair of facing desks, forming a cluster of four desks.

Materials

The digital behavior intervention plans (DBIP) incorporating multimedia anchored-instruction were developed using the AppleTM application FileMaker Go[®] and iMovieTM. The FileMaker Go application requires iOS 6.0 to operate and is designed for both iPad and iPhone. The treatment condition of this study required the downloading of the application FileMaker Go to each iPad in the study. The DBIPs were constructed using formative data received from behavioral interventionists, teachers, and an expert in the field of e-learning.

Digital Behavior Intervention Plan (Independent Variable)

The DBIPs with multimedia anchored instruction were constructed using FileMaker Pro[®], a digital format designed for the iPad. FileMaker Pro[®] is a digital authoring system that incorporates text, video, and sound overlay. The resulting DBIPs used multimedia and incorporated visual demonstrations, sound (voice-overs), and explanatory text. Screen shots are available within the appendices (see Appendix F).

The DBIPs used three screens, each with a separate intervention strategy (e.g., prevention, teaching, reinforcing). The DBIPs allowed teachers to move independently from one intervention screen to another, in any order. The individual screens contained a prevention strategy, a teaching strategy, or a reinforcement strategy that was broken down into a written task analysis. Teachers were able to watch each respective anchored-instructional video incorporating text, voice, and video that corresponded with either the

prevention, the teaching, or reinforcement section of the DBIP. Once a teacher opened up and began one of the videos, the teacher was required to watch the video in its entirety due to the design of the DBIP. A counter was programmed to count the number of visits to each page and the number of videos watched by the teacher. The teachers were not allowed to view the counters at any time during the studies. The DBIPs were designed using evidence-based guidelines to produce an e-learning environment that met human psychological learning requirements (Clark & Mayer, 2008).

Intervention categories. A task analysis approach was used to break down the teaching strategies into teachable components (Dunlap et al., 2010). This served as the basis of the e-learning design encompassing text, video, and audio (Clark & Mayer, 2008). Three intervention strategies were constructed (i.e., prevention, teaching, reinforcing) with each strategy being broken down into demonstration components.

The *preventative strategy* was used in the digital behavior intervention plan to change the environment in a way to prevent the disruptive behavior from happening. This strategy was broken down into four steps for the teacher to interpret and complete. Individualized multimedia anchored-instruction accompanied this section of the plan using video demonstration, text, and video-sectioned components corresponding to the itemized strategy components (see Appendix F).

The *teaching strategy* taught a functionally equivalent replacement skill. Video anchored-instruction was contained in this section of the plan with video demonstrations, text, and voice over stressing the core components of this strategy. This strategy was broken down into four steps for the teacher to interpret and complete (see Appendix G).

The *reinforcement strategy* was used to reinforce and shape the replacement skill identified for each student (i.e., desirable classroom behavior), and to reduce the delivery of reinforcement that may have been maintaining disruptive undesirable behavior. This strategy was necessary for the delivery of positive reinforcement to motivate on-task desirable behavior. A multimedia anchored-instructional component was contained in this section with a video demonstration, text, and voice over attached to the itemized strategy components. The use of voice over stressed the core components of the strategy (see Appendix H).

Formative evaluation. The beta version of the digital behavior intervention plan using multimedia anchored-instruction was developed for the purpose of formative evaluation in the study. The DBIP video anchored-instructions for the template were created with the use of a teacher model and a student model. Each signed a model release form (see Appendix I). An expert in e-learning instructional design reviewed the digital behavior intervention plan template with anchored-instruction for the purpose of providing design feedback. Revisions and modifications were made based on the expert's feedback.

Two experts in behavior intervention plans for students with disabilities reviewed the task analysis portion of the DBIP. Revisions and modifications were made to the intervention steps in each category of intervention (i.e., prevention strategy, teaching strategy, reinforcement strategy) based on the feedback using the software design questionnaire (see Appendix J). One general education second grade teacher reviewed the digital behavior intervention plan template for clarity of the instructional steps for each

intervention. After teacher feedback was provided using the software design questionnaire, changes were made to the material (see Appendix J).

Three interventionists, who were not participating in the study, were given a digital behavior intervention plan with multimedia anchored-instruction. After reviewing the software design questionnaire (see Appendix J), the number of steps per intervention category was reduced from eight to four-to-six components based on their input. After the technology design expert, the behavior expert, the general education teacher, and interventionists' formative evaluations (see Appendix J), the input was used to develop the final template of the digital behavior intervention plan using multimedia anchored-instruction (see Appendices F, G, and H).

Individualized digital behavior intervention plans. The individualized digital behavior intervention plans used in the study were consistent with positive behavior support practices derived through a functional behavior assessment process (Sugai & Horner, 2009). Each intervention strategy selected matched the results from the individual student's functional behavior assessment data and was implemented within the student's general education classroom.

Six digital behavior intervention plans with individualized video anchored instruction videos were created for the study and replication study. The digital behavior intervention plans were constructed based on the student participants' functional behavior assessment information and discussion with each individual general education teacher to help with interpretation if needed of each paper/pencil behavior intervention plan. Multimedia anchored-instruction was developed for each of the six individual behavior intervention plans, thus six individual digital behavior intervention plans were created for

the primary and replication studies. The researcher created video demonstrations with multimedia anchored-instruction for each of the individual student participants in the primary and replication studies (see Appendix K). The six student participants participated with the researcher in the development of each individualized DBIP with video anchored-instruction.

Cameras

Two cameras were used in each of the six classrooms for the purpose of recording teacher fidelity of implementation (see Appendix K) and subsequent student behavior (see Appendices L and M) during a fixed 10-minute interval recording time each day. One camera was used to record teacher behavior while the other camera focused on student behavior.

Apple iPad

Teachers read the individualized student digital behavior intervention plans using the Apple iPad Mini. Each iPad had a digital behavior intervention plan created and uploaded using FileMaker Go 13®.

Instrumentation (Dependent Variables)

Three instruments were used to evaluate teacher fidelity of implementation and student behavior. The fidelity of implementation measure was used to evaluate teacher fidelity of implementation of the behavior intervention plans (see Appendix K). Two instruments were used to record student behavior in the study: (a) a desirable student behavior recording form (see Appendix L), and (b) an undesirable student behavior

recording form (see Appendix M). The teachers completed a satisfaction questionnaire at the completion of the study (see Appendix N).

Teacher Fidelity of Implementation Measure

The teacher fidelity of implementation measure was used to determine the percentage of the implementation of the behavior intervention plan components during the baseline, treatment, and maintenance phases of the study (see Appendix K). The measure had twelve total steps that consisted of: (a) a four-step antecedent or prevention section, (b) a four-step teaching section, and (c) a four-step reinforcement strategy section. Each section of the plan had a corresponding task analyzed intervention for the purpose of prevention, teaching, or shaping alternative behavior. Event recording was used to score each BIP component as: (a) implemented as written, (b) not implemented as written (sometimes or never), or (c) no opportunity to implement the strategy (see Appendix K). Fidelity of implementation total scores were determined by taking the total number of steps independently implemented with their student divided by the total number of intervention steps possible (i.e., 12) x 100.

Teacher Fidelity Observer

A teacher fidelity observer was present in the class for 10-minutes each day to collect teacher fidelity of implementation. The teacher fidelity observer recorded data using the teacher fidelity of implementation form (see Appendix K). Video was also collected during the 10-minute observation for the purpose of interrater reliability.

Teacher Interrater Observer

The interrater observer recorded data from 33% of the teacher fidelity of implementation videos using the fidelity of implementation measure (see Appendix K).

Event recording was used to score each BIP component as: (a) implemented as written, (b) not implemented as written (sometimes or never), or (c) no opportunity to implement the strategy (see Appendix K). Interrater reliability scores were determined by $[\text{agreements}/(\text{agreements} + \text{disagreements}) \times 100 = \text{percent of agreement}]$ and were used to determine the level of reliability (Tawney & Gast, 1984).

Student Behavior Measures

The student behavior recording forms (i.e., desirable student behavior, undesirable student behavior) (see Appendix L and Appendix M) were used to document the individual student behavior change across baseline, treatment, and maintenance conditions. Data collection was at 10-second intervals over a 10-minute time period each day.

Desirable behavior. A whole interval recording system was used to record student desirable behavior during the baseline, treatment, and maintenance phases of the study (see Appendix L). An occurrence was scored for the interval if the student demonstrated desirable classroom behavior during the entire 10-second interval. Data collection was for 10-minutes each day thus a possible 60 occurrences of desirable behavior within a 10-minute observation period were possible. All other intervals were scored as non-occurrences. Occurrences and nonoccurrences of student desirable behavior were recorded during 10-second intervals for the duration of 10-minutes daily.

An interrater observer recorded data from 33% of each student's classroom videos to determine interrater reliability of desirable student behavior. Interval-by-interval agreement data were calculated $[\text{agreements}/(\text{agreements} + \text{disagreements}) \times 100 =$

percent of interval agreement] and were used to determine the level of reliability (Tawney & Gast, 1984).

Undesirable behavior. A partial interval recording system was used to record student engagement in undesirable behavior during the baseline, treatment, and maintenance phases of this study (see Appendix M). Students' engagement in an undesirable behavior at any point in the interval was scored as an occurrence, and a nonoccurrence was scored if the student did not engage in the defined behavior at any time during the interval. Occurrences and non-occurrences of the undesirable student behavior were recorded during 10-second intervals for the duration of 10-minutes daily.

Student Behavior Observer

A student behavior observer watched video of all daily student behavior on two different occurrences. On the first occurrence, the student behavior observer recorded data on desirable student behavior (see Appendix L). On the second occurrence, the student behavior observer recorded data on undesirable student behavior (see Appendix M).

Student Interrater Observer

An interrater observer recorded data from 33% of each student's classroom video to determine interrater reliability of undesirable student behavior. Interval-by-interval agreement data were calculated $[\text{agreements}/(\text{agreements} + \text{disagreements}) \times 100 = \text{percent of interval agreement}]$ and were used to determine the level of reliability (Tawney & Gast, 1984).

Digital Behavior Plan Satisfaction Questionnaire

The Behavior Intervention Satisfaction Questionnaire was adapted, with permission, from the *Treatment Acceptability Rating Form-Revised* (Reimers & Wacker, 1988) (see Appendix N). The Behavior Intervention Satisfaction Questionnaire was used to evaluate the level of satisfaction of the teachers with the digital behavior intervention plan (see Appendix O). The questionnaire was based on a five-point Likert scale with 1-being least satisfied and 5-being most satisfied.

Training

Teachers who participated in the study were trained to capitalize on the effects of a DBIP. Teachers were trained to understand the purpose of the functional behavior assessment process and the purpose of the behavior intervention plan. Teachers attended one training session prior to the implementation of the DBIP in the classroom. The training session was two hours in duration.

Accessing the iPad

To begin the training, the teachers were shown the DBIP template. This included: (a) how to manipulate the iPad, (b) how to access the DBIP, and (c) how to access the video anchors within the plan. Each teacher had his or her own iPad for the training and duration of the study. A half-hour was designated for iPad use and instruction on accessing the sample behavior plan and template. Teachers were required to demonstrate 100% accuracy of access and use of the iPad by the end of the session (see Appendix P).

Digital Behavior Intervention Plan (DBIP)

The six teachers were trained to implement the sample digital behavior intervention plan template (one that would not be used in the study.) An hour was designated for DBIP purpose and use. This included: (a) the purpose of functional assessment, (b) how attention to task is taught, (c) intervention plan description, and (d) purpose of the three individualized strategies (i.e., prevention, teaching replacement skill, reinforcement). The final 30-minutes was used for training the teachers to use and set up the video camera (see Appendix Q).

Interrater Reliability Observer

The interrater observer was recruited to observe both the teacher and the student videotapes to determine the level of interrater agreement for 33% of teacher and student participant behavior data. The interrater observer watched and rated behavior on video of both a teacher and a student. The interrater was trained and practiced until the interrater showed agreement established at 100% with the teacher observer trainer and the student observer trainer on all test videos. Agreement data were calculated by
$$[\text{agreements}/(\text{agreements} + \text{disagreements}) \times 100 = \text{percent of agreement}]$$
 and were used to determine the level of reliability (Tawney & Gast, 1984). The interrater observer randomly selected and watched 33% of the videotapes of students and 33% of the video tapes of teachers across all three conditions of the study in order to collect reliability checks on: (a) teacher fidelity of the behavior intervention, (b) student desirable behavior, and (c) student undesirable behavior.

Teacher fidelity of implementation. The interrater was trained to score fidelity of implementation steps. The interrater was trained to rate behavior and collect data using

the teacher fidelity of implementation measure (see Appendix K). The fidelity of implementation measure was marked as follows: (1) implemented as written, (2) not implemented as written (sometimes or never), and (3) no opportunity to observe (see Appendix K). The rater circled the corresponding number associated with the fidelity level of each component of the digital behavior intervention plan. Training continued until scoring on two consecutive sessions were 100% accurate.

Desirable student behavior. The interrater learned the definition of desirable student behavior for the purposes of visual identification and discrimination from the videos. The definition of desirable student behavior is when the student is sitting with his/her bottom touching the chair, body upright; eyes are looking at the teaching stimuli, teacher, and not talking out of turn. The definition of desirable student behavior was on the desirable student behavior recording form (see Appendix L). The interrater was taught to rate behavior using a whole interval recording strategy. The interrater was taught to determine if desirable behavior occurred and determine if the duration of the desirable behavior was the full 10-second interval. If the desirable student behavior duration was the full 10-second interval, then the interrater was taught to place a mark in the interval box to rate the occurrence of the behavior (see Appendix L). After the demonstration, the interrater was given opportunities to score desirable student behaviors by viewing practice videos. Training continued until scoring on two consecutive sessions was 80% or greater in interrater agreement. Cooper, Heron, and Heward (2007) suggested using an interval-by-interval calculation method. Agreement was calculated by $(\text{interval agreements} / (\text{interval agreements} + \text{interval disagreements}) \times 100 = \text{percent of scored interval agreement}$.

Undesirable student behavior. The interrater learned the definition of undesirable student behavior for the purpose of visual identification from the videos. The definition of undesirable student behavior is when the student is out of their seat, talking to another student, talking out of turn, grabbing material out of turn, grabbing material that is not theirs, touching other people, spitting, hitting, throwing material, or anything similar. The definition of undesirable student behavior was on the undesirable student behavior recording form (see Appendix M). The interrater was taught to identify if the undesirable behavior occurred at any time during the interval. If so, the interrater marked the interval by placing a mark in the interval box to rate the occurrence of the behavior. After the demonstration, the observer was given opportunities to score undesirable behaviors by viewing practice videos. Training continued until scoring on two consecutive sessions were 80% or greater in interrater agreement. Cooper, Heron, and Heward (2007) suggested using an interval-by-interval calculation method. Agreement was calculated by $(\text{interval agreements} / (\text{interval agreements} + \text{interval disagreements})) \times 100 = \text{percent of scored interval agreement}$.

