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Increasing independence in children with autism spectrum disorders using video self modeling.

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INCREASING INDEPENDENCE IN CHILDREN WITH
AUTISM SPECTRUM DISORDERS USING VIDEO SELF MODELING

By

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M.Ed., Indiana Wesleyan University, 2003

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DEDICATION

This dissertation is dedicated to my parents

Carole and Rich Iberer

for the selflessness and personal sacrifices they made to ensure

I had every opportunity that this life has to offer.

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Thank you to my students at Malcolm B. Chancey Elementary School, who have taught me more than any theory about what it means to reach, teach, and inspire life-long learning. Also to my Chancey friends, I am lucky to have an amazing network of intelligent, inspirational women who challenge me spiritually and intellectually.

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ABSTRACT

INCREASING INDEPENDENCE IN CHILDREN WITH

AUTISM SPECTRUM DISORDERS USING VIDEO SELF MODELING

Julie Iberer Bucalos

May 10, 2013

Independent task completion was examined using a multiple probe across participants research design for three students with autism spectrum disorders (ASD) functioning in an inclusive classroom. Results were positive and suggest that video self-modeling (VSM) is a viable solution to decrease prompt dependence and increase independence and task completion for students with an ASD. Participants quickly reached criterion, generalized behavior, and maintained skills after four weeks at 80-100% independence. Social validity of VSM was also measured by surveying teachers and students and found clear variations between general and special education teachers regarding their perceptions of the independence of students as a result of the VSM. This study also revealed the discrepancy between the levels of prompting between general education and special education teachers.

Keywords: independence, task completion, video self-modeling, autism, inclusion

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CHAPTER I

INTRODUCTION

The identification of children with disabilities has notably increased in the past 20 years. For example, research suggests that one 1 out of 6 children is diagnosed with a developmental disability (i.e. attention deficit hyperactivity disorder; intellectual disability; cerebral palsy; autism; seizures; stuttering or stammering; moderate to profound hearing loss; blindness; learning disorders; and/or other developmental delays) (Boyle et al., 2011). Furthermore, the identification of children with an autism spectrum disorder (ASD) has increased noticeably since the early 1990s to approximately 1 in 110 individuals (Rice et al., 2010).

Over the past 20 years, more students with varying degrees of disabilities are being educated with nondisabled peers. The least restrictive environment (LRE) has been a part of federal special education law since its inception in 1975. The LRE requirements of the Individuals with Disabilities Education Act (IDEA) in §§300.114 through 300.117 express a strong preference, not a mandate, for educating children with disabilities in regular classes alongside their peers without disabilities (71 Fed. Reg. 46585). In basic terms, LRE refers to the setting where a child with a disability can receive an appropriate education designed to meet his or her educational needs, alongside peers without disabilities to the maximum extent appropriate. The law also recognizes that for successful inclusion, supplementary aids and services may be necessary to provide a special needs student with access to the general education curriculum (71 Fed. Reg. 46585). For children with autism, this may be a unique challenge.

Children with ASDs increasingly are participating in various levels of inclusion, despite research, which suggests their needs require a highly specialized education (Kasari, Freeman, Bauminger, & Alkin 1999; Lovaas, 1981; Lovaas & Smith, 1989; Rogers, 1998; Yianni-Coudurier et al., 2008). Ferguson (1995) describes the construct of what may be considered ‘authentic inclusion’:

> a unified system of public education that incorporates all children and youths as active, fully participating members of the school community; that views diversity as the norm; and that ensures a high-quality education for each student by providing meaningful curriculum, effective teaching, and necessary supports for each student (p. 286).

This definition identifies diversity, equality, and quality that are needed to achieve successful inclusion. Most important, it welcomes the unique needs of individual students and emphasizes individualized, needs-based programming as an essential component. Ferguson’s (1995) construct of “authentic inclusion” refers to full inclusion and serves as an ideal definition where students with disabilities fully participate along non disabled peers in a social and learning environment that supports their strengths and needs.

Autism Spectrum Disorders

Autism is a developmental disability that is usually diagnosed in young children before the age of three. At one time, autism was considered a rare disorder, but currently, it affects 1 in 110 individuals and is now considered a high incidence disability (Centers for Disease Control and Prevention, n.d.; Gelbar, Anderson, McCarthy, & Buggey, 2012). Autism is four times as common in boys as in girls (American Psychiatric Association, 2000). Autism is considered a spectrum of disorders due to the variability of severity of autism and its impact on development (Lynch, 2009).

Autism Spectrum Disorder (ASD) is comprised of several disorders including: (a) autism, (b) pervasive developmental disorder – not otherwise specified, (c) Asperger's syndrome, (d) Rett syndrome, and (e) Childhood Disintegrative Disorder, but all definitions define ASD as having impaired social and language development. For the purpose of this dissertation, ASD refers to autistic disorder, Asperger disorder, pervasive developmental disorder – not otherwise specified (PDD-NOS) and high functioning autism. High functioning autism is a general term used to refer to students with autism who have IQs above 70 (Carpenter, Soorya, & Halpern, 2009; Siegel, Minshew, & Goldstein, 1996). The medical definition of autistic disorder is characterized by having three types of observable features such as: behavioral deficits in social awareness and reciprocity, behavioral deficits in producing and understanding communication and language, and behavioral excesses in the display of odd, repetitive behaviors and interests (DSM-IV-TR; American Psychiatric Association, 2000).

Characteristics of ASD. Autism Spectrum Disorders are defined as a group of developmental disabilities characterized by deficits in the development of socialization, communication, behavior, and, in many case, learning, attention, and sensory functioning (Kalyva & Avramidis, 2005; Rice et al., 2010). The Individuals with Disabilities Education Act 2004 (IDEA 2004) defines autism as a developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before age three, which adversely affects a child's educational performance (IDEA 2004, [34 CFR §300.8(c)(1)]).

Educational practices for children with ASD. Classroom teachers require the tools and knowledge to meet the functional needs of their students with ASD (Horrocks, White & Roberts, 2008; Spencer & Simpson, 2009). Organizational difficulties, transitions, and task completion are all obstacles for children with ASD in the classroom (Boyd & Shaw, 2010). In addition, difficulties with processing auditory information can affect their abilities to follow verbal directives or multistep directions (Boyd & Shaw, 2010). An important goal for all students is developing the ability to function independently throughout the school day, by organizing materials, completing routine tasks, and generalizing information. For students with an ASD, these skills are the foundation for successful community inclusion and life skills.

More students with disabilities, including those with ASD, are being provided with all or nearly all of their educational services in general education classrooms among their non-disabled peers in general education classrooms (Eldar, Talmor, & Wolf-Zuckerman, 2010) with teachers being required to provide the necessary specialized instruction (Spencer & Simpson, 2009). Many general education teachers do not have sufficient training in the education of students with disabilities as legal mandates such as No Child Left Behind (NCLB, 2002) and IDEA 2004, have led to the placement of more students with disabilities, including ASD, in general education classrooms (Boyd & Shaw, 2010; Eldar et al., 2010). In addition, these laws are holding schools accountable for every child's progress, thus enforcing equal access to general education curriculum and measuring student progress with standardized assessments or alternate assessments.

However, such legislation does not address the specially designed instruction or supports, which must be in place to support successful inclusion and access to the general education curriculum (Boyd & Shaw, 2010).

Inclusion of students with ASD. The LRE principle as stated in IDEA 2004 requires that public agencies must ensure that, to the maximum extent appropriate, children with disabilities are educated among children without disabilities. Furthermore, IDEA 2004 states that,

> “special classes, separate schooling, or other removal of children with disabilities from the regular educational environment occurs only if the nature or severity of the disability is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactorily” §300.114(a)(2)(i).