Design and Procedures

A multiple-probe design across subjects (Horner & Baer, 1978) with one replication was used in this study. The design was used to evaluate the effects of digital behavior intervention plans on teacher fidelity of implementation, the acquisition of the replacement behavior by students (i.e., desirable student behavior), and the reduction of disruptive behavior by students (i.e., undesirable behavior). This study was conducted over an 8-week period and incorporated baseline, treatment, and maintenance conditions.

The following was included in the three phases of this study: (a) formative evaluation of the digital behavior intervention plans that incorporated multimedia anchored-instruction, (b) teacher selection and training, (c) teacher baseline-treatment-maintenance probes, (d) student baseline-intervention-maintenance probes, (e) interrater agreement, (f) teacher procedural fidelity, and (g) completion of the social validity measure.

In this multiple probe design, each teacher was matched with one student for the duration of the study. Three teacher-student dyads were formed for each respective study (i.e., primary study, replication study). Student data were collected during all three phases of the study (i.e., baseline condition, treatment condition, maintenance condition), but student data did not have criteria for the beginning of the next dyad to begin intervention and did not have mastery criteria for replacement skill behavior.

In this multiple probe design, after a series of continuous baseline probes were conducted, the independent variable (i.e., DBIP) was introduced to the first teacher in the two separate studies (e.g., primary, replication). The remaining teachers remained in baseline and received probe trials until a predetermined performance criterion of 80% adherence score was reached (Horner & Baer, 1978). When a teacher reached 80% adherence, the next teacher received an additional baseline probe before starting the treatment phase (e.g., use of the digital behavior intervention plan). The baseline probe trials in this study were conducted once per week for 10-minutes. Concurrent baseline probes provided information on teacher dependent variable levels prior to the implementation of the intervention.

The second teacher began intervention after receiving one additional baseline probe when the first teacher reached 80% criteria (i.e., 80% of the DBIP task analyzed

components) in each study (e.g., primary, replication). The first teachers remained in intervention until each teacher met criteria for mastery (i.e., 100% for three consecutive days). As the second teachers reached 80% criteria, the third teachers received one additional baseline probe and then began intervention on the following day. All three teachers responded to the baseline probes consistently (e.g., both studies with steady and stable baselines, improvement occurred only after intervention was introduced), therefore a demonstration of a functional relationship existed to establish internal validity (Barlow, Nock, & Hersen, 2009).

Phase One

The purpose of Phase One was to obtain school authorization by soliciting principals to authorize access to campuses to conduct the research. School and principal permission was received (see Appendix E), and university IRB permission was obtained. The six teachers were selected using nonprobability convenience sampling and randomized for the order of their participation within the study.

The teachers were selected from a pool of educators who had indicated high levels of problem behavior in their classroom (see Table 1). Once participants were selected for this study, approval was obtained through informed consent and assent forms for teachers, parents, and students (see Appendices A, B, and C). The teachers were randomly assigned to the primary or replication study as well as their order of receiving the intervention (e.g., A, B, C, D, E or F). The three teachers assigned A, B, and C participated in the primary study and the order of intervention implementation randomly assigned. The teachers who received D, E, and F participated in the replication study and their randomly assigned order. Teachers were placed either within the primary or

replication study by drawing names from a hat and placing them within the studies in the order they were drawn (i.e., the first name drawn was assigned A and placed in first position within the primary study, the second name drawn was assigned B and placed in second position within the primary study).

Phase Two

During Phase Two of the study, the digital plans were created based on the functional assessment data for each of the six student participants. The teacher's fidelity of implementation measure was constructed based on the strategies identified as a preventative strategy to help prevent undesirable behavior, a teach strategy to teach a replacement behavior for their respective student, and a reinforcement strategy to differentially reinforce behaviors appropriately.

Digital behavior intervention plans. The individual functional behavior assessments for the six students, for the purpose of DBIP development, were reviewed. Digital behavior intervention plan development was based on functional equivalency and used video anchored-instructions to outline the teaching of a replacement skill. The interventions used for all six students were based on their functional behavior assessment data and two board certified behavior analysts formatively evaluated subsequent task analyses of the interventions. All teachers reviewed the digital behavior intervention plan for their student daily before the intervention began. Teachers reviewed the digital behavior intervention plans each morning before the arrival of students and when necessary to improve fidelity. Each digital behavior intervention plan had three components: (a) an antecedent or preventive strategy, (b) a teaching strategy, and (c) a reinforcement strategy.

Teacher fidelity of implementation measure. The fidelity of implementation measure (see Appendix K) was developed individually for each teacher-student dyad by selecting a needed intervention for each component of the plan: (a) a prevention strategy, (b) a teaching strategy, and (c) a reinforcement strategy. For each component of the plan (e.g., prevention, teaching, reinforcing), a task analysis was developed outlining the needed steps to implement the intervention within the general education classroom. Fidelity of implementation measures were developed using the individual intervention task analyses for the purpose of data collection. Baseline probes were taken on each teacher's current level of intervention components used (see Appendix K), and the student frequency of desirable behavior and undesirable student behavior was collected (see Appendices L and M). Teachers were videotaped for the purpose of reliability. A fidelity checker measured fidelity from the video, and the data were used for interrater agreement.

Phase Three

Phase Three of the study took place over the course of 6 weeks. This phase consisted of baseline, intervention, and maintenance probes using a multiple baseline across subjects design with one replication (Barlow, Nock, & Hersen, 2009) (see Appendix R).

Three teachers participated in the primary study, and another three teachers participated in the replication study to demonstrate external validity by demonstrating an intersubject direct replication that maintains all aspects of a similar study with similar subjects (Cooper, Heron, & Heward, 2007). Each educator in the primary study and replication study was observed directly in his or her classroom for 10-minutes per day.

The time of day for the observation was consistent throughout the baseline, treatment, and maintenance conditions. The observations focused on the prevent intervention, the teach intervention, and the reinforce intervention procedures as outlined in each individual student's digital behavior intervention plan. Fidelity of implementation scores were determined at the end of each 10-minute observation daily across the conditions, and only percentage of implementation feedback was provided to each teacher.

The teacher-student dyad interactions were videotaped for 10-minutes per day, five times per week during the intervention phase. The time of day was consistent throughout baseline, treatment, and maintenance conditions. The following data were collected during this time: (a) fidelity of implementation of the digital behavior intervention plan, (b) percentage of occurrence of student desirable classroom behavior, and (c) percentage of occurrence of student undesirable classroom behavior.

Baseline condition. The multiple probes across subjects began with Teacher A, Teacher B, and Teacher C in the primary study, and Teacher D, Teacher E, and Teacher F in the replication study. All teachers received baseline probes on fidelity of implementation of the interventions based on the individual dyad's (e.g., teacher and student) current paper/pencil behavior intervention plan used prior to the onset of this study (see Appendix K). All students received interventions that were based on their paper/pencil behavior intervention plans consistent with the current teacher intervention protocol. Baseline criterion performance of teacher fidelity of implementation was set at a minimum of three data points with no more than 20% variability, with stability in trends and level prior to the beginning of treatment (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005).

Teachers A and D began treatment each in their respective studies (e.g., primary, replication) independent of each other. The use of the digital behavior intervention plan (DBIP) began once a steady, stable baseline was established. When Teacher A reached 80% criterion level, Teacher B received one more baseline probe before beginning to use the DBIP the following day. When Teacher D reached the adherence level criterion of 80% in the replication study, Teacher E received one more baseline probe before beginning to use the DBIP the following day. Teachers C and F began using the DBIP once Teachers B and D reached criterion level of adherence and had received one more baseline probe.

Baseline probes for Students A, B, and C within the primary study, and Students D, E, and F were collected during the same 10-minute observation period daily with each of their respective teachers. When Teacher A was being observed live for levels of fidelity of implementation (see Appendix K), Student A was video taped to score later for both desirable (see Appendix L) and undesirable behavior (see Appendix M). Each teacher was video taped for interrater reliability.

Two studies were in process simultaneously (i.e., primary, replication). The primary study consisted of Teachers A, B, and C, while the replication study consisted of Teachers D, E, and F. These studies were completely independent of each other.

Treatment condition. Teachers were given an Apple iPad with a digital behavior intervention plan using multimedia anchored-instruction designed for their specific student (Thomas & Rieth, 2011). The teachers were required to review the plan at least daily, but were initially encouraged to access the plan whenever possible or until feedback on their percentage of occurrence was at least 80% when using the DBIP. The

teachers were given preventative (see Appendix F), teaching replacement skill (see Appendix G), and reinforcement (see Appendix H) strategies for their student.

Multimedia anchored-instruction (Mayer, 2003) descriptions of procedures were used to model and teach the systematic intervention components using video, text, and voice over outlining and modeling the appropriate strategy implementation with their student.

Teachers were allowed to move from intervention strategy to intervention strategy at their own pace (e.g., prevention to reinforcement, reinforcement to prevention). Once a teacher began to watch a specific video of multimedia anchored-instruction, the program would not allow them to leave that anchor until the end of that particular video.

Maintenance condition. Two weeks following the completion of the treatment condition, a maintenance probe was given to determine the extent of the mastery of the behavior interventions (i.e., fidelity of implementation) and the two levels of student behavior (i.e. desirable student behavior, undesirable student behavior). These probes determined the extent to which participants maintained levels of implementation and behavior change following the completion of the daily probes. Maintenance probes were for one 10-minute interval two weeks following the end of intervention for each teacher-student dyad.

Social validity. Finally, to assess social validity of the study, teacher participants filled out the *Digital Behavior Plan Satisfaction Questionnaire*. The importance of intervention effect to the participants is legitimized through social validity (Wolf, 1978). The questionnaire consists of 14 questions designed to measure the teacher participants' level of satisfaction with the digital behavior intervention plans with multimedia

anchored-instruction. The participants rated each question on a scale from 1 to 5 (see Appendix N).

Treatment of Data

Data from the baseline, treatment intervention, and maintenance probes was used to answer research questions. Frequency data of target behavior of students was used to determine effectiveness of the intervention on student behavior.

Visual Analysis of Teacher and Student Data

Visual analysis of the teachers' fidelity of implementation of the intervention strategies determined the effects of the Digital Behavior Intervention Plans. Each teacher's percentage of implementation, student's percentage of occurrence of desirable behaviors, and percentage of occurrence of undesirable behaviors was graphed and assessed for changes in level, trend, and slope to determine the effectiveness of the intervention. Level refers to the mean change in performance on the dependent variable from the first condition (baseline) to the second condition (intervention), and finally to the third condition (maintenance). Trend refers to the 'best-fit' straight line of the dependent variable data points. An increase in the slope of this line indicates intervention success. Little variability is expected along the best-fit line in the treatment phase. If the intervention is successful, a steady increase in slope should be observed with little variability around the best-fit line.

Replication of this study was demonstrated by using an additional multiple probe design across teachers (i.e., three teacher-student dyads). External validity was

strengthened by observation of an increase in the fidelity of implementation of the teachers. Excel software was used to create dynamic display line graphs for this study.

Percentage of Non-overlapping Data

When determining a difference between baseline and treatment, the percentage of non-overlapping data (PND) was used. The PND is a calculation of non-overlapping data between baseline and successive intervention phases (Scruggs, Mastropieri, & Casto, 1987). The identification of the highest data point in baseline of each teacher and student was compared to all of the intervention data that is higher in level in the treatment phases of all respective teachers and students. The higher the percentage of non-overlapping data implies the effectiveness of the treatment and could be considered an effect size in single subject design.

Research Question Data Sets

Research Question 1: Does a digital behavior intervention plan using multimedia anchored-instruction improve teacher fidelity of implementation of behavior change programs?

The data set that was obtained for this question was the fidelity of implementation probes given throughout the study.

Analysis: Both visual analysis (i.e., Baseline Logic) and percentage of overlapping data were used to analyze the data set.

Research Question 2: Do teachers using digital behavior intervention plans maintain high levels of teacher fidelity of implementation of behavior change programs two weeks after training has ended?

The data set that was obtained for this question was the fidelity of implementation probes given during the maintenance probe at the end of the study.

Analysis: Visual analysis was used to determine change in level between the intervention and maintenance conditions.

Research Question 3: Do students with disabilities improve in learning a replacement-targeted skill (i.e., increase desirable behavior and decrease undesirable behavior) following the teacher implementation of a digital behavior intervention plan?

This data were obtained for this question by scoring the number of intervals of targeted behavior during 10-minute daily video samples across the phases of this study.

Analysis: Both visual analysis (i.e., Baseline Logic) and percentage of overlapping data were used to analyze the data set. The Percentage of Nonoverlapping Data was calculated between the baseline conditions and treatment conditions for each student on both desirable behavior and undesirable behavior.

Research Question 4: How satisfied are teachers using a digital behavior intervention plan with multimedia anchored-instruction while teaching students with disabilities?

At the end of the study, teachers completed the Digital Behavior Intervention Plan Questionnaire.

Analysis: Data obtained from the survey was analyzed by determining the mean per question of all the teachers to determine individual differences as well as account for variability within the study. Descriptive data were charted.

CHAPTER FOUR

RESULTS

The purpose of this study was to investigate the effects of multimedia anchored-instruction on teacher implementation fidelity of behavior intervention plan components. Data were collected to answer four research questions related to the participants' ability to learn from multimedia anchored-instruction video models demonstrating and anchoring to behavior intervention plan components and the effect the teachers' learning had on their students. In addition, data were collected on teachers' satisfaction levels in relation to their digital behavior intervention plan utilizing multimedia anchored-instruction. The first section of the chapter provides an overview of the intervention used, measure development, and collected data following the parameters of the multiple probe design. Second, the chapter provides the results related to each of the four research questions. Third, Interrater reliability and fidelity of treatment data are provided. Lastly, the chapter concludes with a summary of the results obtained in the study.

Overview

According to the parameters of the multiple probe design, data collections were staggered (Horner & Baer, 1978). Six teacher participants, each with one student participant (i.e., teacher-student dyad), were arranged with three teacher-student dyads in the primary study and three teacher-student dyads within the replication study. Research began with both studies running concurrently. The second study was used to increase external validity (Barlow, Nock & Hersen, 2009). Teachers were randomly selected and assigned by drawing names from a hat and assigning a letter and thus order within either

the primary study or replication study (e.g., Teacher A, Teacher B, Teacher C, Teacher D, Teacher E, Teacher F). Teacher performance and student desirable and undesirable behaviors related to baseline, intervention (i.e., digital behavior intervention plan utilizing multimedia anchored-instruction), and maintenance are displayed in figures 1 and 2. Teacher and student results are discussed in greater detail related to the research questions in this study.