The amount of time a student spends in school with nondisabled peers is based on the LRE continuum. Students with ASD fall at every level of that continuum, ranging from full inclusion to no inclusion with nondisabled peers (Mesibov & Shea, 1996; Ochs, Kremer-Sadlik, Solomon, Gainer Sirota, 2001). Inclusion has been shown to have a beneficial effect on young students overall development, especially in the area of social skill development (Buysse & Bailey, 1993; Lynch & Irvine, 2009). However, for students with ASDs, inclusion without appropriate accommodations may not provide enough support, either academically or behaviorally (Ochs et al., 2001).

The LRE continuum directly affects the inclusive education of children with an ASD who demonstrate significant deficits in basic areas of functioning, including social interaction, communication, learning, and behavior. These challenges contribute to the need for supplementary aids and services that are crucial in meeting their needs in a full inclusion model. As the number of children diagnosed with an ASD increases, more of these students served in public schools are recommended for placement in general education settings. General education teachers and administrators commonly support inclusion of students with an ASD, but few feel they are knowledgeable or well prepared to meet their complex needs (Horrocks et al., 2008). This general education perception of limited knowledge of ASDs coupled with the mandate for LRE poses an incompatible position for students being served in an inclusion model.

Interventions used with individuals with ASD. For children with developmental disabilities, early intervention is a key factor. For children with an ASD, most early intervention consists of one-on-one tutoring, therapy, direct teaching of behaviors, and social skills training (Kasari et al., 1999; Lovaas, 1981; Lovaas & Smith, 1989; Rogers, 1998). However, many students with ASDs require visual supports, such as pictures or written cues, and reminders to complete even the simplest tasks and develop the skills needed for increased independence. Without proper supports in place, 'inclusion' is just another label and students will continue to experience exclusion when placed in the general education classroom (Bock, Bakken, & Kempel-Michalak, 2009).

As the number of students with ASDs continues to increase in schools, evidence-based interventions also evolve as standard practices. Many interventions focus on increasing students' social or communication development (Bellini, Peters, Benner, & Hopf, 2007; Flippin, Reszka, & Watson, 2010). Teaching strategies rely on frequent adult prompting and reinforcement, which may create a dependence on adult support, defined as prompt dependence (Hume, Loftin, & Lantz, 2009). While these strategies are necessary in providing the acquisition of skills, strategies that promote independence should also be addressed. The most common research based interventions (Ryan, Hughes, Katsiyannis, McDaniel, & Sprinkle, 2010) to increase independence for students with an ASD include structured work systems (Carnahan et al., 2009; Hume et al., 2009; Panerai et al., 2009; Schopler, 1994), self-monitoring (Hume et al., 2009; King-Sears, 2006; King-Sears & Carpenter, 2005; Lee, Poston et al., 2007; Lee, Simpson et al., 2007), social stories (Adams, Gouvousis, Van Lue, & Waldron, 2004; Agosta, Graetz, Mastropieri, & Scruggs, 2004; Barry, & Burley, 2004; Brownell, 2002; Gray & Garand, 2003; Kuoch & Mirenda, 2003), video modeling (Charlop-Christy, Le, & Freeman, 2000; Cihak, Fahrenkrog, Ayres, & Smith, 2010; Delano, 2007; Dowrick, 1999; Maione & Mirenda, 2006; McCoy & Hermansen, 2007; Nikopoulos & Keenan, 2003), and video self modeling (Bellini & Akullian, 2007; Bellini, Akullian, & Hopf, 2007; Buggey, 2005; Buggey, 2007; Hitchcock, Dowrick, & Prater, 2003).

Structured work systems. Structured work systems refer to an element of structured teaching designed specifically for students with an ASD. The Treatment and Education of Autistic and related Communication handicapped Children (TEACCH) method trains parents to be co-therapists and takes into account the features of ASD using structured and continuous interventions, environmental adaptations, and augmentative and alternative communication in order to minimize the child's obstacles. (Panerai et al., 2009; Schopler, 1994). According to Hume, Loftin and Lanz (2009), there are four main elements to a structured work system which include:

1. The tasks the student is supposed to do.
2. How much work there is to be completed.

3. How the student knows he/she is finished (progress toward goal).

4. What to do when he/she has finished

Recent studies have demonstrated the efficacy of the TEACCH work system in increasing on-task behavior in students with autism, while decreasing the number of prompts required from professionals (Hume & Odom, 2007; Hume & Odom, 2009).

Self-management. One of the main characteristics of ASDs, by educational definition, is the negative impact on an individual's communication and socialization as it relates to one's education (IDEA, 2004, 20 U.S.C. § 1400). As public education moves more toward inclusion, students with ASDs are more frequently expected to demonstrate their knowledge using their socialization and communication skills (Ochs et al., 2001). These skills can be taught using self-management strategies.

Self-management is a term used to describe the process of achieving personal autonomy. The goal of self-management for individuals with disabilities is to shift supervision and control from a person of authority to the person him/herself (Lee, Poston et al., 2007; Ward, 2005). The three most commonly accepted components to self-management include: (a) self-monitoring, (b) self evaluation, and (c) self-reinforcement (King-Sears, 2006; Lee, Poston et al., 2007; Lee, Simpson et al., 2007).

Self-management strategies tend to be most widely used in developing task completion and independent behaviors for students with autism. When teaching skills, instructors use a variety of instructional cues including verbal, gestural, and physical prompting as well as modeling. Students may continue to rely upon the teacher for initiation and/or correction cues even after they have learned the skill (Alberto, Sharpton, Briggs, & Stright, 1986). When students become dependent on prompts, stimulus control must be shifted from the teacher to the student. Strategies must be used in order for the student to rely more on himself or herself rather than on an external prompt.

Self-monitoring. Self-monitoring skills are commonly used to address undesirable behaviors for students with autism. Self-monitoring skills are taught intentionally, developing one's ability to monitor personal engagement in appropriate social skills, on-task behaviors, and problematic behaviors (Koegel, Koegel, Harrower, & Carter, 1999). For a child with an ASD, the ability to self-monitor behaviors can also serve as a last phase of development toward generalization of new skill (Lee, Simpson et al., 2007).

Social stories. Social story interventions consist of short stories that describe situations by explaining the social cues and common responses of others (Gray, 2000). For children with an ASD social stories provide a detailed description of a potentially confusing situation in a short, concise story format that is developmentally appropriate for the individual. Social stories are directive and affirmative, and provide information about appropriate actions or behaviors for a given situation.

A growing body of literature has examined the effectiveness of social stories with individuals with autism. Existing literature showed that social stories were effective in decreasing aggressive behavior (Adams et al., 2004; Gray & Garand, 1993; Rowe, 1999), increasing appropriate behaviors (Agosta et al., 2004; Kuoch & Mirenda, 2003; Smith, 2001), increasing the use of appropriate social skills (Barry & Burley 2004; Hagiwara & Myles, 1999), and increasing on-task behavior (Schneider & Goldstein, 2010).

Video modeling and video self-modeling. One type of instructional strategy that incorporates the essence of social stories and the use of technology is video modeling, which is based heavily on visual cues and complements the visual strengths of students with an ASD (McCoy & Hermansen, 2007). Video modeling consists of video-taping desired behaviors, giving the individual opportunities to view the video then setting up similar situations in order to expand the child's capacity to memorize, imitate, and generalize the desired behaviors. (Maione & Mirenda, 2006; McCoy & Hermansen, 2007).