Teacher Fidelity of Implementation Measure

The teacher fidelity of implementation measure was developed for each teacher-student dyad by reviewing each behavior intervention plan with the regular education teacher and clarifying intervention for three components of the plan: (a) an antecedent manipulation or prevention component, (b) a strategy to teach a replacement skill, and (c) a strategy to reinforce student behavior. Although each plan had components of intervention, none of the behavior intervention plans outlined proactive teaching steps for the teachers. Task analyses were developed outlining the teacher steps needed to perform the interventions currently designed in each behavior intervention plan. The intervention selected for each dyad was based on their current paper/pencil behavior intervention plan. Each plan needed a task analysis detailing instruction for preventing difficult classroom behavior, teaching a replacement skill to the student and reinforcing the student when engaging in a replacement behavior. Two board certified behavior analysts formatively evaluated the 12-step task analysis that was used in each behavior plan. Feedback was collected and changes were made to improve teacher understanding and improve feasibility of each component of the intervention.

Digital Behavior Intervention Plans

The six individual functional behavior assessments were reviewed with the general education teacher for the purpose of creating a digital behavior intervention plan using multimedia anchored-instruction for the study and replication study. Multimedia anchored instruction was created digitally for each of the six individual behavior intervention plans. Video was taken of the researcher demonstrating each step of the task analysis for each respective student participant. Video was broken down using the program iMovie to (a) embed voice over to describe the step, (b) visually write the step in text, and then (c) the researcher demonstrated the use of the step with the student participant as a model for the teachers. Each of the 12-steps were broken down to establish 12 video-anchors using multimedia.

Baseline Condition

The multiple probe across subjects began with Teacher A, Teacher B, and Teacher C in the primary study and Teacher D, Teacher E, and Teacher F in the replication study beginning baseline. All teachers received baseline probes on fidelity of implementation of the current intervention level using the established paper/pencil behavior intervention plan used prior to the onset of the intervention phase of the study. All students in baseline received intervention that was consistent with the current intervention protocol designed to prevent disruptive behavior, teach more appropriate behaviors and reinforce desirable behavior in the classroom. The first two teachers in each of the respective studies were observed daily, while the second and third teachers in each study received baseline probes weekly. Stability on the fidelity of implementation measure was used to determine the teachers' level of fidelity of implementation of the

paper/pencil behavior intervention plans. All six teachers demonstrated relative stability during baseline.

Intervention Condition

Teachers A and D began the intervention phase of the study by receiving the digital behavior intervention plan with multimedia anchored-instructions on the same day (see Figure 1, see also Figure 2). Teacher B, Teacher C, Teacher E and Teacher F continued to receive baseline probes once per week. When Teacher A or Teacher D attained criterion of 80% accuracy of fidelity of implementation of the multimedia anchored-instruction components, the next respective teacher started. When Teacher B or Teacher E attained 80% criterion, then the last respective teacher began the intervention phase of each respective studies (e.g., primary, replication).

Multimedia anchored-instruction behavior intervention plans used the 12-step task analysis with video anchors for each step of the plan. The digital plan consisted of a prevention or antecedent approach with four steps. The teaching components consisted of four steps to teach a replacement skill that would end up with the same reinforcement as the disruptive classroom behavior. Finally, the last four steps of the task analysis broke down the steps necessary to reinforce and shape new behaviors within the classroom.

Figure 1. Primary Study Teacher-Student Dyads. Percentage of Occurrence by Teacher-Student participant Dyads A, B, and C. *Note.* ■ = Teacher Fidelity of Implementation, ○ = Desirable Behavior, △ = Undesirable Behavior. TS = Teacher-Student Dyad; BL = Baseline; DBIP = Digital Behavior Intervention Plan; M = Maintenance.

Figure 2. Replication Study Teacher-Student Dyads. Percentage of Occurrence by Teacher-Student participant dyads D, E, and F. Note. ■ = Teacher Fidelity of Implementation, ○ = Desirable Behavior, △ = Undesirable Behavior. TS = Teacher-Student Dyad; BL = Baseline; DBIP = Digital Behavior Intervention Plan; M = Maintenance.

Research Questions and Related Findings

The purpose of this study was to examine the effects of multimedia anchored-instruction on teacher fidelity of implementation of behavior intervention plan components. Student's desirable and undesirable behaviors were also examined to determine effects following any teacher fidelity of implementation change.

Research Question 1

Does a digital behavior intervention plan improve teacher fidelity of implementation of behavior change programs?

One data set was used to answer this question. The data were obtained from the digital behavior intervention using multimedia anchored-instruction probes (i.e., teacher fidelity of implementation probes) given throughout the study. All six participants were able to reach mastery performance using the digital behavior intervention plan using multimedia anchored-instruction. It took teacher participants between four and nine sessions to reach the prescribed mastery level fidelity of implementation during the intervention phases of the primary and replication studies. A mastery probe was given to each teacher-student dyad two weeks following the intervention phase. During the two periods between intervention and mastery probes, teachers were allowed to keep their digital behavior intervention plans, rather than removing them. Overall, by using the characteristics of Baseline Logic (Cooper, Heron, & Heward, 2007), a functional relationship exists between DBIPs with multimedia anchored-instruction and improvement in teacher fidelity of implementation.

Primary study. Three teacher-student dyads were arranged in the primary study. The primary and replication studies ran concurrently and separately.

Teacher A. Baseline probes for Teacher A on the fidelity of implementation of the paper/pencil behavior intervention plan were 17%, 8%, and 17%. Intervention probes after the implementation of the digital behavior intervention plan with multimedia anchored-instruction phase were 83%, 92%, 100%, 100%, and 100% (see Table 3). Visual analysis of data indicated that the level of fidelity of implementation increased significantly from baseline condition to the intervention condition (see Figure 1). With regard to trend, scores for Teacher A revealed an immediate level increase with a steady ascending trend towards 100% mastery for three consecutive days.

After visual inspection, visually identifying the highest point in baseline and determining the percentage of data points during intervention exceeding the highest baseline level calculated Percentage of Nonoverlapping Data (PND) (Scruggs, Mastropieri, & Casto, 1987). In the treatment condition, 100% of the data points were improved above baseline.

Teacher B. Baseline scores for Teacher B on the fidelity of implementation of the paper/pencil behavior intervention plan were 8%, 17%, and 8%. Intervention probes after the implementation of the digital behavior intervention plan with multimedia anchored-instruction phase were 58%, 92%, 92%, 100%, 100%, and 100% (see Table 3). Data indicated that the level of fidelity of implementation increased significantly from baseline condition to the intervention condition (see Figure 1). With regard to trend and variability, scores for Teacher B revealed an immediate level increase with a steady ascending trend towards 100% mastery for three consecutive days.

After visual inspection, visually identifying the highest point in baseline and determining the percentage of data points during intervention exceeding the highest

baseline level calculated Percentage of Nonoverlapping Data (PND) (Scruggs, Mastropieri, & Casto, 1987). In the treatment condition, 100% of the data points were improved above baseline.

Teacher C. Baseline scores for Teacher C on the fidelity of implementation of the paper/pencil behavior intervention plan were 8%, 8%, and 0%. Intervention probes after the implementation of the digital behavior intervention plan with multimedia anchored-instruction phase were 50%, 75%, 80%, 100%, 100%, and 100% (see Table 3). Visual analysis of data indicated that the level of fidelity of implementation increased from baseline condition to the intervention condition (see Figure 1). With regard to level, trend and variability, scores for Teacher C revealed an immediate level increase with a steady ascending trend towards 100% mastery for three consecutive days.

After visual inspection, visually identifying the highest point in baseline and determining the percentage of data points during intervention exceeding the highest baseline level calculated Percentage of Nonoverlapping Data (PND) (Scruggs, Mastropieri, & Casto, 1987). In the treatment condition, 100% of the data points were improved above baseline.

Baseline logic was used for the purpose of determining a functional relationship between the intervention and changes in teacher fidelity of implementation. Three elements were used: (a) prediction, (b) verification, and (c) replication. It is predicted that once Teacher A's baseline data were stable, Teacher A would begin intervention. During Teacher A's intervention, Teachers B and C would continue in baseline (see Figure 1).

Table 3

Primary Study Teachers' Fidelity of Implementation. Percentage Scores for Baseline, Digital Behavior Intervention Plan (DBIP), and Maintenance Fidelity of Implementation Probe (FIP)

Teachers	Baseline <i>FIP</i>	DBIP <i>FIP</i>	Maintenance <i>FIP</i>
Teacher A	17%, 8%, 17%	83%, 92%, 100%, 100%, 100%	100%
Teacher B	8%, 17%, 8%	58%, 92%, 92%, 100%, 100%, 100%	100%
Teacher C	8%, 8%, 0%	50%, 75%, 80%, 100%, 100%, 100%	75%

This prediction was then verified that Teachers B and C would have stayed at prior baseline levels without the introduction of the intervention. Both Teacher B and Teacher C demonstrated replications of effect once the interventions were introduced.

Replication study. The replication study ran concurrently to the primary study. The second study was used to further increase external validity from the primary study alone.

Teacher D. Baseline probes for Teacher D on the fidelity of implementation of the paper/pencil behavior intervention plan were 17%, 8%, and 17%. Intervention probes after the implementations of the digital behavior intervention plan with multimedia anchored-instruction phase were 83%, 100%, 100%, and 100% (see Table 4). Visual analysis of data indicated that the level of fidelity of implementation increased significantly from baseline condition to the intervention condition (see Figure 2). With

regard to trend, scores for Teacher D revealed an immediate level increase with a steady ascending trend towards 100% mastery for three consecutive days.

After visual inspection, visually identifying the highest point in baseline and determining the percentage of data points during intervention exceeding the highest baseline level calculated Percentage of Nonoverlapping Data (PND) (Scruggs, Mastropieri, & Casto, 1987). In the treatment condition, 100% of the data points were improved above baseline.

Teacher E. Baseline probes for Teacher E on the fidelity of implementation of the paper/pencil behavior intervention plan were 8%, 17% and 8%. Intervention probes after the implementation of the digital behavior intervention plan with multimedia anchored-instruction phase were 67%, 25%, 58%, 80, 75%, 100%, 100%, and 100% (see Table 4). Visual analysis of data indicated that the level of fidelity of implementation increased significantly from the baseline condition to the intervention condition (see Figure 2). With regard to trend and variability, scores for Teacher E revealed an immediate level increase with variability ascending trend towards 100% mastery for three consecutive days.

After visual inspection, visually identifying the highest point in baseline and determining the percentage of data points during intervention exceeding the highest baseline level calculated Percentage of Nonoverlapping Data (PND) (Scruggs, Mastropieri, & Casto, 1987). In the treatment condition, 100% of the data points were improved above baseline.

Teacher F. Baseline probes for Teacher F on the fidelity of implementation of the paper/pencil behavior intervention plan were 8%, 8%, and 8%. Intervention probes after

the implementation of the digital behavior intervention plan with multimedia anchored-instruction phase were 75%, 91%, 100%, 100%, and 100% (see Table 4). Visual analysis of data indicated that the level of fidelity of implementation increased significantly from baseline condition to the intervention condition (see Figure 2). With regard to trend and variability, scores for Teacher F revealed an immediate level increase with a steady ascending trend towards 100% mastery for three consecutive days.

After visual inspection, visually identifying the highest point in baseline and determining the percentage of data points during intervention exceeding the highest baseline level calculated Percentage of Nonoverlapping Data (PND) (Scruggs, Mastropieri, & Casto, 1987). In the treatment condition, 100% of the data points were improved above baseline.

Baseline logic was used for the purpose of determining a functional relationship between the intervention and changes in teacher fidelity of implementation. Three elements were used: (a) prediction, (b) verification, and (c) replication. It is predicted that Teacher's baseline data would increase above baseline trends only after the introduction of the intervention (see Figure 2). During Teacher D's intervention, Teachers E and F continued in baseline and remained steady. The prediction of steady states during baselines was verified by Teachers E and F and stayed at baseline until the introduction of the intervention. Both Teacher E and Teacher F demonstrated replications of effect once the interventions were introduced.

Interrater reliability. Interrater agreement on teachers' fidelity of implementation was gathered for 33% of the sessions across the primary and replication studies. The researcher scored all the teacher fidelity of implementation measures with

in-vivo scoring. To determine interrater reliability, the interrater observed 33% of the teacher fidelity of implementation probes across baseline, and treatment phases of the study. Results of interrater agreement yielded 98% agreement between observers (range 90% to 100%). Interrater agreement results for teachers' fidelity of implementation are shown in Table 7.

Research Question 2

Do teachers using digital behavior intervention plans maintain high levels of teacher fidelity of implementation of behavior change programs two week after training has ended?

One data set was used to answer this question. The data set was obtained from the intervention and maintenance probes given to each teacher participant during the maintenance probe. The last mastery probes were compared to the maintenance probes for each of the six respective teachers. All six participants reached mastery performance using the digital behavior intervention plans using multimedia anchored-instruction. All six teachers were told to keep the iPad with the digital plan and watch the video anchors if they saw fit and to use it any way they would like. It was felt that it would be unethical to completely pull the tool from the teacher participants, since programmatic drift is so prevalent in behavior intervention (Dunlap et al., 2010). Built-in counters were installed in each iPad to count the individual teacher movements within the digital behavior intervention plan. For example, if the teacher reviewed the antecedent-prevention portion of the plan, the counter would collect that information with a time stamp. Frequency counts of individual digital behavior plan use will be discussed later in the chapter.

Table 4

Replication Study Teachers' Fidelity of Implementation. Percentage Scores for Baseline, Digital Behavior Intervention Plan (DBIP), and Maintenance Fidelity of Implementation Probe (FIP)

Teachers	Baseline <i>FIP</i>	DBIP <i>FIP</i>	Maintenance <i>FIP</i>
Teacher D	17%, 8%, 17%	83%, 100%, 100%, 100%	100%
Teacher E	8%, 17%, 8%	67%, 25%, 58%, 80%, 75%, 100%, 100%, 100%	91%
Teacher F	8%, 8%, 8%	75%, 91%, 100%, 100%, 100%	92%

Primary Study. Teachers A, B, and C in the Primary study all received one maintenance probe on the fidelity of implementation of the digital behavior intervention plan with multimedia anchored-instruction. Two weeks following the last mastery probe of the intervention for each teacher participant, a maintenance probe was given to each of the teacher participants to determine the level of sustainability of the teachers' fidelity of implementation of the 12-step intervention. Teacher's A, and B obtained a maintenance probe and fidelity of implementation score of 100% (see Table 3). Teacher C obtained a maintenance probe score of 75%. Visual analysis of the data indicated that Teachers A and B sustained mastery levels of fidelity of implementation two weeks following the intervention phase, while Teacher C had a slight drop in fidelity of implementation (see Table 3).

Replication study. Teachers D, E, and F in the replication study all received one maintenance probe on the fidelity of implementation of the digital behavior intervention plan with multimedia anchored-instruction. Two weeks following the last mastery probe of the intervention for each teacher participant, a maintenance probe was given to each of the teacher participants to determine the level of sustainability of the teachers' fidelity of implementation of the 12-step intervention. Teacher D obtained a maintenance probe of 100% (see Table 4), while Teachers E and F received maintenance probe scores of 91% and 92% respectively. Visual analysis of the data indicated that Teacher D sustained mastery levels of fidelity of implementation two weeks following intervention, while Teachers E and F had slight drops in implementation fidelity (see Table 4).