With the relative ease of technology, participants are acting as their own models in videos. This method is described as video self-modeling (VSM) and has been shown to be effective across a wide range of behavior, ages, and abilities (Bellini & Akullian, 2007; Bellini, Peters, Benner & Hopf, 2007; Buggey, 2005; Buggey & Ogle, 2010; Delano, 2007; Gelbar, Anderson, McCarthy, & Buggey, 2012; Hitchcock, Dowrick, & Prater, 2003; Prater, Carter, Hitchcock, & Dowrick, 2012). Research in video modeling has demonstrated that the most effective models are close in age and function only slightly above the level of the participant (Buggey, 2005; Hitchcock et al., 2003; Prater et al., 2012). Video self-modeling has been effective in studies across multiple disciplines, such as psychology, and speech pathology, and in improving academic achievement in general. It is thought that by watching edited self-modeling videos, individuals acquire mastery of targeted behaviors (Bellini, Akullian, & Hopf, 2007). Numerous studies report that VSM interventions are effectively generalized across situations, persons, and environments (Bellini & Akullian, 2007; Bellini, Akullian et al., 2007; Buggey, 2005; Charlop-Christy et al., 2000; Corbett, 2003; Delano, 2007; Maione & Mirenda, 2006; McCoy & Hermansen, 2007; Nikopoulos & Keenan, 2003; Prater et al., 2012).

Problem Statement

Autism spectrum disorder diagnoses continue to be on the rise, and an increasing number of students with an ASD are being educated in general education classrooms. In an effort to adhere to the LRE mandates and allow students with disabilities access to standards based curriculum, supports must be in place in order for students to be successful and develop academically (Kluth, 2010). However, many times students with an ASD struggle in completing even routine tasks for a multitude of reasons. Often general education teachers feel untrained and have little knowledge of the specially designed instruction and supports necessary to support included students with an ASD (Horrocks et al., 2008).

Over the past decade, there has been an increase in curriculum related publications that focus on best practices for students with an ASD. Many of these focus on social skill interventions, including the use of video modeling (VM) and VSM (Bellini, 2008; Delano, 2007; Charlop-Christy et al., 2000). In addition, several studies address assisting teachers with the design of an inclusive program for students with an ASD (de Boer & Simpson, 2009; Smith, 2011). However, few studies provide detailed strategies to support successful inclusion, such as VM and VSM interventions (Buggey, 2009; Kluth, 2010; Spencer & Simpson, 2009).

In addition, it appears that few investigations have explored methods of improving academic task completion for individuals with an ASD using a VSM intervention, nor does there appear to be any studies that have measured the efficacy of video modeling to increase independent academic task completion of students with an

ASD in an inclusive general education setting (Bellini & Akullian, 2007; Delano, 2007; Graetz, 2009).

Rationale for the Study

VSM, based on its growing empirical base, may provide a way to support the specialized needs of students with an ASD by positively affecting task completion and giving students access to general education curriculum. In numerous studies across ages and disabilities, VSM produced results that accelerated quickly from baseline performance, were maintained in follow-up assessment, and were effectively generalized across situations, persons, and environments (Bellini & Akullian, 2007). This study will add to the research by demonstrating the efficacy and efficiency of using a VSM intervention within the general education classroom to support the inclusion of the rapidly growing number of included students with an ASD.

There are many questions regarding how to support students with an ASD, such as (a) how can all teachers support students with ASDs who are increasingly "included" with their non-disabled peers, but require specialized instruction and supports, and (b) how can students with ASDs develop increased independence in an inclusive classroom and successfully complete routine tasks without constant adult verbal or physical prompting or overt support? Cameron, Cook and Tankersley (2012) found that verbal prompting is not generalized by students and the more severe a student's disability, the more prompting they tend to receive by adults. This study will investigate the problem of incomplete routine academic tasks performed independently by students with an ASD. While studies have been conducted to investigate the effectiveness of VSM on classroom behavior of students with an ASD, no studies have been identified that examine the effects of VSM on reducing prompt dependence and increasing independence for students with an ASD in an inclusive classroom (Bellini & Akullian, 2007; Delano, 2007; Gelbar, Anderson, McCarthy, & Buggey, 2011). It is hypothesized that using a VSM intervention, students with an ASD will independently complete academic tasks. When students complete academic tasks independently they are able to demonstrate authentic understanding of curriculum. In turn, teachers are able to formatively assess student learning by planning and teaching lessons that are intentional and rigorous, yet appropriate based on the goals set forth in students' Individual Education Plans (IEP).

Research Questions

This study will examine the difficulty that many students with ASDs have within inclusive classrooms: failure to complete routine academic tasks independently. The following research questions were investigated:

1. Is VSM an effective intervention to increase task completion of written work for elementary aged students with an ASD?
2. Is VSM an effective intervention for maintenance of task completion for elementary aged students with ASDs?
3. Can elementary aged students with an ASD generalize independent task completion skills using VSM?

To answer these questions, a VSM intervention was designed to increase the independent task completion of students with an ASD will be applied in a fifth grade inclusive English language arts (ELA)/social studies classroom. Generalization to another subject area (math) was also examined, to determine if the VSM intervention affected students' generalization of independent task completion skills. The results are presented using a multiple probe across participants design. The VSM intervention was delivered on an Apple iPod Touch™ and the social validity was examined through surveys completed by the classroom teachers, special education resource teacher, and students.

Definition of Terms

Apple™ iPod Touch™. A touch screen portable media player, personal digital assistant, handheld game console, and Wi-Fi mobile device that is designed and marketed by Apple. (Retrieved from: http://en.wikipedia.org/wiki/IPod_Touch)

Assistive technology device. Identified in IDEA 2004 as: Any item, piece of equipment or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of children with disabilities. The term does not include a medical device that is surgically implanted, or the replacement of such device. (IDEA, Authority 20 U.S.C. 1401(1))

Autistic disorder. A neuro-developmental disorder characterized by three types of observable features: behavioral deficits in social awareness and reciprocity, behavioral deficits in producing and understanding communication and language, and behavioral excesses in the display of odd, repetitive behaviors, and interests (DSM-IV-TR; American Psychiatric Association, 2000).

Autism. A developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before age three, that adversely affects a child's educational performance. [IDEA 2004, 34 CFR §300.8(c)(1)]

Autism spectrum disorder (ASD). A group of developmental disabilities characterized by deficits in the development of socialization, communication, behavior, and, in many cases, learning, attention, and sensory functioning (Kalyva & Avramidis, 2005; Rice et al., 2010). ASDs include autistic disorder, Asperger disorder, high functioning autism, and pervasive developmental disorder – not otherwise specified (PDD-NOS).

Developmental disability. This term refers to several disabilities that are identified before the age of three, including: attention deficit hyperactivity disorder; intellectual disability; cerebral palsy; autism; seizures; stuttering or stammering; moderate to profound hearing loss; blindness; learning disorders; and/or other developmental delays (Boyle et al., 2011)

In Vivo modeling. This term refers to the use of real life models demonstrating tasks for students to attempt (Charlop-Christy et al., 2000; Graetz, Mastropieri, & Scruggs, 2006).

Inclusion. A unified system of public education that incorporates all children and youths as active, fully participating members of the school community; that views diversity as the norm; and that ensures a high-quality education for each student by providing meaningful curriculum, effective teaching, and necessary supports for each student (Ferguson, 1995 p. 286).