Research Question 3

Do students with disabilities improve in learning a replacement-targeted skill (i.e., increase desirable behavior and decrease undesirable behavior) following the teacher implementation of a digital behavior intervention plan?

Data were obtained by scoring intervals of targeted behavior (e.g., desirable behavior, undesirable behavior) during 10-minute daily video samples across the phases of the study. Data were then converted to a percentage score by dividing the number of desirable behavior intervals by the number of opportunities to present desirable behavior (i.e., 60). Undesirable behavior was converted to a percentage score by dividing the number of undesirable intervals by the total number of interval opportunities (i.e., 60). For each student participant, desirable and undesirable behaviors were organized and graphed.

Primary study. Again, the primary study consisted of students A, B, and C. The primary and replication studies ran concurrently. The second study was used to further increase external validity.

Student A. Baseline scores for Student A for desirable behavior were 52%, 23%, and 78%; undesirable behaviors were 48%, 77%, and 22%. Scores during the digital behavior intervention plan with multimedia anchored-instruction treatment phase for desirable behavior were 55%, 80%, 87%, and 81%; undesirable behavior were 45%, 20%, 13%, and 19%. During the maintenance probe, desirable behavior was 88% and conversely, undesirable behavior was 12%. Visual analysis of the data indicated that the levels of desirable and undesirable behavior were variable and not steady during baseline, but as the intervention phase was introduced, a steady increase of desirable behavior emerged with little variability along with steady decrease of undesirable behavior (see Figure 1). Trends continued during the maintenance probe with the highest percentage of desirable behavior obtained and conversely the lowest undesirable student behavior obtained.

After visual inspection, visually identifying the highest point in baseline for desirable student behavior and determining the percentage of data points during intervention exceeding the highest baseline level calculated Percentage of Nonoverlapping Data (PND) (Scruggs, Mastropieri, & Casto, 1987). The reverse was performed for undesirable behavior by visually identifying the lowest point in baseline and determining the Percentage of Nonoverlapping Data (PND). In the treatment condition, 75% of the data points were improved above baseline for desirable student behavior, while 75% of the undesirable student behavior data points improved by

decreasing in percentage of occurrence. Results of the PND calculation were PND range 70 - 90%. The findings suggest that the intervention to improve teacher fidelity of implementation was fairly effective in improving Teacher A's ability to teach Student A more desirable behavior and decrease undesirable behaviors.

Student B. Baseline scores for Student B for desirable behavior were 65%, 80%, and 12%; undesirable behaviors were 35%, 20%, and 88%. Scores obtained during the digital behavior intervention plan with multimedia anchored-instruction treatment phase for desirable behavior were 62%, 85%, 93%, 98%, 93% and 60%; undesirable behavior were 38%, 15%, 7%, 2%, 7% and 40%. During the maintenance probe, desirable behavior was 92% and conversely, undesirable behavior was 8%. Visual analysis of the data indicated that the levels of desirable and undesirable behavior were variable during baseline, but as the intervention phase was introduced, a steady increase of desirable behavior emerged with little variability until the last day of mastery for the teacher where desirable behavior dropped to 60% (see Figure 1). Trends continued during the maintenance probe with decreased variability as the maintenance probe for both desirable and undesirable behavior followed the trend from the intervention phase.

After visual inspection, visually identifying the highest point in baseline for desirable student behavior and determining the percentage of data points during intervention exceeding the highest baseline level calculated Percentage of Nonoverlapping Data (PND) (Scruggs, Mastropieri, & Casto, 1987). The reverse was performed for undesirable behavior by visually identifying the lowest point in baseline and determining the Percentage of Nonoverlapping Data (PND). In the treatment condition, 67% of the data points were improved above baseline for desirable student

behavior, while 67% of the undesirable student behavior data points improved by decreasing in percentage of occurrence. Results of the PND calculation were PND range 50%-70%. The findings suggest that the intervention to improve teacher fidelity of implementation was questionable in improving Teacher B's ability to teach Student B more desirable behavior or decrease undesirable behaviors.

Student C. Baseline scores for Student C for desirable behavior were 32%, 30%, and 43%; undesirable behaviors were 68%, 70%, and 57%. Scores obtained during the digital behavior intervention plan with multimedia anchored-instruction treatment phase for desirable behavior were 60%, 98%, 88%, 100%, 100% and 100%; undesirable behavior were 40%, 2%, 12%, 0%, 0% and 0%. During the maintenance probe, desirable behavior was 92% and conversely, undesirable behavior was 8%. Visual analysis of the data indicated that the levels of desirable and undesirable behavior were variable during baseline, but as the intervention phase was introduced, a steady increase of desirable behavior emerged with little variability (see Figure 1). Trends continued during the maintenance probe with decreased variability as the maintenance probe for both desirable and undesirable behavior followed the trend from the intervention phase.

After visual inspection, visually identifying the highest point in baseline for desirable student behavior and determining the percentage of data points during intervention exceeding the highest baseline level calculated Percentage of Nonoverlapping Data (PND) (Scruggs, Mastropieri, & Casto, 1987). The reverse was performed for undesirable behavior by visually identifying the lowest point in baseline and determining the Percentage of Nonoverlapping Data (PND). In the treatment condition, 100% of the data points were improved above baseline for desirable student

behavior, and 100% of the undesirable student behavior data points improved below baseline in percentage of occurrence after the onset of the intervention to improve teacher fidelity of implementation. The findings suggest that the intervention to improve teacher fidelity of implementation was effective in improving Teacher C's ability to teach Student C more desirable behavior and decrease undesirable behaviors.

Baseline logic was used for the purpose of determining a functional relationship between the intervention changes in teacher fidelity of implementation and changes in level of desirable and undesirable student behavior. Three elements were used: (a) prediction, (b) verification, and (c) replication. It was predicted that Student A's baseline levels would be stable during this phase of the study and baseline levels for Students B and C would not improve without the improvement of teacher fidelity of implementation. This was not true. Baseline levels for Students A and B were variable. Student C had a stable trend with a slight increase in desirable behavior and a slight decrease in undesirable behavior just before the onset of the intervention. Verification of intervention effect was demonstrated for all three student participants within the primary study. Replication was demonstrated for both Students B and C once the interventions were introduced.

Replication study. The replication study consisted of students D, E, and F. The primary and replication studies ran concurrently. The second study was used to further increase external validity from the primary study alone.

Student D. Baseline scores for Student D for desirable behavior were 62%, 27%, and 78%; undesirable behaviors were 38%, 73%, and 22%. Scores obtained during the

digital behavior intervention plan with multimedia anchored-instruction treatment phase for desirable behavior were 63%, 93%, 78%, and 95%; undesirable behavior were 37%, 7%, 22%, and 5%. During the maintenance probe, desirable behavior was 95% and conversely, undesirable behavior was 5%. Visual analysis of the data indicated that the levels of desirable and undesirable behavior were variable and not steady during baseline, but as the intervention phase was introduced, a fairly steady increase of desirable behavior emerged with little variability (see Figure 2). Trends continued during the maintenance probe with decreased variability as the maintenance probe for both desirable and undesirable behavior followed the trend from the intervention phase.

After visual inspection, visually identifying the highest point in baseline for desirable student behavior and determining the percentage of data points during intervention exceeding the highest baseline level calculated Percentage of Nonoverlapping Data (PND) (Scruggs, Mastropieri, & Casto, 1987). The reverse was performed for undesirable behavior by visually identifying the lowest point in baseline and determining the Percentage of Nonoverlapping Data (PND). In the treatment condition, 75% of the data points were improved above baseline for desirable student behavior, while 75% of the undesirable student behavior data points improved by decreasing in percentage of occurrence. Results of the PND calculation were PND range 70 - 90%. The findings suggest that the intervention to improve teacher fidelity of implementation was fairly effective in improving Teacher D's ability to teach Student D more desirable behavior and decrease undesirable behaviors.

Student E. Baseline scores for Student E for desirable behavior were 47%, 58%, and 47%; undesirable behaviors were 53%, 42%, and 53%. Scores obtained during the

Table 5

Primary Study Students' Percentage Scores of Occurrence. Desirable and Undesirable Behavior for Baseline, Digital Behavior Intervention Plan (DBIP), and Maintenance

Students	Baseline	DBIP	Maintenance
Student A			
Desirable	52%, 23%, 78%	55%, 80%, 87%, 81%	88%
Undesirable	48%, 77%, 22%	45%, 20%, 13%, 19%	12%
Student B			
Desirable	65%, 80%, 12%	62%, 85%, 93%, 98%, 93%, 60%	92%
Undesirable	35%, 20%, 88%	38%, 15%, 7%, 2%, 7%, 40%	8%
Student C			
Desirable	32%, 30%, 43%	60%, 98%, 88%, 100%, 100%, 100%	92%
Undesirable	68%, 70%, 57%	40%, 2%, 12%, 0%, 0%, 0%	8%

digital behavior intervention plan with multimedia anchored-instruction treatment phase for desirable behavior were 92%, 90%, 100%, 92%, 100%, 97%, and 100%; undesirable behavior were 8%, 10%, 0%, 8%, 0%, 3%, and 0%. During the maintenance probe,

desirable behavior was 98% and conversely, undesirable behavior was 2%. Visual analysis of the data indicated that the levels of desirable and undesirable behavior were steady during baseline with little variability. As the intervention phase was introduced, an immediate increase of desirable behavior emerged with little variability (see Figure 2). Conversely, there was an immediate decrease in undesirable behavior. Trends continued during the maintenance probe with a slight decrease in desirable behavior.

After visual inspection, visually identifying the highest point in baseline for desirable student behavior and determining the percentage of data points during intervention exceeding the highest baseline level calculated Percentage of Nonoverlapping Data (PND) (Scruggs, Mastropieri, & Casto, 1987). The reverse was performed for undesirable behavior by visually identifying the lowest point in baseline and determining the Percentage of Nonoverlapping Data (PND). In the treatment condition, 100% of the data points were improved above baseline for desirable student behavior, and 100% of the undesirable student behavior data points improved below baseline in percentage of occurrence after the onset of the intervention to improve teacher fidelity of implementation. The findings suggest that the intervention to improve teacher fidelity of implementation was effective in improving Teacher E's ability to teach Student E more desirable behavior and decrease undesirable behaviors.

Student F. Baseline scores for Student F for desirable behavior were 65%, 97%, and 100%; undesirable behaviors were 35%, 3%, and 0%. Scores obtained during the digital behavior intervention plan with multimedia anchored-instruction treatment phase for desirable behavior were 97%, 100%, 98%, 100%, and 100%; undesirable behavior were 3%, 0%, 2%, 0%, 0%, and 0%. During the maintenance probe, desirable behavior

was 100% and conversely, undesirable behavior was 0%. Visual analysis of the data indicated that the levels of desirable and undesirable behavior were variable and not steady during baseline, but as the intervention phase was introduced, a consistent level of desirable behavior emerged with little variability (see Figure 2). Trends continued during the maintenance probe.

After visual inspection, visually identifying the highest point in baseline and determining the percentage of data points during intervention exceeding the highest baseline level calculated Percentage of Nonoverlapping Data (PND) (Scruggs, Mastropieri, & Casto, 1987). The reverse was performed for undesirable behavior by visually identifying the lowest point in baseline and determining the Percentage of Nonoverlapping Data (PND). In the treatment condition, 0% of the data points were improved above baseline, since Student F had a baseline probe of 100% for desirable behavior and conversely, 0% of the data points for undesirable behavior were below baseline levels. Results of the PND calculation were within the range of no effect. The findings suggest that the intervention to improve teacher fidelity of implementation was not effective due to the student desirable and undesirable behavior baseline levels.

Using baseline logic to predict, verify and replicate to demonstrate a functional relationship between increased teacher fidelity of implementation and increased desirable behavior, as well as decreases in undesirable behavior, had mixed results. It was predicted that Student D would continue to be steady in baseline and not improve until improvements in teacher fidelity of implementation were established. Student E continued to be stable in baseline while Student D had treatment verification with desirable student behavior improvements and undesirable behavior improvements with

decreased frequency of occurrence. Once Student E entered the treatment phase there was an immediate improvement in desirable behavior and decreases in undesirable behavior establishing replication of effect. Student F improved during baseline, eliminating possible prediction, verification of effect and replication of effect. Overall Student F's desirable and undesirable behaviors improved, but this improvement was before the improvement of teacher fidelity of implementation.

Interrater reliability. Interrater agreement on students' desirable and undesirable behaviors was gathered for 33% of the sessions. The researcher scored all the students' behavior via video. To determine interrater reliability, the interrater observed 33% of the students' desirable and undesirable behaviors across baseline, treatment, and maintenance phases of the study. Results of interrater agreement yielded 95% agreement between observers (range 87% to 98%). Interrater agreement results for student's desirable and undesirable behaviors are shown in Table 7.

Research Question 4

How satisfied are teachers using a digital behavior intervention plan with multimedia anchored-instruction while teaching students with disabilities?

The Behavior Intervention Satisfaction Questionnaire with permission was adapted from the *Treatment Acceptability Rating Form-Revised* (Reimers & Wacker, 1988) (see Appendix N). The Behavior Intervention Satisfaction Questionnaire was used to evaluate the level of satisfaction of the teachers with the digital behavior intervention plan (see Appendix O). The Behavior Intervention Satisfaction Questionnaire contained 14 questions. The questionnaire was based on a five-point Likert scale. The teachers filled out the questionnaire at the completion of the study.

Question 1: How acceptable was the digital plan? Teacher participants' ratings were as follows: (a) 33% (2/6) of the participants' responses indicated that the digital behavior intervention plans were Very Acceptable, (b) 33% (2/6) indicated that the digital plans were Acceptable, and (c) 33% (2/6) were Undecided with the question. Across all teachers the average score was acceptable.

Question 2: Are you likely to use this type of plan? Teacher participants' ratings were as follows: (a) 33% (2/6) of the teachers' responses indicated that they were very likely, (b) 33% (2/6) indicated that the teachers were likely, and (c) 33% (2/6) were undecided with the question. The results suggest that the teachers would be likely to use this type of plan.

Question 3: Are there problems in following this digital plan? Responses were of a Likert-type format with "1" indicating non-likely, and "5" representing many likely. Teacher participants' ratings were as follows: (a) 33% (2/6) indicated that a few were likely, (b) 17% (1/6) indicated indecision in the question, and (c) 50% (3/6) indicated that one disadvantage may be likely. The results suggest there may be some problems to using this type of behavior intervention plan.