Individual education plan (IEP). The term 'individualized education program' or 'IEP' means a written statement for each child with a disability that is developed, reviewed, and revised in accordance with section 614(d). [IDEA, §20 USC 1412 Sec. 612 (a)(4)]

Individuals with Disabilities Education Act 2004 (IDEA). The United States federal law originally enacted by Congress in 1975 to ensure that children with disabilities have the same opportunities as other children: to receive a free and appropriate education. Congress passed the most recent amendments in December, 2004, with final regulations published in August 2006 (Part B for school aged children) and September 2011 (Part C, for babies and toddlers). (Retrieved from http://nichcy.org/laws/idea)

Kodak™ Playfull™ Video Camera Ze1. A tapeless camcorder for recording digital video created by Kodak (Retrieved from: http://support.en.kodak.com).

Least restrictive environment (LRE). Stated in IDEA, that "in general - to the maximum extent appropriate, children with disabilities, including children in public or private institutions or other care facilities, are educated with children who are not disabled, and special classes, separate schooling, or other removal of children with disabilities from the regular educational environment occurs only when the nature or severity of the disability of a child is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactorily. [IDEA §20 USC 1412 Sec. 612 (a)(5)(a)]

Self-management. A term, rooted in psychology, which refers to a strategy in which a student keeps track of his/her own behavior, either for the purpose of increasing a positive behavior or skill or for the purpose of decreasing a problem behavior (Lee, Simpson et al., 2007; Ward, 2005).

Social learning theory. A conceptual framework that assumes human beings are intelligent problem solvers, rather than individuals controlled passively by their environment (Bandura, 1977).

Social Story™. Short stories that describe situations by explaining the social cues and common responses of others (Gray, 2000).

Supplementary aids and services. Aids, services, and other supports that are provided in regular education classes, other education-related settings, and in extracurricular and nonacademic settings, to enable children with disabilities to be educated with nondisabled children to the maximum extent appropriate (IDEA, §300.114 through 300.116).

Video modeling (VM). Refers to the practice of video taping desired behaviors, giving the individual opportunities to view the video then setting up similar situations in order to expand the child's capacity to memorize, imitate, and generalize the desired behaviors (Delano, 2007; Maione & Mirenda, 2006; McCoy et al., 2007).

Video self modeling (VSM). Refers to the practice of participants acting as their own models in videos (Buggey, 2005; Dowrick, 1986; Hitchcock et al., 2003).

CHAPTER II

REVIEW OF THE LITERATURE

The purpose of this chapter is to provide a review of the pertinent literature related to this study. Five major areas are addressed: (a) autism spectrum disorders (ASD), (b) inclusion of students with an ASD, (c) assistive technology and visual strategies, (d) teacher attitudes and children with autism, and (e) VM/VSM to promote independent task completion, socialization, and communication.

Autism Spectrum Disorders

Autism was first recognized as a disability by Dr. Leo Kanner in 1943. Kanner's (1943) publication has been considered the foundational research of autism (Blacher & Christensen, 2011), where he examined the behaviors of 11 children and recognized delays and deficits in the development of social interaction, communication and behavior.

Autism is viewed as a neurological disability that typically appears during the first three years of life. Autism spectrum disorders (ASD) affect approximately 1 in 110 individuals (Rice et al., 2010). Autism is more prevalent in boys than in girls and the exact cause remains unknown. Research indicates that race, family income, and lifestyle do not affect one's chance of an autism diagnosis (Baron-Cohen, 2008; Frith, 2008). Additionally, autism impacts the normal development of the brain in the areas of social interaction and communications skills. Children and adults with autism typically have difficulties with verbal and non-verbal communication, social interactions, and leisure or play activities (Baron-Cohen, 2008; Frith, 2008). In some cases, individuals may demonstrate aggressive and/or self-injurious behavior (Baron-Cohen, 2008; Frith, 2008). According to the DSM-IV (2000), an autism diagnosis is given when a child exhibits 6-12 symptoms across three major areas: social interaction, communication, and behavior. Other diagnoses on the autism spectrum (i.e. Asperger Syndrome, Rett Syndrome, Pervasive Developmental Disorder- Not Otherwise Specified or, childhood disintegrative disorder) may be given when an individual meets some of the criteria for autism or has autistic-like symptoms (Baron-Cohen, 2008; Frith, 2008).

For many children with an ASD, the ability to make social connections and develop meaningful peer relationships is complicated. Children with an ASD have difficulty participating in play, joint attention tasks, and social reciprocity (Bledsoe, Myles, & Simpson, 2003; Lantz, Nelson, & Loftin, 2004). They also may not demonstrate an ability to independently navigate social situations, which affects their ability to orient and attend to social tasks and engage in socializing (Kroeger, Schultz, & Newsom, 2007; Simpson & Myles, 1998).

Studies suggest a lower frequency and lower quality of social interaction by children with autism at all functioning levels (Bauminger, Shulman, & Agam, 2003; Bauminger & Kasari, 2000). For example, in their study, Bauminger et al. (2003) compared peer interaction and loneliness among 18 students with high functioning autism (HFA) and their typically developing peers between the ages of 8 and 17. The investigators defined HFA as children with autism, with at least an average IQ measure, who generally lack the understanding of social relationships and interactions with peers. They may require specific interventions to focus their abilities in a more socially meaningful way (Bauminger et al., 2003). In the study, the investigators observed the number of spontaneous peer interactions and their responses during natural settings at school, such as recess and snack time. Their findings suggested that typical peers had higher levels of peer interaction, as expected, but the specific social behaviors of both groups were identical. For example, both groups displayed similar levels of eye contact, proximity, verbal or physical aggressiveness. Bauminger et al. (2003) found that children with HFA initiated contact more than reciprocated social contact, suggesting that children with autism are seeking social interaction with peers. However, it was found that children with HFA demonstrated increased functional communication rather than the spontaneous communication demonstrated by typical peers. They also found that children with HFA reported higher degrees of loneliness than their typically developing peers. The results of this study suggest the need for specialized instruction for children with ASD, giving them an opportunity to feel accepted by similar peers as well as increased opportunities to interact with typical peers.

Bauminger's (2003) findings support the need to examine steps toward independence because in many classrooms, children with autism rely on adult prompting in all aspects: social, academic, and communication. Independently performing task completion of previously mastered skills brings children with an ASD closer to their typically developing peers, who generally do not rely on continuous adult prompting to complete tasks in an inclusive classroom.

Social skills in school settings. Social skills deficits for students with an ASD are the greatest hindrance toward educators' perceptions of successful inclusion (Horrocks, White, & Roberts, 2008). In their study, Robertson, Chamberlain, and Kasari (2003) examined the relationships between general education teachers and students with autism. They found that teachers generally had positive relationships with students with ASDs, but the quality lessened when students had a higher rating of maladaptive social or inattentive behaviors. Consistent with the Ochs et al. (2001) research, Robertson et al. (2003) concluded that the relationship a student with an ASD had with his teacher impacted subsequent relationships with his peers and his future level of social inclusion. They also found that the quality of the teacher-student relationship was associated with the student's peer status in the classroom. Therefore, the relationship a student with an ASD had with his teacher impacted subsequent relationships with his peers and his future level of social inclusion. For students with an ASD, who are continuously monitored and prompted by adults, this research suggests that these students may viewed by peers as having less ability and possibly being less capable, supporting the need to increase independence.

Ochs et al. (2001) found that interactions and exposure to typically developing peers support the social and communication development of children with ASD, however, inclusion without supports is not enough (Boyd & Shaw, 2010). Both parents and educators must educate themselves on the evidence based practices effective for students with autism such as evidence based visual and environmental supports (Lovitt & Cushing, 1999).

Inclusion of students with an ASD. Aside from medication and biological interventions, the primary source of intervention for students with an ASD is through their families and the educational system (Lord et al., 2005). There does not appear to be a universally supported model to educate all children with an ASD. Research suggests that there is a range of services from very specific one-on-one discreet trial programs to full inclusion among typically developing peers (Graetz, 2009; Rogers, 1998; Ryan, Hughes, Katsiyannis, McDaniel, & Sprinkle, 2010). At times, the full inclusion model appears almost identical to general education settings with little to no specially designed instruction or individualized interventions (Lord et al., 2005).

Since an ideal educational environment for students with an ASD has not been proven, debates continue over the best educational placement for students with ASD. The actual placement of students with an ASD falls at every level of the educational continuum (i.e. self contained) to a least restrictive (full inclusion) classroom environment. A concern about full inclusion for students with an ASD is that, as a policy, it "explicitly and implicitly discourages the development of specialized approaches," but the needs of students with autism make specialization essential (Mesibov & Shea, 1996, p. 345). Few states require teachers to hold a specialized certification to work with students with an ASD and most educators' knowledge of autism research is generally minimal (Lord et al., 2005). The LRE strongly encourages that students with disabilities are educated with their non disabled peers, yet few teachers have the specialized training to include all of their students (Ferguson, 2008). Therefore, there remains an argument whether the inclusive classroom is more restrictive than a specialized, special needs classroom where modifications are in place and students have access to curriculum materials, but not access to their non disabled peers (Ravet, 2011).

Ravet (2011) examined the dominant arguments for inclusive (i.e. rights based perspective) v. specialized (i.e. needs based perspective) educational environments and the implications of this argument for classroom teachers. The results of this study found a need for specialized pedagogy and increased support for teachers to implement specialized approaches in an effort to better meet the needs of their students with an ASD.

Ochs et al. (2001) used ethnographic observations and video recordings to examine the social realities of inclusion for 16 HFA students ranging from 8-12 years old. The researchers examined the children's reactions to negative inclusion, whether or not it was intentional, and its implications on the HFA student's social connectedness. The results of this study suggested that the best inclusive models consisted of teachers who positively included students with an ASD. Furthermore, the results indicated that when teachers practice positive inclusion, peers might also positively include students with HFA and practice greater peer awareness of the capabilities and limitations of students with HFA.

Recently, researchers are calling for an "integrated approach" in education and recognize the need for specially designed instruction to support successful communication, social, and behavioral interactions (Lynch & Irvine, 2009). Mesibov and Shea (1996) suggest that for some students with an ASD, it may be best to develop predictable routines and practices in a self-contained special education classroom with a teacher knowledgeable about the research based practices in autism before implementing mainstreaming or full inclusion.

Lynch and Irvine (2009) suggest that inclusion should "not be open to interpretation" children are "either included or they are not" (p. 852). They offer suggestions for best practices including: specialized curriculum, highly supportive teaching environments and general education strategies, predictability and routine, functional approach to challenging behavior, transition services, and family involvement. They maintain that family support is integral to the development of a positively functioning inclusive education for children with an ASD.

Parental perceptions. Kasari et al. (1999) investigated parents' perceptions on inclusion as it related to their children with an ASD and found that parents of older children with ASD expressed less satisfaction with the educational services their children were receiving in inclusive classrooms. Furthermore, the parents reported lower levels of inclusion activities for their children with an ASD due to concerns over the children's peer relationship problems and possible rejection by others. Additionally, parents noted concerns about their children being easily overwhelmed by a larger class size as well as the school's inability to provide a specialized education (i.e., discreet trials) in an inclusive setting (Kasari et al., 1999). In a similar study, Lovitt and Cushing (1999) found that approximately equal numbers of parents reported feelings of satisfaction and dissatisfaction with their children's education. Consistent with the findings from Kasari et al. (1999) it appeared that parents became more dissatisfied with their child's education as children became older. An explanation could be that the educational system becomes more standardized and less individualized as students get older (Lynch & Irvine, 2009). These findings suggest that more must be done on the part of the educational institution to provide supports for students with disabilities, particularly ASDs, so that children may access their right to a free and appropriate public education. Developing independence for students with an ASD early, in the elementary years, through the use of specialized instruction and visual supports, such as video self-modeling, may help foster increased support of inclusion by parents of children with an ASD.

School personnel factors. General education teachers and administrators generally support inclusion of students with ASDs, but few feel they are knowledgeable or well prepared to meet the complex needs of students with an ASD (Horrocks et al., 2008). This general education perception of limited knowledge of an ASD coupled with the mandate for the least restrictive environment (LRE) poses an incompatible position for students being served in an inclusion model. On one hand children with an ASD need to be provided access to the general curriculum. On the other hand, it is not required that general education teachers have the training and knowledge base for educating children with an ASD (Horrocks et al., 2008; Ochs et al., 2001). Ochs et al. (2001) found that teachers play a pivotal role in the social acceptance of individuals with an ASD by promoting positive inclusion rather than negative inclusion. Negative inclusion is the practice of neglect and/or overt rejection, whereas, positive inclusion refers to disclosing awareness to non-disabled peers regarding the capabilities and impairments of children with autism (Ochs et al., 2001). The findings by Ochs et al. (2001) suggest that schools must intentionally implement positive inclusion interactions so that children with disabilities have access to the proper supports, which may promote equity, independence, and exposure to typically developing peers and may support the social deficits of children with an ASD by allowing access to peer role models. The findings also suggest that intentional, positive inclusion interactions may promote the social acceptance of students with an ASD among their peers.

Assistive Technology and Visual Strategies

One way teachers can support students with an ASD in an inclusion model is through the use of visual supports. There are many research-based options that provide visual supports to children with an ASD, including Social Stories™ (Abner & Lahm, 2002; Adams et al., 2002; Gray, 2000), video modeling, and video self-modeling (Bellini & Akullian, 2007; Buggey & Ogle, 2012; Delano, 2007; Dowrick, 1999) all of which can be considered assistive technology on a student's IEP.

Assistive Technology

Assistive technology (AT) devices are defined as "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities" [29 U.S.C. Sec 2202(2)]. Assistive technology, as it relates to students receiving a public education, means that when designing an Individualized Education Plan (IEP) for a student with special needs, the team must consider the use and implementation of assistive technology. Although IDEA mandates school districts to consider assistive technology devices because they assist students in remaining in a least restrictive environment, there remains a disproportionately low number of students who actually use assistive technology devices or technology-based supplementary aids and services as specifically stated in their IEPs (Parette & Murdick 1998). One reason for this may be that few teacher preparation programs are adequately preparing preservice teachers with the knowledge to implement AT devices (Safhi, Zhou, Smith & Kelley, 2009; Smith & Kelley, 2007).

Some AT tools are used to enhance cognitive development in a variety of capacities and settings. Implementing research based strategies as outlined by Horner et al. (2005), such as Social Stories™ (Abner, & Lahm, 2002; Adams et al., 2004; Gray & Garand, 2003), and video modeling and video self-modeling (Bellini & Akullian, 2007;

Buggey & Ogle, 2012; Charlop-Christy et al., 2000; Delano, 2007; Dowrick, 1999) are examples of AT appropriate for an IEP, making implementation legally mandatory.

Social Story™ Approaches

Social Story™ interventions consist of short stories that describe situations by explaining the social cues and common responses of others (Gray, 2000). For children with an ASD, social stories provide a detailed description of a potentially confusing situation in a short, concise story format that is developmentally appropriate for the individual. Gray and Garand (1993) developed a set of guidelines to writing social stories, which include writing the story on the student's reading and comprehension level and using age appropriate vocabulary. Furthermore, there are six types of sentences that must be included in each story: (a) descriptive, (b) perspective, (c) directive, (d) control, (e) affirmative, and (f) cooperative. Each type of sentence is written in simplistic language. For example, Simpson (1993) provides an example of a typical social story used with an 11-year-old boy with an ASD to reduce calling out in the classroom:

> Students look at and listen to Miss Ramos when she is talking. I look at and listen to Miss Ramos when she is talking. Students are quiet when Miss Ramos is talking. I am quiet when Miss Ramos is talking (p. 2).