Question 4: Was more time needed to implement the digital plan? Responses were of a Likert-type format with "1" indicating little time needed, "3" undecided, and "5" indicating much time was needed. Teacher participants' ratings were as follows: (a) 66% (4/6) indicated that little time was needed, (b) 33% (2/6) indicated that some extra time was needed. The results suggest that the majority of the teachers felt that very little

Table 6

Replication Study Students' Percentage Scores of Occurrence. Desirable and Undesirable Behavior for Baseline, Digital Behavior Intervention Plan (DBIP), and Maintenance

Students	Baseline	DBIP	Maintenance
<hr/>			
Student D			
Desirable	62%, 27%, 78%	63%, 93%, 78%, 95%	95%
Undesirable	38%, 73%, 22%	37%, 7%, 22%, 5%	5%
Student E			
Desirable	47%, 58%, 47%	92%, 90%, 100%, 92%, 100%, 97%, 100%	98%
Undesirable	53%, 42%, 0%	8%, 10%, 0%, 8%, 0%, 3% 0%	2%
Student F			
Desirable	65%, 97%, 100%	97%, 100%, 98%, 100%, 100%,	100%
Undesirable	35%, 3%, 0%	3%, 0%, 2%, 0%, 0%	0%
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time was needed to use a digital behavior intervention plan.

Question 5: How assured are you about the effectiveness of the plan? Likert-type responses were “1” not at all assured, “3” undecided, and “5” very assured. The teacher participants’ ratings were as follows: (a) 50% (3/6) confident, (b) 33% (2/6) undecided, and (c) 17% (1/6) lacking confidence. The results suggest that half of the teachers felt assured that behavior plan was having some effect, while the other half were undecided or felt there was no effect.

Question 6: Are you assured the plan will make lasting improvements in behavior? Responses were Likert-type format with “1” indicating assured, “3” undecided, and “5” indicating very assured. Teacher participants’ ratings were as follows: (a) 33% (2/6) assured, (b) 50% undecided, and (c) 17% (1/6) may not be assured. The results suggest the teachers believe there may be a few permanent improvements.

Question 7: Was the plan implementation disruptive? Responses were of Likert-type format with “1” indicating not at all disruptive, “3” indicating undecided, and “5” indicating very disruptive. The teacher participants’ ratings were as follows: (a) 50% (3/6) indicated some disruption, (b) 33% little to no disruption, and (c) 17% (1/6) not at all disruptive. The results suggest the teachers felt there was some disruption to their daily routines.

Question 8: How did you feel about the procedures used in the digital plan? Responses were Likert-type format with “1” indicating do not like them at all, “3” undecided, and “5” liked them very much. The Teacher participants’ responses were as follows: (a) 33% (2/6) liked them very much, (b) 50% (3/6) like them, and (c) 17% (1/6)

Table 7.
Interrater Results for Each Teacher-Student Dyad. Fidelity of Implementation Probes (FIP), Desirable Behavior, and Undesirable Behavior.

Study	Dyad	FIP	Desirable Behavior	Undesirable Behavior
Primary				
	Teacher-Student A	99%	87%	87%
	Teacher-Student B	100%	93%	93%
	Teacher-Student C	90%	98%	98%
Replication				
	Teacher-Student D	100%	95%	95%
	Teacher-Student E	100%	98%	98%
	Teacher-Student F	100%	98%	98%

somewhat disliked them. The results suggest that the majority of teachers liked the procedures included in the digital plan.

Question 9: Any side-effects from this digital plan? Responses were Likert-type format with “1” indicating no side-effects, “3” undecided, and “5” many side-effects. The Teacher participants’ responses were as follows: (a) 33% (2/6) no side-effects, (b) 50% (3/6) none to some side-effects, and (c) 17% (1/6) undecided. The results suggest that the majority of teachers felt there were little to no side-effects.

Question 10: Any discomfort experienced by the student during the digital plan implementation? Responses were Likert-type format with “1” indicating no discomfort at all, “3” undecided, and “5” very much discomfort. The Teacher participants’ responses were as follows: (a) 50% (3/6) no discomfort at all, (b) 33% (2/6) little to no discomfort,

and (c) 17% (1/6) undecided. The results suggest that the majority of teachers felt the student has little to no discomfort with this digital behavior intervention plan.

Question 11: Are you willing to change to implement a digital plan? Responses were Likert-type format with “1” indicating not at all, “3” undecided, and “5” very willing. The Teacher participants’ responses were as follows: (a) 50% (3/6) very willing, (b) 17% (1/6) willing, (c) 17% (1/6) undecided, and (d) 17% (1/6) maybe willing. The results suggest that teachers are willing to change to implement a digital plan.

Question 12: Did the digital plan mesh into your current daily schedule? Responses were Likert-type format with “1” indicating not at all well, “3” undecided, and “5” very well. The Teacher participants’ responses were as follows: (a) 17% (1/6) very well, (b) 33% (2/6) well, and (c) 50% (3/6) not well. The results suggest that half of teachers carried out the behavior plan well within their current routines and the other half felt the behavior plan did not fit into their current routines.

Question 13: Was the digital plan effective for addressing student appropriate behavior? Responses were Likert-type format with “1” indicating not at all effective, “3” undecided, and “5” very effective. The Teacher participants’ responses were as follows: (a) 33% (2/6) very effective, (b) 33% (2/6) effective, (c) 17% (1/6) undecided and (d) 17% (1/6) no effect. The results suggest that the majority of teachers felt the interventions within the digital behavior plan were effective in addressing student appropriate behavior.

Question 14: Did the intervention accommodate the overall goal to teach desirable behavior? Responses were Likert-type format with “1” indicating not at all, “3”

Table 8.

Participants' Ratings on The Behavior Intervention Satisfaction Questionnaire.

P1 = Participant 1; P2 = Participant 2; P3 = Participant 3; P4 = Participant 4; P5 = Participant 5; P6 = Participant 6; M = Mean score for questionnaire question.

Questionnaire Statements	P1	P2	P3	P4	P5	P6	M
1. How acceptable was the digital plan?	3	4	5	5	4	3	4.0
2. Are you likely to use this type of plan?	3	4	5	5	3	3	3.8
3. Are there problems in following this type of digital plan?	4	4	2	2	2	3	2.8
4. Was more time needed to implement the digital plan?	1	1	1	1	4	4	2.0
5. How assured are you about the effectiveness of the plan?	3	4	4	4	3	2	3.3
6. Are you assured the plan will make lasting improvements in behavior?	3	3	4	4	3	2	3.2
7. Was the plan implementation disruptive?	4	2	1	2	4	4	2.8
8. How did you feel about procedures used in the digital plan?	2	5	5	4	4	4	4.0
9. Any side-effects from this digital plan?	2	2	2	2	3	1	2.0
10. Any discomfort experienced by the student during the digital plan implementation?	2	1	2	1	3	1	1.7
11. Are you willing to change to implement a digital plan?	2	5	5	5	4	3	4.0
12. Did the digital plan mesh into your current daily schedule?	2	4	5	4	2	2	3.2
13. Was the digital plan effective for addressing appropriate student behavior?	2	5	5	4	4	3	3.8
14. Did the intervention accommodate the overall goal to teach desirable behavior?	2	4	5	5	5	4	4.2

undecided, and “5” very much. The Teacher participants’ responses were as follows: (a) 50% (3/6) very much, (b) 33% (2/6) well, and (c) 17% (1/6) not well. The results suggest that the majority of teachers felt the digital plan would improve the student’s desirable behavior.

Summary of Findings

In regards to teacher fidelity of implementation, all baselines for teacher participants remained low with stable levels and did not show remarkable level change in the number of steps correctly implemented until the initiation of treatment. Each of the teacher participants' graphs in these studies showed behavior change only after the implementation of the digital behavior plan with multimedia anchored-instruction treatment began. There was evidence of four replications of effect and two studies (i.e., primary, replication) that demonstrated a functional relationship. The Percentage of Nonoverlapping Data (PND) calculations also indicated treatment effects that were favorable with all six teachers having scores of 100%.

Across all six teacher-participants, durability was suggested and remained above all baseline levels (range 75% to 100%). Although the digital behavior plan with multimedia anchored-instruction was not completely withdrawn. The presence of the researcher, and cameras were removed. Teachers were simply told to do what ever they would like (i.e., paper plan or digital plan).

However, some students' desirable and undesirable behaviors were quite variable and unstable during the baseline phases of the studies. Although baseline data were unstable during baseline, a steady increase of desirable behavior emerged with little variability as the study progressed. In regards to Percentage of Nonoverlapping Data, student participants A and D were fairly effective. Student participants C and E both had nonoverlapping data that suggests improvement in student C's desirable behaviors and a decrease in undesirable behavior. Students F had baseline probes of desirable behavior at 100% during baseline that suggested no effect.

Finally, teacher questionnaire responses confirmed the social validity of the potential use of digital behavior intervention plans with multimedia anchored-instruction. Teachers felt that very little time was needed to use the digital plan. Five out of the six teachers liked the interventions used in the plans while one teacher felt some dislike towards the plan. Also, five out of 6 teachers indicated they were willing to change their routines and carry out a digital behavior plan.

CHAPTER FIVE

DISCUSSION

Current research indicates that a training gap exists between preservice and practicing teachers in the area of proactive teaching strategies to deal with aggression, emotional, disruptive, and severe behaviors in the classroom (Cook et al., 2007). Serious problem behavior interferes with learning within the classroom (Rose & Gallup, 2005). Unfortunately, difficult classroom behavior often leads to students dropping out of school (U.S. Department of Education, 2008). Functional behavior assessments and behavior intervention plans have been helpful in improving classroom behavior (Allday & Pakurar, 2007; Armendariz & Umbreit, 1999; Carr et al., 1999; Cihak, Fahrenkrog, Ayres & Smith, 2010; Cote, Thompson & McKerchar, 2005; Cushing & Kennedy, 1997; Dunlap et al., 2010; Moore, Anderson, & Kumar, 2005; Riley, McKevitt, Shriver, & Allen, 2011). Previous researchers who have evaluated fidelity of implementation (e.g., Coddling, Livanis, Pace, & Vaca, 2008; Digennaro-Reed, Coddling, Catania, & Maguire, 2010; Kelleher, Riley-Tillman, & Power, 2008; Noell et al., 2005) have evaluated effects by using performance feedback, collaborative models, and video modeling. The existing research suggests that teachers are underexposed to training in the areas of functional assessment and behavior intervention plan components, and that as much as 89% of these plans were found to be inadequate (Cook et al., 2007; Iovannone et al., 2009).

Research Discussion

The purpose of the current study was to extend previous literature on fidelity of implementation to investigate the effects of multimedia anchored-instruction on the

fidelity of implementation of behavior intervention plan components by general education teachers who teach students with disabilities. It was hypothesized that teachers would increase their fidelity of implementation as a result of the multimedia anchored-instruction within the digital behavior intervention plan. Additionally, it was hypothesized that teachers would maintain a high level of fidelity of implementation of the intervention plans two weeks following intervention. Thirdly, it was hypothesized that students would learn a replacement skill (e.g., desirable classroom behavior) following teacher implementation of a digital behavior intervention plan. Lastly, it was hypothesized that teachers would have a high level of satisfaction when using the digital behavior intervention plan.

This study included six teachers who were each matched up with one student from their respective classes to form six individual dyads. Three of the dyads formed the primary study and three of the dyads formed the replication study. Each teacher worked with only one student throughout the studies. Six individual general education classrooms on one charter school campus participated in the primary and replication studies. Results of the studies are reviewed with each research question and in context with previous research studies.

Teacher Fidelity of Implementation

Does a digital behavior intervention plan improve teacher fidelity of implementation of behavior change programs?

By the end of the study, all six teachers demonstrated improvement in fidelity of implementation with high accuracy of the twelve-step intervention using the digital intervention plan with multimedia anchored-instruction for each plan. Previous

researchers who have targeted fidelity of implementation have reported successful increases in fidelity of implementation and treatment integrity. (Coddling, Livanis, Pace, & Vaca, 2008; Digennaro-Reed, Coddling, Catania, & Maguire, 2010; Kelleher, Riley-Tillman, & Power, 2008; Noell et al., 2005). Thus, the finding of this study concurs with those of previous researchers even though this study used multimedia anchored-instruction within a digital behavior intervention plan. This is the first study designed to assess the effects of multimedia anchored-instruction within a digital behavior intervention plan.

It was predicted that when treatment was applied, fidelity of implementation of the interventions would increase compared to baseline condition. All six teacher participants met mastery criteria within eight intervention probes (range, 4 to 8). Following visual inspection, all six teachers had 100% of the intervention data points improve over baseline. This provides evidence of a functional relationship in regards to all six teacher participants. Brunvand and Fishman (2007) found that the impact of scaffolds like onscreen text and voice-over aligned properly could draw attention to the video components they are designed to support.

To further examine results of the participants who were successful with the intervention, an interesting relationship was noted. Although all six teachers were successful in improving their fidelity of implementation, Teacher A and Teacher D were both third grade teachers. Both of these teachers reached mastery criteria faster and with higher initial increases in level change from baseline than the other four teacher participants. Next, Teacher B was a fifth grade teacher who reached mastery criteria in only 6 days, and lastly, Teachers C, E, and F all being sixth grade teachers, reached

mastery criteria in 6, 8 and 5 days respectively. This may be due to elementary teachers focusing more on behavior than the middle school teachers who are more content driven.

Maintaining High Levels of Fidelity of Implementation

Do teachers using digital behavior intervention plans maintain high levels of teacher fidelity of implementation of behavior change programs two weeks after training has ended?

For five of the six teacher participants, the effects of multimedia anchored-instruction were tested and found to have maintained high levels of fidelity of implementation two weeks after treatment had ended. A previous study on fidelity of implementation also observed high levels of fidelity for participants following a maintenance probe (Digennaro-Reed, Coddling, Cantania, & Maguire, 2010). However, it is important to note that the digital behavior intervention plan was not removed. Only the researcher and video cameras were removed from the classroom. Teachers were told to use either the paper/pencil behavior intervention plan or their digital plan if the teachers felt the need.

Within each digital behavior intervention plan, a frequency counter was installed to count component task analysis page viewings as well as video anchored instruction views of the plan. It is important to note that a sixth grade teacher, Teacher C, had fidelity of implementation drop to 75% following the intervention and that Teacher C did not view the digital behavior intervention plan following intervention, whereas the other teacher participants viewed the digital plan on several occasions following intervention.

These results indicate that training and maintenance of high levels of fidelity after the removal of the researcher and cameras were durable for a brief period of time. Again

it is interesting to note that Teacher C was told that the counter was installed to determine the digital plan's use. If Teacher C would have reviewed the anchors, it is plausible that her maintenance score would have been higher. Future researchers may want to evaluate the durability of treatment effects for this type of training after a longer period of time, as well as determine the effects of frequency and time using the digital plan in relation to fidelity of implementation and maintenance.

Teaching Student Replacement Behavior

Do students with disabilities improve in learning a replacement-targeted skill following the teacher implementation of a digital behavior intervention plan?