Social stories are concise, directive, and affirmative, and provide information about appropriate actions or behaviors for a given situation. A growing body of literature has examined the effectiveness of social stories with individuals with autism, including decreasing aggressive behavior, increasing appropriate behavior, increasing the appropriate use of social skills, increasing on-task behavior, and decreasing tantrum behaviors. For example, Reynhout and Carter (2006) examined 11 studies using social stories to teach appropriate behaviors to students with disabilities and found that although data on maintenance and generalization are limited, the results suggested that social stories are effective in shaping the behaviors of children with disabilities. Ali and Fredrickson (2006) also examined 16 articles for the evidence base of social stories and found that all of the results were positive. Ali and Fredrickson (2006) suggested that the available evidence base suggested that social stories were beneficial to individual children with an ASD. Furthermore, the data suggested that social stories could be used in combination with other approaches, provided that there is careful evaluation of changes over time in each student's target behaviors and monitoring of other important aspects of their social functioning.

In their study, Adams et al. (2004) used an ABAB design to examine the frustration behaviors of a 7 year-old boy with Asperger syndrome. The researchers identified homework time as frustrating for the student by noting physical responses (crying, screaming, falling, hitting) and verbal responses ("I can't do this" and "I have a dumb brain" p. 88) that supported frustration and anxiety related to homework. The researchers implemented a social story intervention over 12 sessions broken into four phases; (1) the baseline phase, (2) the treatment phase, (3) withdrawal of the treatment phase, and (4) reintroduction of the treatment. The data suggested that the use of social stories decreased crying by 48%, decreased screaming by 61%, decreased falling by 74%, and decreased hitting by 60%. Parents and teachers also reported improved ability to express needs verbally. Rowe (1999) used a social story to decrease aggressive behaviors in the school lunchroom with a second grade male student identified with Asperger syndrome. The case study results suggested that the social story intervention was immediately effective in decreasing the student’s verbal and physical outbursts.

Agosta et al. (2004) used an ABCA design to implement a social story intervention to decrease verbal outbursts (screaming, yelling, crying, humming) of a child with autism during circle time in a special education classroom. Their results suggested that the use of a social story increased the length of the student’s quiet behavior from 4.8 minutes (baseline), to 9.5 minutes (intervention phase 1), to 8.8 minutes (intervention phase 2) to 12 minutes (maintenance).

Examining the efficacy of social stories when used as the sole intervention to increase social interactions, Scattone, Tingstrom, and Wilczynski (2006) used a multiple baseline across participants design among three male children with an ASD. Two of the three students made meaningful gains in social initiations with the social story intervention and those same two students generalized social initiations to other areas, including home and the playground. In another study, Kuoch and Mirenda (2003) used social story interventions to decrease aggressive or undesirable behaviors with young male students with autism. The results of this study also suggested that social stories are an effective means of increasing positive behaviors for young students with an ASD.

While research supports the efficacy of social stories for students with an ASD, many children may rely on adult supports to read and process the message presented in the social story, which may decrease their independence in the classroom. Computer assisted social stories may help eliminate the need for some adult supports allowing children with an ASD to achieve more independence.

Social stories and technology. Computer assisted or multimedia social stories present information in a structured, consistent, and attractive presentation with visual and auditory stimuli (Hagiwara & Myles, 1999). Technology enhances social stories because it allows stories to become personal and interactive by the use of digital photos, video, and voice recording. Using digital media can also increase learning by gaining students' attention through the use of familiar people and settings (More, 2008). Multimedia applications offer children more control of the learning experience (Yildirim, Ozden, & Aksu, 2001). Research indicates that giving the student control of a learning experience can lead to increased motivation and engagement (More, 2008; Yildirim et al., 2001), and can allow for repetition and feedback which may be necessary for some students with an ASD.

Digital media applications also offer the benefits of repetition and direct feedback. Several research investigations have found that computer aided instruction produces positive results across a variety of skills, including increased phonemic awareness (Segers & Verhoeven, 2005), attention to task (Cardona, Martinez, & Hinojosa, 2000), vocabulary generalization (Bosseler & Massaro, 2003), and self-advocacy (Bernad-Ripoll, 2007; Lancaster, Schumaker, & Deshler, 2002).

Creating a social story, either in writing or with media, requires some effort on the part of the caregiver, but if the tools are readily available, its creation requires minimal training and funding. One attempt that has been effective with students diagnosed with an ASD is to apply the foundations of a social story to an interactive media. For example, Bernad-Ripoll (2007) paired social stories with self-as-model photographs to create an intervention to decrease frustration, anxiety, and anger for a 9-year-old boy with Asperger syndrome. A functional behavior assessment was used to identify the antecedent, target behaviors and consequences of behaviors to the student. Bernad-

Rippoll (2007) used a digital camera to take pictures of the student performing targeted behaviors, then used those pictures to create a social story and elicit questions such as "How did you feel?", "Why did you feel like this?" and "What should you do in that situation?" (p. 101). Results indicated that the child could label and explain emotions consistently at 100%. Furthermore, when a caregiver noticed a behavior that typically caused a tantrum and read the social story to the child, the child could deescalate his own behavior by choosing alternate behaviors (i.e. squeezing a stress ball) depicted in the social story.

This research suggests that creating social stories using digital photography or multi-media may give students with an ASD control over the learning environment by connecting with a familiar topic (More, 2008; Yildirim et al., 2001). However, digital photography applied to a paper social story, while portable, may still require adult supports and prompting. Multi-media social stories may eliminate some of the need for adult prompting if students have good computer accessibility, but often computers are stationary, which may increase exclusion of a student with an ASD from his peers if he needs to move away from peers to access the intervention.

Visual Supports through Modeling

The concept of modeling and imitating behaviors was introduced by Albert Bandura as part of his work in social learning theory. Bandura (1977) maintained that children acquire knowledge by observing others perform a skill rather than only personal experience. Bandura (1977) also noted that children must be motivated to attend to their model in order for learning to be effective. He asserted that children must perceive their model as competent and they must identify with him in some way (e.g. physically, age, ethnicity, social group, etc.). The practice of video and video self modeling support Bandura's (1977) theory of observational learning. There is a rapidly growing body of evidence to support the efficacy of video modeling and video self modeling for individuals with an ASD (Dowrick, 1999).

Video modeling. Video modeling (VM) refers to a learner viewing a videotaped depiction of a model correctly performing a target behavior before he or she attempts to perform the target behavior him or herself (Delano, 2007; Maione & Mirenda, 2006). Many positive studies have demonstrated video modeling to be an effective intervention in a variety of areas for individuals with an ASD (McCoy & Hermanson, 2007).

A growing body of evidence suggests that video modeling could be another method to enhance social development in children with autism (Buggey, 2009; Graetz, Mastropieri, & Scruggs, 2006). For example, Nikopoulos and Keenan (2003) examined the effects of VM on initiating social interactions among seven children aged 9-15 years of age, diagnosed with an ASD, being educated in an alternative school for children with intellectual disabilities. A multiple treatment design was used for six children and an AB design was used for one child. The children were shown a video of a model appropriately interacting with peers using different types of toys individualized for the participant. The results of this study found that video modeling enhanced both social initiation and appropriate toy play in four of the seven participants across a number of conditions. The research also suggested that children generalized skills across settings, peers, and toys, after one and two months follow-up. In another study, Boudreau and D'Entremont (2010) used a multiple baseline across subjects design to examine the effectiveness of VM for teaching play skills to two preschool boys with an ASD and the results suggested that

VM is an effective intervention and both children were able to generalize and maintain skills.

In vivo modeling. In contrast, in vivo (real life) modeling refers to real life models demonstrating tasks for students to attempt. Typical teaching methods, teachers modeling behaviors for students, and intensive applied behavior analysis therapy would serve as examples of in vivo modeling. Charlop-Christy et al. (2000) found that students with an ASD who consistently used VM in comparison with in vivo modeling demonstrated quicker rates of acquisition with VM. VM is also more cost effective and less time consuming than in vivo modeling (Graetz et al., 2006).

Although video modeling has been found to increase rates of acquisition for children with an ASD, it was unknown what method children preferred: video or in vivo. Geiger, LeBlanc, Dillon, and Bates (2010) examined preferences of children with ASDs preference for modeling interventions using a concurrent-chains procedure. They investigated the performance of three children with a medical diagnosis of an ASD on individualized skills: “what’s your name” and “draw a house” (Child 1), “tell a joke” and “tell a knock-knock joke” (Child 2), and “draw a house” (Child 3) using a multiple baseline across participants design (p. 280). Results indicated that when given a choice, none of the children demonstrated a preference for in vivo or VM, however, two of the participants attended more to the video model than in vivo, which is consistent with the findings of Charlop-Christy et al. (2000). The results from this study differ from Charlop-Christy et al. (2000) because there was no consistent difference in treatment effectiveness in which one participant performed slightly better with in vivo modeling and the other two participants required the same number of trials to criterion for the two conditions.

Charlop-Christy et al. (2000) found that VM resulted in fewer trials to criterion for four of five participants and better generalization than in vivo modeling.

Video self-modeling (VSM). Video self-modeling was first introduced in the literature in 1970 (Creer & Miklich, 1970). Due to in the inaccessibility and cost of video editing software, VSM research was limited, less than one study per year, and remained mostly in clinical settings (Buggey & Ogle, 2012). There has been a growth in the research since the 1990s, most likely attributed to advances in video editing technology and accessibility (Buggey & Ogle, 2012).

VSM is an extension of video modeling and includes the practice of using oneself, rather than another person, as a model, to observe positive or desirable behaviors (Buggey, 2007; Buggey & Ogle, 2012; Dowrick, 1999). It has been defined as "a procedure in which people see themselves on videotapes showing only adaptive behavior" (Dowrick, 1986, p. 201). Effective VSM interventions edit out all inappropriate behaviors and adult prompting so that the focus of the video is on positive self observation (Buggey & Ogle, 2012). Bellini and Akullian (2007) conducted a meta-analysis of VM and VSM interventions for children with an ASD and found that both interventions met criteria for being an evidenced based practice as defined by Horner et al. (2005). Gelbar et al. (2012) suggest that VSM can be considered an effective evidenced based intervention for children with an ASD across four areas: language/communication, social skills, behavior, and task instruction.

Bellini and Akullian (2007) suggest that VSM supports self-efficacy as defined by Bandura's (1977) social learning theory, (e.g., individuals can acquire self efficacy through observation of their own success). VSM has been successful across multiple disciplines and populations to teach an array of skills (Buggey, 2007; Buggey & Ogle, 2012; Dowrick & Raeburn, 1977; Hitchcock et al., 2003; Prater, Carter, Hitchcock, & Dowrick, 2012). Dowrick (2012) concurred, and also described self-modeling within the construct of learning theory (Bandura, 1977) and proposed that "self-as-model" works because it is a "self evident truth" (p. 30).

Explanations provided by Bellini and Akullian (2007), regarding how self-modeling worked centered on self-efficacy (seeing oneself perform tasks successfully). Dowrick (2012) suggested, however, that there is growing evidence to suggest that "feed forward" and "positive self-review" in self modeling may account for more rapid growth in behavior change. Dowrick (2012) described feed forward as changes in the brain in which component behaviors are reconfigured to create new skills, which may enable rapid changes in behavior or performance. Dowrick (2012) described positive self-review as a process where skills, which are rarely achieved by an individual, are selected to promote a more consistent performance. He suggested that when paired, feed forward and positive self-review allow one's brain to work forward and "time travel" seeing oneself successfully performing a future task (p. 34). Dowrick (2012) suggests that this type of "time travel" explains how video self-modeling works to affect individuals and self-efficacy is more the result of a self-modeling intervention. Dowrick's theories are evolutionary as he is one of the early researchers of VSM in the 1970s.

History of video self modeling. Creer and Miklich (1970) introduced the concept of VSM. They presented a case study of a 10 year-old boy and used a VSM intervention to decrease aggressive and immature behaviors. The researchers videotaped a role-play with the child and for two weeks instructed the boy to view the video, which showed him performing only positive behavior. The results suggested that the negative behavior were reduced. For the next two weeks, the boy watched as he acted as his own model, performing negative behavior, which resulted in increased aggressive and immature behavior. Finally, the researchers again showed the boy the video as he was performing positive behavior, and again negative and immature behavior decreased. The researchers noted that the boy was able to maintain positive behavior for over six months.

Dowrick and Raeburn (1977) conducted another early VSM study to determine the efficacy of videotaped self-modeling using a 4 year-old “hyperactive” boy who was “initially under psychotropic medication” to role play social behaviors (p. 1157). Their findings suggested that VSM when paired with medication, was a clinical success and the subject increased positive behaviors over 60% during self-directed play.

Video modeling and video self modeling across disciplines. There have been several reviews of the studies in VM and VSM (Bellini & Akullian, 2007; Buggey & Ogle, 2012; Dowrick, 1999; Hitchcock et al., 2003; Delano, 2007; McCoy & Hermanson, 2007; Prater et al., 2012). The results of which indicate that VSM does lead to the acquisition and generalization of taught skills and strong maintenance of skills across various disabilities and behaviors. Although the number of studies is rapidly growing, the sample sizes remain relatively small. Many of the studies used either a case study or single subject design.

Dowrick (1999) was the first to provide a selective review of the research using VSM, video self-monitoring, and video self-observation interventions. Dowrick (1999) suggested that VSM is a verified and viable mode of intervention, which can be applied to a full range of human endeavors, ages, and conditions.

Hitchcock et al. (2003) also reviewed the literature with the purpose of providing an updated synthesis of the studies of VSM interventions used in school-based settings as well as to confirm the efficacy of VSM with the acquisition of a variety of academic and behavioral skills. The researchers selected 18 studies, available prior to 2001, that included VSM interventions with 129 school age children (i.e. ages 3-18) with identified disabilities, such as language disorders, ADHD, intellectual and behavioral disabilities, and neurological disabilities such as spina bifida and cerebral palsy, in school settings, with defined variables. The dependent variables included disruptive behavior (i.e. fighting, fidgeting, touching, out of seat), compliance (i.e. task completion, following directions), and language responses (i.e. increases in verbal fluency, language use, or structure of language). VSM was the independent variable in all of the studies the researchers reviewed. Various research designs were used in the studies reviewed by Hitchcock et al. (2003) including mostly multiple baseline designs, but also between groups and within participant designs, as well as traditional statistical designs such as ANOVA and MANCOVA. The review of the data indicated that there is clear evidence related to positive outcomes using VSM interventions. They also noted that when compared to other interventions, the effect of VSM interventions was usually immediate, making it time and cost efficient. Videos produced for self-modeling were portable, and had been used to prevent the deterioration or loss of skills over school holidays (Dowrick, 1991). The researchers noted that the sample size of 18 studies was small and suggested the need for more research.