Five out of the six student participants showed improvements in stability and trend after the introduction of the digital behavior intervention plans with multimedia anchored-instruction following visual inspection. One of the student participants, Student F, had two baseline scores of desirable behavior that were 100% indicating another possible explanation for his improved desirable classroom behavior. Previous researchers have specifically targeted teacher fidelity of implementation and as a result have had students acquire better on-task behaviors along with a more desirable behavior for some of their participants overall (Cihak, Fahrenkrog, Ayres, & Smith, 2010; Iovannone et al., 2009; Strain, Wilson, & Dunlap, 2011). Thus, the findings of this study concur with those of previous researchers in spite of using multimedia anchored-instruction to improve teacher fidelity of implementation.

It was predicted that when treatment was implemented the number of desirable behaviors within the classroom would increase as compared to the baseline condition, and conversely the number of undesirable behaviors would decrease when treatment was

implemented as compared to the baseline condition. Of the six student participants within both the primary study and the replication study, only two of the students demonstrated steady trends and levels during the baseline condition (Student C and Student E). Of the six student participants, one met mastery criteria level during the baseline condition (Student F), thus a functional relationship cannot be determined from his data.

Interestingly, on the second and third days of baseline condition Teacher F began to increase her proximity to Student F as well as her amount of questions to him and periodic touching of his shoulder. This proximity intervention was not in his paper/pencil behavior intervention plan, but appears to have had an effect on desirable student behavior. Another plausible explanation could be due to the researcher developing the digital anchored-instruction intervention plan with the student. Because the researcher modeled the plan in video with the student, a possible relationship may have developed due to the intervention steps related to positive reinforcement procedures and thus the researcher being present in the classroom during probes inadvertently promoted desirable behavior.

Data from student participants A, B, C, D, and E all indicate a possible functional relationship. Although Student A was missing the initial data point on the first day of the treatment phase due to technical difficulties with cameras, a clear increase in level, trend and reduced variability of desirable behavior emerged with a stable trend greater than 80% and thus conversely, a steady decreasing trend with little variability in undesirable behavior emerged trending towards 20% for undesirable behavior. Student A maintained a level of desirable behavior two weeks following the intervention (i.e., desirable behavior 88%, undesirable behavior 12%). Again, teachers were told to use either plan

(i.e., paper/pencil plan, digital behavior intervention plan) during the two-week maintenance period. Intriguingly, Teacher A continued to use the digital plan throughout the two week period as per the frequency counter within her digital plan. Teacher A was observed on several occasions using components of the digital plan on other students with difficult behavior, and Teacher A reported that her intervention plan was working for other students in her classroom as well. Student A received his best percentage of desirable behavior during the maintenance probe (88%).

Student B demonstrated clear level changes in desirable behavior once the treatment phase was implemented. Additionally, Student B achieved higher levels of desirable behavior than undesirable behavior on two of the three baseline phase probes. Because the multiple probe design was created to compare teacher behaviors, steady student behavior within baseline was not achieved which led to a decrease in visual evidence of a functional relationship. Future researchers should establish steady baseline data for both teachers and students in order to establish a clear functional relationship. Moreover, stability of Student B's baseline probes may have been affected by the relationship established with the researcher during the production of the digital behavior intervention plan and video anchors. Upon the implementation of the digital behavior intervention plan, Student B had an immediate step up in level from 12% to 62% on the first probe within the treatment phase. Over the next five treatment probes, Student B's desirable behavior data demonstrated an increase in trend and levels greater than 90% for desirable classroom behavior. Conversely, Student B's undesirable behavior data had a decrease in trend, decrease in level and reduced variability suggesting a possible functional relationship. On the last day of treatment, Student B had a drop in level of

desirable behavior down to 60% and an increase in undesirable behavior up to 40%.

These changes in level happened even though the teacher's fidelity of implementation for that day was 100%. After speaking with the teacher, a plausible explanation for this result was the occurrence of a setting event at home between Student B and a sibling before he arrived at school on that day. Again, teachers were told to use either plan (i.e., paper/pencil plan, digital behavior intervention plan) during the two-week maintenance period. Teacher B continued to use the digital plan throughout the two-week period as per the frequency counter within her digital plan. Excitingly, Teacher B was seen on several occasions using components of the digital plan on other students with difficult behavior, and Teacher B reported that her intervention plan components were working for other students in her classroom as well. Student B received a desirable behavior score of 92% and conversely an undesirable behavior score of 8% on the maintenance probe.

Student C had very stable baseline data with increases in level, trend, and reduced variability after the teacher implemented the digital behavior intervention plan during the treatment phase. Student C maintained high levels of desirable behavior even though Teacher C did not maintain high levels of fidelity of implementation after intervention. Notably, Student C obtained a desirable behavior maintenance score of 92% even though Teacher C's fidelity of implementation had dropped by 25%. Again, Teacher C did not view the digital behavior intervention plan components or anchors during the two weeks between intervention and the maintenance probe. A plausible explanation for high levels of desirable behavior may be due to the relationship developed during the digital plan construction between the researcher and Student C.

Student D had an unstable baseline as well with desirable behavior ranging from 62% to 27% and undesirable behavior ranging from 22% to 78%. Again, a plausible explanation may be the fact that a relationship may have been established between Student D and the researcher during the digital behavior intervention plan production process and the researcher being present during data collection. Although there was not an initial increase in level once the treatment phase was implemented, there was a clear demonstration of an increased trend during the treatment phase of the study with reduced variability. Student D's maintenance probe provided durability of the digital intervention plan with a final desirable behavior probe score of 95% and an undesirable behavior probe of 5%.

Student E had a stable baseline trending flat pre intervention. Desirable and undesirable behavior ranged between 42% and 58% and demonstrated an immediate level increase demonstrating a functional relationship once teacher fidelity of implementation improved. Desirable behavior trending towards 100% with limited variability during the intervention phase.

As previously mentioned, Student F had baseline values of desirable behavior suggesting a confounding variable. It was noted previously that the teacher had started another intervention not previously discussed or placed in the paper/pencil behavior intervention plan. A functional relationship between increased fidelity of implementation of a digital behavior intervention plan with multimedia anchored-instruction cannot be made for Student F.

As previously mentioned, Student B had unstable data within the baseline condition thus revealing questionable effect when Percentage of Nonoverlapping Data

(PND) was calculated. Students F had no effect when calculating PND due to high levels of desirable behavior during baseline. Students A, C, D and E had fairly-effective to effective results when calculating PND. All six of these students may have responded to tier one and tier two interventions alone without the need of a functional assessment and a behavior intervention plan. Again, these findings suggest that future researchers may wish to conduct functional behavior assessments to determine currently functional relationships and frequency of disruptive behavior within the classroom and campus (Carr et al., 1999) to better assess the need of an individualized functional behavior assessment. In many cases, it is plausible that tier one (i.e. clear classroom rules) and tier two interventions (i.e., increase proximity/attention) would be efficient on their own.

Teacher Satisfaction

How satisfied are teachers using a digital behavior intervention plan with multimedia anchored-instruction while teaching students with disabilities?

Four out of the six teacher participants indicated that digital behavior intervention plans with multimedia anchored-instruction were very acceptable to acceptable. The remaining two teachers remained undecided. An explanation for the preference may include the lack of change between baseline and treatment scores since one student had higher frequencies of desirable behavior than undesirable behavior, and another had such variable baseline data with increasing desirable behavior at the onset of intervention. Across all teachers the average score was acceptable. Teachers indicated that they would be willing to carry out this type of intervention plan.

Five out of the six teachers liked the procedures used in the digital behavior intervention plan, while one teacher somewhat disliked them. An explanation for this

preference of somewhat dislike may be the need to address desirable behavior while teaching a high content driven class that is often found in general education middle school classrooms. Four out of six teachers indicated that they would be willing to change their daily procedures to implement a digital behavior intervention plan, while two indicated that they were undecided or maybe unwilling. Again, a recurrent unwillingness or lack of positive preference by one teacher may be indicative of a lack of student change during the digital behavior intervention plan treatment.

Three out of the six teachers indicated that the digital behavior intervention plan procedures meshed well into their current daily schedule, while the other half indicated that the intervention plan procedures did not fit well. Interestingly, during baseline none of the teachers were running intervention components, while by the end of the study they all mastered the twelve-step intervention. The different grade levels included in the study may explain this. Three grades were elementary, while three grades were middle school and more content driven.

Five out of six teacher participants indicated that the intervention accommodated the overall goal to teach desirable behavior. One teacher indicated that the intervention did not fit well. The results suggest that the majority of teachers felt the digital plan accommodated the overall goal to teach alternative desirable behavior.

Finally, it is possible that the results of the digital behavior plan questionnaire were the results of prior history with interventions and practice shaping students' behavior within the classroom. Overall, the preference for a digital behavior intervention plan with multimedia anchored-instruction appeared to be a socially acceptable means of improving teacher fidelity of implementation of behavior intervention plan components.

Additional Discussion of Relevant Data

Teachers were given an Apple iPad with their student specific digital behavior intervention plan with multimedia anchored-instruction. Each behavior intervention plan had a counter installed to record teacher access data. Each teacher was told the counter was installed and that frequency data would be collected. When teachers navigated from page to page or watched a video, a time stamp recorded each occurrence (i.e., component task analysis pages, video anchored-instruction). This data were not used to test any of the hypotheses of this study, but rather used to discuss differences between the teacher subjects and generate future research questions in the area of digital behavior intervention plans and fidelity of implementation (see Table 9).

All six of the teacher participants had a relatively large change in level once intervention was implemented, but there were differences between how often the teachers accessed the digital behavior intervention plan. Within the primary study, all three teachers reached mastery criteria within 6 days from the beginning of their respective treatment phases. Teacher A mastered the intervention first and accessed the digital behavior intervention plan by viewing either component task analysis or video anchors that were associated with the task analysis for a total viewing of 109 occurrences, while Teacher B needed 116 viewings of pages or videos to reached mastery within the intervention phase. Teacher C had the lowest initial step-up at the onset of the intervention, but mastered the intervention within six observations. Teacher C's total

Table 9.

Additional Relevant Data for Primary and Replication Studies. Occurrence Levels Per Teacher. Prevention Component Total (PCT), Teaching Component Total (TCT), Reinforcement Component Total (RCT), Video Starts (VS), Total Occurrences (TO), Days to Mastery (DTM), and Latest Time Stamp (LTS).

Study	Teacher	PCT	TCT	RCT	VS	TO	DTM	LTS
Primary								
	Teacher A	23	29	30	27	109	5	20:12:45
	Teacher B	21	24	20	51	116	6	17:15:19
	Teacher C	15	16	11	30	72	6	12:29:00
Replication								
	Teacher D	39	40	32	34	145	4	20:13:45
	Teacher E	20	19	14	24	77	8	18:59:00
	Teacher F	8	9	7	22	46	5	18:40:35

viewing occurrences of the plan components and video anchors were 72. Seemingly, Teacher A's high frequency of access of the digital plan and video anchors appears to have enabled her to achieve both a higher initial intervention score and quicker mastery.

Within the replication study, Teacher D accessed the digital plan with the highest frequency (i.e., 145 different pages or video anchor viewings), while Teacher F accessed the plan the least (i.e., total of 46 different pages or video anchor viewings). Interestingly, Teacher D mastered the strategy within intervention in four days, while Teacher F mastered the intervention using video anchored instruction in only 5 days with only 32% of the number of views of either the plan components or video anchors of Teacher D. Teacher E took the longest to master the intervention components (i.e., 8 days) and only

accessed the digital plan pages or video anchors a total of 77 times. Teacher D accessed the digital plan twice as much as Teacher E (see Table 9).

Limitations

Some limitations exist in this study. These include the limited sample size, lack of researcher functional assessment to determine appropriateness of the interventions and need, lack of a highly skilled consultant during the functional assessment process, baseline data comparisons for student participants, teachers being given a choice of whether to use the digital plan or paper/pencil plan during the maintenance period, and baseline measures of digital behavior intervention components without video anchored-instruction individualized components.

Beginning with the sample of participants, only six teachers were included in this study. Teachers C, E, and F had 2, 1, and 2 years of experience respectively. It would have been helpful to explore the level of functional behavior assessment participation by these teachers and determine the level of collaboration or involvement between them. In a prior study, Kelleher, Riley-Tillman, and Power (2008) associated higher levels of fidelity of implementation or treatment integrity when a collaborative partnership was used, rather than expert-driven consultation only. It is unknown the level of participation of the teachers on functional assessments that were completed for the student participants who took part in this study.

Again, although a functional relationship can be determined for all of the teachers, a functional relationship was more difficult to determined for student participants A, D, and F because of unstable baselines. For students, treatment suggests improvements in

trend and overall level for five of the students, but the lack stable baselines make it difficult to claim to a functional relationship. Because of the way Percentage of Overlapping Data is calculated, it is not sensitive and does not use all of the data points in baseline to determine a difference between baseline and treatment.

Student F appeared to improve by the teacher simply moving in closer to the student and periodically touching him on the shoulder. A functional assessment by the researcher would have identified Student F as a candidate benefitting from tier one and tier two interventions, without the need of an individualized intervention plan. Despite this student's limited change in behavior, Teacher F did show improvements in fidelity of implementation resulting in sustained student improvement in desirable behavior.

Another limitation was the teacher participant baseline measures. Baseline measures were of paper/pencil behavior intervention plans that were difficult to follow without clear intervention approaches and strategies. Although the Individuals with Disabilities Education Act (1997) first mandated the use of functional behavior assessments, the teachers' paper/pencil plans did not outline specific treatment intervention in a step-by-step format. These plans were similar to those of which there is an expressed concern today that exhibit an inadequate functional behavior assessment and the use of function based interventions within schools (Blood & Neel, 2007).

Another limitation was that teachers were given a choice to keep using the digital behavior intervention plan during the maintenance period. Because the paper/pencil behavior intervention plans lacked specificity concerning intervention steps, teachers were given a choice to use either plan. Behavior intervention plans are teacher instructional guides that should always be present in the classroom for a teacher's

frequent referral. This may have helped many teachers maintain high levels of fidelity of implementation. Because behavior intervention plans should be changed as student behavior changes, it is not practical to completely remove the intervention. Needless to say, it remains a limitation even though the researcher and cameras were all removed during this time.

The final limitation is that teachers were not given an opportunity to implement a highly adequate intervention plan with task analyzed intervention plan components during the baseline phase. Future researchers may address fidelity of implementation by first assuring an accurate functional assessment and behavior intervention plan construction that is function-based for the purpose of teaching replacement behaviors.

Recommendations for Future Research

The following is a list of recommendations for future research and their rationale based upon the findings from this study.

1. Future studies may wish to investigate both a treatment group and a control group to determine effects across groups.
2. Investigate the effects of digital behavior intervention plans only after both teachers and students have stable baseline measures.
3. Investigate long-term feasibility of a digital behavior intervention plan only after teachers have been using an adequate paper/pencil intervention plan.
4. Investigators may wish to perform functional assessment in a collaborative format to help teams first produce adequate paper/pencil behavior intervention plans

before comparing paper/pencil plans to digital plans to assure adequacy of both types of behavior intervention plans.

5. Include multiple public school settings to demonstrate generality of results.
6. Include parent perceptions to determine treatment effects across settings.
7. Assess generalization of teacher fidelity of implementation to other school personnel coming in contact with students with disabilities.

Summary

Based on results obtained in this study, the following conclusions may be drawn. Digital behavior intervention plans were beneficial for all teacher participants in improving their fidelity of implementation through the use of a multimedia anchored-instruction behavior intervention plan. A clear functional relationship was determined for all teachers. Visually, for five of the six student participants, frequency of desirable behavior increased as teacher fidelity of implementation improved. Additionally, Student desirable behavior was maintained two weeks following intervention. Finally, five out of six teachers indicated a preference for using a digital behavior intervention plan that utilizes multimedia anchored-instruction.

Appendix A

Teacher Consent Form

INFORMED CONSENT

Department of Special Education and Clinical Studies

TITLE OF STUDY: Digital Behavior Intervention Plans: Effects on General Education Teacher Fidelity of Implementation

INVESTIGATOR(S): Dr. Kyle Higgins and Chris Holcomb

For questions or concerns about the study, you may contact Dr. Kyle Higgins at (702)-895-3205.

For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted, contact **the UNLV Office of Research Integrity – Human Subjects at 702-895-2794, toll free at 877-895-2794 or via email at IRB@unlv.edu**.

Purpose of the Study

You are invited to participate in a research study. The purpose of this study is to investigate the effects of multimedia anchored-instruction on the fidelity of implementation of behavior intervention plan components by teachers working with students with disabilities.

Participants

You are being asked to participate in the study because you fit these criteria: (a) teach within inclusive environments, and (b) teach students with disabilities within your general education classroom.

Procedures

If you volunteer to participate in this study, you will be asked to do the following: (a) attend a training session on the use of a digital behavior intervention plan, (b) implement the digital behavior intervention plan for students with disabilities, and (c) agree to be observed for 10-minutes each day, (d) allow video tape of both you and a student in your class for 10-minutes each day. You will allow the investigator to analyze the effects on

***Deemed exempt by the ORI-HS and/or the UNLV IRB. Protocol #1403-4746M Exempt
Date: 03-27-14***

teacher fidelity of implementation using a digital behavior intervention plan with anchored-instruction. This study will be conducted over a 12-week time period.

Benefits of Participation

There may be direct benefits to you as a participant in this study. We hope to learn more about improving fidelity of implementation of behavior intervention plans when teaching students in grades 1-8 who have disabilities.

Risks of Participation

There are risks involved in all research studies. This study may include only minimal risks. This study involves natural observation of you and a student in the classroom setting. Because of this, there is minimal risk to you or the students from participating (physical, psychological, social, or legal).

Cost /Compensation

There will not be a financial cost to you to participate in this study. The study will take 10-minutes per day of your time. You will not be compensated for your time.

Confidentiality

All information gathered in this study will be kept as confidential as possible. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at UNLV for at least three years after completion of the study. After the storage time the information gathered will be destroyed.

Voluntary Participation

Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time without prejudice to your relations with UNLV. You are encouraged to ask questions about this study at the beginning or any time during the research study.

Participant Consent:

I have read the above information and agree to participate in this study. I have been able to ask questions about the research study. I am at least 18 years of age. A copy of this form has been given to me.

Signature of Participant

Date

Participant Name (Please Print)

***Deemed exempt by the ORI-HS and/or the UNLV IRB. Protocol #1403-4746M Exempt
Date: 03-27-14***

Audio/Video Taping:

I agree to be audio or video taped for the purpose of this research study.

Signature of Participant

Date

Participant Name (Please Print)

***Deemed exempt by the ORI-HS and/or the UNLV IRB. Protocol #1403-4746M Exempt
Date: 03-27-14***

Appendix B

Parent Consent Form

PARENT PERMISSION FORM

Department of Special Education and Clinical Studies

TITLE OF STUDY: Digital Behavior Intervention Plans: Effects on General Education Teacher Fidelity of Implementation

INVESTIGATOR(S): Dr. Kyle Higgins and Chris Holcomb

CONTACT PHONE NUMBER: (702)-895-3205.

For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted, contact **the UNLV Office of Research Integrity – Human Subjects at 702-895-2794, toll free at 877-895-2794 or via email at IRB@unlv.edu.**

Purpose of the Study

Your child is invited to participate in a research study. The purpose of this study is to investigate the effects of multimedia anchored-instruction on the fidelity of implementation of behavior intervention plan components by teachers working with students with disabilities. It is hoped that as a result of participation, teachers will improve in the implementation of behavior intervention plans promoting increased quality of life for students.

Participants

Your child is being asked to participate in the study because he or she fit these criteria: (a) attends a charter school, (b) participates within the general education classroom, and (c) has a disability.

Procedures

If you allow your child to volunteer to participate in this study, your child will be asked to do the following: (a) participate in the classroom as they would normally, (b) allow the investigator to video record him/her 10-minutes per day to document his/her targeted

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Date: 03-27-14***

behaviors, and (c) allow the investigator to analyze the effects of the digital behavior intervention plan with anchored-instruction on your child's classroom behavior. This study will be conducted over a 12-week time period.

Benefits of Participation

There may be direct benefits to your child as a participant in this study. We hope to learn more about improving teacher fidelity of implementation of behavior intervention plans that use multimedia anchored-instruction to teach students with disabilities. The direct benefit to your child's participation outweighs the small risk to your child. You may find that participation directly benefits him or her in (a) improved on task behavior during non-preferred activities, (b) improved social skills with peers, and (c) improved teacher pleasing behavior (e.g., sitting, waiting, raising hand).

Risks of Participation

There are risks involved in all research studies. This study may include only minimal risks. The expected gains from the study outweigh the small risks of your child losing classroom instruction. This study involves natural observation of your child in the classroom setting as the teacher implements components of your child's behavior intervention plan.

Cost /Compensation

There will be no financial cost to you to participate in this study. There will be no compensation.

Contact Information

If you or your child have any questions or concerns about the study, you may contact Kyle Higgins at **702-895-3205**. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact **the UNLV Office of Research Integrity – Human Subjects at 702-895-2794, toll free at 877-895-2794, or via email at IRB@unlv.edu**.

Voluntary Participation

Your child's participation in this study is voluntary. Your child may refuse to participate in this study or in any part of this study. Your child may withdraw at any time without prejudice to your relations with UNLV. You or your child is encouraged to ask questions about this study at the beginning or any time during the research study.

Confidentiality

All information gathered in this study will be kept as confidential as possible. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at UNLV for at least three years after completion of the study. After the storage time the information and video gathered will be destroyed.

***Deemed exempt by the ORI-HS and/or the UNLV IRB. Protocol #1403-4746M Exempt
Date: 03-27-14***

Participant Consent:

I have read the above information and agree to participate in this study. I am at least 18 years of age. A copy of this form has been given to me.

Signature of Parent

Date

Parent Name (Please Print)

Audio/Video Taping:

I agree to allow my child to be video taped for the purpose of this research study.

Signature of Parent

Date

Parent's Name (Please Print)

***Deemed exempt by the ORI-HS and/or the UNLV IRB. Protocol #1403-4746M Exempt
Date: 03-27-14***

Appendix C

Student Assent Form

STUDENT ASSENT TO PARTICIPATE IN RESEARCH

Digital Behavior Intervention Plans: Effects on General Education Teacher Fidelity of Implementation

1. Our names are Dr. Kyle Higgins and Mr. Chris Holcomb
2. We are asking you to take part in a study because we are trying to learn more about helping students enjoy school through improvements in teaching strategies.
3. If you want to be in this study, you will simply be yourself and work with your teacher normally. Your teacher will help you if you if you ever have a problem.
4. During this study, I will watch your teacher and you as she works with you. You and your teacher will be videotaped each day to record how you and your teacher are doing working together. There is very little risk to you from being in this study.
5. You may find that you will like school better after working with your teacher.

Deemed exempt by the ORI-HS and/or the UNLV IRB. Protocol #1403-4746M Exempt

Date: 03-27-14

6. Please talk this over with your parents. We will also ask your parents to give their permission for you to take part in this study. But even if your parents say “yes” you can still say “no.”
7. If you don’t want to be in this study, you don’t have to. Remember, being in this study is up to you and no one will be upset if you don’t want to be in this study or even if you say “no” later.
8. You can ask any questions that you think of about the study. If you can’t think of one now, you can call Dr. Kyle Higgins and Chris Holcomb at 895-3205 or ask me when I see you.

Students Signature:

Date:

Parent’s Name:

Date

***Deemed exempt by the ORI-HS and/or the UNLV IRB. Protocol #1403-4746M Exempt
Date: 03-27-14***

Audio/Video Taping:

I agree to be video taped for the purpose of this research study.

Signature of the student

Date

Parent Name

Date

Parent's Name (Please Print)

***Deemed exempt by the ORI-HS and/or the UNLV IRB. Protocol #1403-4746M Exempt
Date: 03-27-14***

Appendix D

Non-Participating Student Video Tape Consent Form

Title of Study: **Digital Behavior Intervention Plans: Effects on General Education**

Teacher Fidelity of Implementation

1. Our names are Dr. Kyle Higgins and Mr. Chris Holcomb
2. The study is examining the effects of digital behavior intervention plans on teachers.
3. We are requesting consent for your child to possibly be video taped during the course of the study.
4. During this study, examiners will watch your teacher and a student selected for the study. **Your child is not participating in the study.** The teacher will be video taped each day for 10-minutes to record how the teacher is using the behavior plan.
5. There is no obligation. If you prefer your child not be taped, he/she will be given instruction outside the view of the camera during the daily 10-minute observation and taping.
6. You can ask any questions that you think of about the study. You can call Dr. Kyle Higgins and Chris Holcomb at 895-3205 or ask me when I see you.

***Deemed exempt by the ORI-HS and/or the UNLV IRB. Protocol #1403-4746M Exempt
Date: 03-27-14***

Audio/Video Taping:

I agree to allow my child to be video taped for the purpose of this research study.

Signature of Parent

Date

Parent's Name (Please Print)

***Deemed exempt by the ORI-HS and/or the UNLV IRB. Protocol #1403-4746M Exempt
Date: 03-27-14***

Appendix E

Permission to Access Campus

Doral Academy of Nevada

9625 West Saddle Ave.
Las Vegas, NV 89147
702-776-6491

Office of Research Integrity – Human Subjects
University of Nevada Las Vegas
4505 Maryland Parkway Box 451047
Las Vegas, NV 89154-1047

Subject: Letter of Authorization to Conduct Research at Doral Academy-Saddle Campus.

Dear Office of Research Integrity – Human Subjects:

This letter will serve as authorization for the University of Nevada, Las Vegas (“UNLV”) researcher/research team, Kyle Higgins and Chris Holcomb to conduct the research project entitled **Digital Behavior Intervention Plans: Effects on General Education Teacher Fidelity of Implementation** at Doral Academy- Saddle Campus (the “Facility”).

The Facility acknowledges that it has reviewed the protocol presented by the researcher, as well as the associated risks to the Facility. The Facility accepts the protocol and the associated risks to the Facility, and authorizes the research project to proceed. The research project may be implemented at the Facility upon approval from the UNLV Institutional Review Board.

If we have any concerns or require additional information, we will contact the researcher and/or the UNLV Office of Research Integrity – Human Subjects.

Sincerely,

Bridget Phillips
Facility's Authorized Signatory

1-31-14
Date

Bridget Phillips, Principal Doral Academy
Printed Name and Title of Authorized Signatory

Appendix F

Multimedia Anchored-Instruction Prevention Screen Shots

2) Student responds verbally and gestures towards item.

4) "When the timer goes off, you will get (reinforcer)."

Appendix G

Multimedia Anchored-Instruction Teaching Screen Shots

2) Teacher tells student to "wait."

3) Student waits.

4) Teacher says "Nice waiting!" before timer goes off.

5) Timer goes off.

Appendix H

Multimedia Anchored-Instruction Reinforcement Screen Shots

1) If student is waiting when the timer goes off-

**2) Teacher gives praise, i.e. "good job!"
"nice waiting!"**

**2) Teacher gives praise, i.e. "good job!"
"nice waiting!"**

**3) Teacher gives the reinforcer within
1/2 second.**

**3) Teacher gives the reinforcer within
1/2 second.**

4) Teacher says "go play."

Appendix I
Model Release (Template)

MODEL RELEASE

In return for value received, I do hereby authorize the University of Nevada, Las Vegas (UNLV) or persons designated by UNLV to use my child's photograph(s) in publications and materials pertaining thereto, published or copyrighted by UNLV, its successor and assigns. This request includes world rights in all languages and all future revisions and editions thereof. This permission allows UNLV to distribute or publish the material in any manner or through any media, including Internet access.

Signature: Date: 7 Feb 2014

JENNIFER MENDIOLA

MODEL RELEASE

In return for value received, I do hereby authorize the University of Nevada, Las Vegas (UNLV) or persons designated by UNLV to use my photograph(s) in publications and materials pertaining thereto, published or copyrighted by UNLV, its successor and assigns. This request includes world rights in all languages and all future revisions and editions thereof. This permission allows UNLV to distribute or publish the material in any manner or through any media, including Internet access.

Signature: Date: 2.7.14

Christina Settle

MODEL RELEASE

In return for value received, I do hereby authorize the University of Nevada, Las Vegas (UNLV) or persons designated by UNLV to use my photograph(s) in publications and materials pertaining thereto, published or copyrighted by UNLV, its successor and assigns. This request includes world rights in all languages and all future revisions and editions thereof. This permission allows UNLV to distribute or publish the material in any manner or through any media, including Internet access.

Signature:

Date: 2-2-2014

Chris Holcomb

Appendix J

Software Design Questionnaire

1. What are the strengths of the design with respect to:
 - a. Design:
 - b. Content
 - c. Structure and organization
2. What do you like most about the software? Why?
3. What do you like the least about the software? Why?
4. What would you recommend changing to make the software better?

Appendix K

TEACHER FIDELITY OF IMPLEMENTATION MEASURE

Teacher:

Student:

Date:

Replacement Behavior to Teach (Behavioral Definition): Teacher pleasing behavior, on-task behavior (e.g., great sitting, waiting, attention to task, eyes on stimuli, anything similar).

Task Analysis of Interventions	Occurrence		
Prevention of Behavior Strategy			
1. Give positive statements to the student (e.g. 4 to 1).	1	2	3
2. Keep an even tone throughout the period; never get upset.	1	2	3
3. Be specific when making positive comments about behaviors that promote great learning (e.g. great sitting, waiting, watching, attending, quick work, remaining quiet).	1	2	3
4. Make more comments than demands (e.g. “this is what I am talking about!!” “Great sharing with your neighbor!”)	1	2	3
Teaching Strategy			
1. Divide student’s tasks into 3 major sections – e.g. starter, middle, and last third.	1	2	3
2. Tell the student that for each section complete, he earns a reinforcer (e.g. dojo) that he can go up and tally after being told to	1	2	3
3. Inform him that he can use the dojo’s later to get out of work and to get special rewards for himself and the rest of the class.	1	2	3
4. Review his self-management checklist/dojo total sheet with the student. Review each section of the assignment (step 1), his goal (time to complete), and academic engaged behaviors needed (e.g., sitting, waiting, raising hand, using eyes appropriately).	1	2	3
Reinforcement Strategy			
1. Give positive statements and a dojo immediately when student is doing a behavior that promotes learning in the class (e.g. sitting, working, completing a task.)	1	2	3
2. Give little attention to no attention to off task behavior.	1	2	3
3. Give extra attention to a close peer for attending and following directions accurately and swiftly.	1	2	3
4. Give 2 tokens (e.g., dojos) for completion of work with high quality during frustrated situations.	1	2	3
Total (#1 Total/#1+#2 Total)			
Implementation Percent Score			
1) Implemented as written			
2) Not implemented as written (sometimes or never)			
3) No opportunity to observe			

Appendix L

Desirable Student Behavior Recording Form

(Whole Interval)

Student:

Class:

Date:

Rater:

Date Rated:

Attention to task Behavior is defined as: student is sitting with his/her bottom touching the chair, body is upright, eyes are looking at the teaching stimuli and/or teacher; not talking out of turn.

Place an X in the interval boxes if the behavior occurs for the entire interval.

Time	:10	:20	:30	:40	:50	1:00	1:10	1:20	1:30	1:40	1:50	2:00	Totals	
Interval	1	2	3	4	5	6	7	8	9	10	11	12	Yes	No
Occurrence														
Time	2:10	2:20	2:30	2:40	2:50	3:00	3:10	3:20	3:30	3:40	3:50	4:00	Totals	
Interval	13	14	15	16	17	18	19	20	21	22	23	24	Yes	No
Occurrence														
Time	4:10	4:20	4:30	4:40	4:50	5:00	5:10	5:20	5:30	5:40	5:50	6:00	Totals	
Interval	25	26	27	28	29	30	31	32	33	34	35	36	Yes	No
Occurrence														
Time	6:10	6:20	6:30	6:40	6:50	7:00	7:10	7:20	7:30	7:40	7:50	8:00	Totals	
Interval	37	38	39	40	41	42	43	44	45	46	47	48	Yes	No
Occurrence														
Time	8:10	8:20	8:30	8:40	8:50	9:00	9:10	9:20	9:30	9:40	9:50	10:00	Totals	
Interval	49	50	51	52	53	54	55	56	57	58	59	60	Yes	No
Occurrence														

Appendix M

Undesirable Student Behavior Recording Form

(Partial Interval)

Student:

Class:

Date:

Rater:

Date Rated:

Disruptive Classroom Behavior defined: are out of seat, talking to another student, talking out of turn, grabbing material out of turn, grabbing material that is not theirs, touching other people, raising hand excessively, telling on peers, day dreaming, being overly emotional, feeling sorry for himself/herself, spitting, hitting, throwing material or similar.

Place an X in the interval boxes if the behavior occurs at any point during the interval.

Time	:10	:20	:30	:40	:50	1:00	1:10	1:20	1:30	1:40	1:50	2:00	Totals	
Interval	1	2	3	4	5	6	7	8	9	10	11	12	Yes	No
Occurrence														
Time	2:10	2:20	2:30	2:40	2:50	3:00	3:10	3:20	3:30	3:40	3:50	4:00	Totals	
Interval	13	14	15	16	17	18	19	20	21	22	23	24	Yes	No
Occurrence														
Time	4:10	4:20	4:30	4:40	4:50	5:00	5:10	5:20	5:30	5:40	5:50	6:00	Totals	
Interval	25	26	27	28	29	30	31	32	33	34	35	36	Yes	No
Occurrence														
Time	6:10	6:20	6:30	6:40	6:50	7:00	7:10	7:20	7:30	7:40	7:50	8:00	Totals	
Interval	37	38	39	40	41	42	43	44	45	46	47	48	Yes	No
Occurrence														
Time	8:10	8:20	8:30	8:40	8:50	9:00	9:10	9:20	9:30	9:40	9:50	10:00	Totals	
Interval	49	50	51	52	53	54	55	56	57	58	59	60	Yes	No
Occurrence														

Appendix N

Permission to Use Copyrighted Material

Permission to Use Copyrighted Material

Chris Holcomb
7391 W. Charleston Blvd. Suite 150
Las Vegas, NV 89117
Cell (702) 292-2012
Fax (702) 222-0212

12-26-2013

Thomas Reimers, PhD
13460 Walsh Dr.
Boys Town, NE 68010

Dear Dr. Reimers:

I am completing a doctoral dissertation at the University of Nevada Las Vegas entitled "Digital Behavior Intervention Plans: Effects on General Education Teacher Fidelity of Implementation." I am seeking permission to adapt the Treatment Acceptability Rating Form- Revised (TARF-R) (Reimers & Wacker, 1988).

I would like to adapt the TARF-R to reflect the acceptability of teachers within general education classrooms using a multimedia anchored instruction behavior intervention plan.

The requested permission extends to any future revisions and editions of my dissertation, including non-exclusive world rights in all languages, and to the prospective publication of my dissertation by ProQuest through its UMI® Dissertation Publishing business. ProQuest may produce and sell copies of my dissertation on demand and may make my dissertation available for free internet download at my request. These rights will in no way restrict republication of the material in any other form by you or by others authorized by you. Your signing of this letter will also confirm that you own the copyright to the above described material.

If these arrangements meet your approval, please sign this letter where indicated below and return it to me in the enclosed return envelope. Thank you very much.

Sincerely,
Chris Holcomb

PERMISSION GRANTED FOR THE USE REQUESTED ABOVE:

_____
Thomas Reimers, PhD Date: 12-31-13

Appendix O

Digital Behavior Plan Satisfaction Questionnaire

How do you feel about digital behavior intervention plans with multimedia anchored-instruction? Circle the number that indicates your feelings about digital plans.

1. How acceptable was the digital plan?

1	2	3	4	5
Not at all		Undecided		Very

2. Are you likely to use this type of plan?

1	2	3	4	5
Not at all		Undecided		Very

3. Are there problems in following this type digital plan?

1	2	3	4	5
None		Undecided		Many

4. Was more time needed to implement the digital plan?

1	2	3	4	5
Little		Undecided		Much

5. How assured are you about the effectiveness of the plan?

1	2	3	4	5
Not at all		Undecided		Very

6. Are you assured the plan will make lasting improvements in behavior?

1	2	3	4	5
Not at all		Undecided		Very

7. Was the plan implementation disruptive?

1	2	3	4	5
Not at all		Undecided		Very

8. How did you feel about the procedures used in the digital plan?

1	2	3	4	5
Do not like		Undecided		Very much

9. Any side-effects from this digital plan?

1	2	3	4	5
None		Undecided		Many

10. Any discomfort experienced by the student during the digital plan implementation?

1	2	3	4	5
None		Undecided		Very much

11. Are you willing to change to implement a digital plan?

1	2	3	4	5
Not at all		Undecided		Very

12. Did the digital plan mesh into your current daily schedule?

1	2	3	4	5
Not at all		Undecided		Very much

13. Was the digital plan effective for addressing appropriate student behavior?

1	2	3	4	5
Not at all		Undecided		Very

14. Did the intervention accommodate the overall goal to teach desirable behavior?

1	2	3	4	5
Not at all		Undecided		Very much

Appendix P Teacher Training Checklist

Teacher _____

Date _____

<p>1. Can the teacher access the iPad?</p> <p>Notes: _____</p> <p>_____</p> <p>_____</p>	<p>☐ Yes</p> <p>☐ No</p>
<p>2. Does the teacher understand the purpose of functional assessment?</p> <p>Notes: _____</p> <p>_____</p> <p>_____</p>	<p>☐ Yes</p> <p>☐ No</p>
<p>3. Does the teacher understand the purpose of a behavior intervention plan?</p> <p>Notes: _____</p> <p>_____</p> <p>_____</p>	<p>☐ Yes</p> <p>☐ No</p>
<p>4. Does the teacher understand why strategies are task analyzed?</p> <p>Notes: _____</p> <p>_____</p> <p>_____</p>	<p>☐ Yes</p> <p>☐ No</p>
<p>5. Can the teacher navigate the digital behavior intervention plan template?</p> <p>Notes: _____</p> <p>_____</p> <p>_____</p>	<p>☐ Yes</p> <p>☐ No</p>
<p>7. Can the teacher explain a three-strategy approach to teaching?</p> <p>Notes: _____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>☐ Yes</p> <p>☐ No</p>
<p>8. Can the teacher demonstrate camera set up?</p> <p>Notes: _____</p> <p>_____</p> <p>_____</p>	<p>☐ Yes</p> <p>☐ No</p>

Appendix Q

Video Camera Setup Guide

1. Ensure camera is securely attached to either a tripod and attachment device and placed in the designated area of the classroom.
2. Ensure power is connected to camera.
3. Turn on camera.
4. Be sure lens cap is removed.
5. Be sure memory card is installed in Camera.
6. Point camera is the area to capture either the teacher or the student of interest.
7. Press the record button.
8. Check the viewing screen to be sure the camera is recording.
9. Be sure all adults in the room are aware of video recording.
10. Do not move the camera during recordings.
11. Set a 10-minute timer.
12. At the completion of the 10-minute interval, press the “record” button again to stop the recording.
13. Place camera in secure area until the next day.

Appendix R

Multiple Probe Design Across Subjects

Primary and Replication Studies

Figure 1. Percentage of Occurrence by Teacher-Student participant dyads A, B, and C. Primary Study. Note. ■ = Teacher Fidelity of Implementation, ○ = Desirable Behavior, △ = Undesirable Behavior. TS = Teacher-Student Dyad; BL = Baseline; DBIP = Digital Behavior Intervention Plan; M = Maintenance.

Figure 2. Percentage of Occurrence by Teacher-Student participant dyads D, E, and F. Replication Study. Note. ■ = Teacher Fidelity of Implementation, ○ = Desirable Behavior, △ = Undesirable Behavior. TS = Teacher-Student Dyad; BL = Baseline; DBIP = Digital Behavior Intervention Plan; M = Maintenance.

Appendix S
Procedural Fidelity Checklist Form

Teacher:

Condition:

Teacher Signature:

Date:

Reviewed DBIP preventative components with video anchors before class	+	-
Reviewed the DBIP teaching components with video anchors before class		
Reviewed the DBIP reinforcement components with video anchors before class		
Pushed record button on Digital video cameras		
Set a timer for 10-minutes		
Pushed record button off Digital video cameras once finished		

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PRESENT POSTIONS: President of Tandem Therapy Services, LLC, Speech-Language Pathologist and Board Certified Behavior Analyst. Areas of emphasis: Autism, Early Childhood Special Education. Promoting inclusion of children with mild to severe disabilities into inclusive settings, consultation, collaboration, training and research. The development, implementation and supervision of service delivery models for children with low incidence disabilities in home and school settings. Planning and implementation of staff development training activities for in-home Registered Behavior Technicians (RBT) and school district personnel focusing on meeting the unique needs of students with low incidence disabilities such as Autism Spectrum Disorder (ASD). Oversee and coordinate the implementation of behavior change programs for individuals with disabilities.

EDUCATION

PhD, Fall 2014

Special Education

University of Nevada Las Vegas
Las Vegas, NV

Areas of Emphasis:
Autism/Early
Childhood

Master of Education, 1994

Communication
Disorders

Tennessee State University,
Nashville, TN

Bachelor of Science, 1992

Communication
Disorders

University of Wyoming
Laramie, WY

CERTIFICATION, TRAINING & LICENSURE

Certification of Clinical Competence (CCC) from the American Speech-Hearing Association, August 1995.

State of Nevada Board of Examiners for Speech/Language Pathology: SP-620

Certification as a Board Certified Behavior Analyst (BCBA) from Behavior Analyst Certification Board (BACB), December 2004.

State of Nevada Board of Psychological Examiners: Behavior Analyst: LBA0027

Graduate Coursework in Applied Behavior Analysis in preparation for Board Certified Behavior Analyst (BCBA), University of North Texas, September 2002–2004.

Attended and completed the clinical training program: Autism Diagnostic Observation Schedule (ADOS) Workshop conducted by Dr. Catherine Rice, Las Vegas, NV November, 2000.

Advanced Picture Exchange Communication System (PECS) Training held for two-days in Reno, Nevada, February 2000.

Ongoing training and consultation provided by Autism Partnership of Southern California, March 2000– August 2001.

Hands-on Training in Autism with Ron Leaf, Ph.D. of Autism Partnership, Las Vegas, NV, November, 1999.

Dysphasia Disorders, V.A. Medical Center, Nashville, TN (1993-1994).

PROFESSIONAL EXPERIENCE

2000-Current	President of Tandem Therapy Services, LLC Las Vegas, NV
2003-2010	Speech/Language Pathologist/ Board Certified Behavior Analyst Odyssey Charter Schools Las Vegas, NV
1999-2003	Speech/Language Pathologist Clark County School District Las Vegas, NV
2000- 2001	Teacher Trainer Autism Model Demonstration Training Class Low Incidence Disabilities Core

Team
Student Support Services Division
Clark County School District
(CCSD)
Las Vegas, NV

1996-1998

NOWCAP
CASPER, WY

1994-1996

Lander Valley Medical Center
Lander, WY

PRESENTATIONS

Represented University of Nevada Las Vegas as a presenter at the American Speech Hearing Association in the area of Behavior Change Programs in students with maladaptive behavior. (November 2010).

Represented Tandem Therapy Services as a presenter at the Arkansas Speech Language Hearing Association in the area of Collaborative Teaming and Positive Behavior Supports. (October 2006)

Represented Tandem Therapy Services as a presenter at the Arkansas Speech Language Hearing Association in the area of Reduction of Self Injurious behavior using Applied Behavior Analysis. (October 2006).

Represented Odyssey Charter Schools and Tandem Therapy Services as a presenter at the American Association of Mental Retardation Positive Behavior Supports-Nevada and collaborative Teaming. (March 2006).

Represented Odyssey Charter Schools and Tandem Therapy Services as a presenter at the 2nd Annual International Association of Positive Behavior Supports convention in the area of Reduction of Self Injurious Behavior and a Positive Behavior Support Team. (March 2005).

Represented the VA Hospital and Tennessee State University as a presenter at the Tennessee Association of Audiologists and Speech Language Pathologists convention in the area of feeding and swallowing disorders in an institutionalized feeding program. (April 1994).

Autism and Applied Behavior Analysis (ABA) - Two-day intensive workshop for Teachers, Instructional Assistants and Speech Language Pathologists in coordination with Low Incidence Disabilities, Las Vegas, Nevada, May 1999.

UNIVERSITY TEACHING EXPERIENCE

ESP 739 Applied Verbal Behavior University of Nevada Las Vegas (April, 2011)

ESP 740 Language Development University of Nevada Las Vegas (Spring 2012)

ESP 740 Speech Pathology in the Classroom (Language Development) (Spring 2013)

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