Prater et al. (2012) recently examined the evidence of eight VSM interventions on school-based academic skills based on the following criteria: (1) the research was published, (2) the research was not a theoretical or opinion piece, (3) the independent variable was VSM, and (4) the dependent variables were academic skills (e.g. reading, writing, math, or skills that directly influenced academic performance, such as on-task behavior). The sample size included 181 students ages 6-17 years old identified as having a disability or at risk for academic difficulty. The results indicated that VSM was an effective intervention for improving academic skills with school age children. The authors noted that limitations included small sample size of the studies and an inability to draw strong conclusions of the efficacy of VSM to improve academic skills.

Delano (2007) examined 19 empirical studies in which video modeling and video self-modeling interventions were used with 55 individuals with an ASD from the years 1985-2005. Participants ranged in age from 3-20 years, but more than half of the participants were under eight years of age. The settings of the studies included school, home and community. Twelve of nineteen studies involved video modeling, five studies focused on video self-modeling, and two studies investigated combinations of VM, in vivo, and self-modeling. Each study used single subject research designs and most used a multiple baseline design. The results of the 19 studies examined by Delano (2007) suggested that the results of all studies are promising, however there is a need for more research, with larger samples sizes, using VM/VSM interventions with individuals with an ASD.

Bellini and Akullian (2007) performed a meta-analysis and examined the efficacy of VM and VSM for 73 children and adolescents with ASD, ranging in age from 3-20 years old. They examined 23 studies, all of which used a single subject research design from 1980-2005. The researchers performed a percentage of non-overlapping data points

(PND) to examine intervention, maintenance, and generalization effects of VM and VSM interventions across three categories of dependent variables: (a) social-communication skills, (b) functional skills, and (c) behavioral functioning. The also made a determination of VM interventions as an evidence-based practice as outlined in Horner et al. (2005). The researchers used eight criteria for selecting studies: (1) Participants must have been identified as having an ASD, (2) outcome measures must have targeted behavioral, social-communication, or functional skills, (3) the study must have assessed the efficacy of VM or VSM, (4) the study must have used a single subject research design that demonstrated experimental control, (5) studies must have included more than three probes, (6) the study included graphical displays of data, (7) the studies must have been published in peer reviewed journals, and (8) the studies must have been published in English. The results suggested that VM and VSM are evidence based practices (as outlined in Horner et al., 2005) as well as effective intervention strategies for individuals with an ASD because the interventions effectively promoted skill acquisition, maintenance, and generalization effects. It should be noted that sample sizes were small, which prohibited a thorough analysis of the difference between VM and VSM interventions and the researchers could not conclude that VM or VSM interventions were the most effective at targeting functional behaviors. Finally, Bellini and Akullian (2007) concurred with Dowrick (1999) and suggested that VM and VSM are brief intervention strategies, which may be especially appealing to teachers who have limited planning time, as the median duration of videos was three minutes. Bellini and Akullian (2007) suggested that although VM and VSM meet the Horner et al. (2005) criteria for evidence based practice, future research is needed to examine the efficacy and social validity of VM and VSM interventions for individuals with an ASD.

McCoy and Hermanson (2007) also reviewed the research pertaining to VM and VSM for individuals with an ASD. The researchers examined 34 studies using VM interventions from the perspective of the type of model used, such as, adult, peers, or self. The results suggested that for individuals with an ASD, video modeling produced positive results in a variety of skills including the acquisition of social, communication and academic skills regardless of the type of model. However, when the types of models were compared, McCoy and Hermanson (2007) found the research that utilized self as model produced better or equivalent results than peer or adult models. Ayers and Langone (2007) also evaluated the perspective (self or model) in VM interventions for task completion with a young adult with an ASD. The results suggested that both perspectives were equally effective and, most important, that both perspectives impacted the task completion skills of the individual.

Video modeling has been used extensively to support individuals with various disabilities, and research is growing to support the use of video self-modeling with children who have autism. For some children with an ASD, their difficulties with attention to task and selective attention serve as barriers to successful VSM (Buggey, 2005). Additionally, there is limited research supporting the use of VSM in inclusive settings to promote independent task initiation and completion by students with an ASD. Task completion tends to be an area where children with autism have difficulty, which may be due to ritualistic behaviors or behavioral inflexibility (Rayner, 2010).

Video self-modeling in schools. Recently, more researchers have begun to explore utilizing VSM in the classroom (Buggey, 2005; Hitchcock et al., 2003). VSM has been shown to be versatile in addressing numerous behavioral or academic issues (Hartley, Bray, & Kehle, 1998; Meharg & Woltersdorf, 1990; Woltersdorf, 1992). VSM has been shown to be effective in improving on-task behaviors for children with behavioral difficulties (Clare, Jenson, Kehle, & Bray, 2000; Coyle & Cole, 2004; Possell, Kehle, Mcloughlin, & Bray, 1999; Walker & Clement, 1992).

Researchers have shown that VSM has proven to be effective for improving skills in academics, across ages and ability levels (Buggey, 2005; Hitchcock et al., 2003). Hitchcock et al. (2003) applied a VSM intervention in the classroom to assist students struggling with academics or having difficulty maintaining expected behavior by examining the effects of VSM and tutoring on reading comprehension and fluency. The results suggested that VSM was effective in both acquisition and frequency of reading comprehension and fluency skills.

Hitchcock, Prater and Dowrick (2004) tested four first grade students who were identified by parents and teachers as struggling with reading fluency and comprehension. Students were tutored by trained professional tutors, then received a VSM intervention. Hitchcock et al. (2004) found that a combination of tutoring and VSM increased reading skills in comprehension and fluency, and that the greatest gains were made when the fluency intervention of VSM was used. Results suggested that VSM positively affected reading skills, and the researchers proposed that VSM interventions could easily generalized to other school subjects.

Coyle and Cole (2004) examined the effects of a VSM intervention and VM intervention to decrease off-task behaviors in children with an ASD. The researchers created three minute VSM interventions, which showed children displaying on-task behaviors in the classroom and "working very well." The researchers paired VSM with instruction in self-monitoring behavior and measured if students remained on-task for 30 seconds at a time. At the end of the 30 second intervals, the children recorded if they were "working" or "not-working" on checklists. The researchers used visual supports, small pictures on the desk, to remind students of their goal. Results indicated that the self-monitoring and video self-modeling intervention were effective in decreasing off-task behavior. Coyle and Cole (2004) found that during maintenance phases the off task behavior increased again. They noted that these results demonstrated the effectiveness of the intervention.

Despite the efficacy of VM and VSM research in schools, practitioners are still reluctant to apply interventions. Buggey (2007) proposed that VSM may not be widely used because educators and caregivers are not comfortable with the technology needed to create a VSM project. Dowrick (1983) noted that VSM projects do not need to be longer than two and one-half minutes to achieve the desired effects. In fact, longer VSM projects produce minimal improvements compared to shorter projects (Dowrick & Raeburn, 1977). While VSM does require the creator to be somewhat technologically savvy, studies have suggested that the intervention is efficient and the results are effective, especially for individuals who attend to and are motivated by technology (Buggey, 2009). Furthermore, individuals with more profound ASDs tend to have varied results, (Bellini & Akullian, 2007) but this seems to related to age as well as disability (Buggey & Ogle, 2012). Research involving children with an ASD using a VSM intervention continues to grow across ages and disciplines.

Video self-modeling and task completion. VSM has been shown to be effective across various behaviors for individuals of all ages and the effects are usually immediate and dramatic (Hitchcock et al., 2003). Research has investigated the efficacy of using simple VM and VSM interventions for task completion in academic settings. One reason for this is that video modeling promotes independence because it can be delivered without direct teacher or adult instruction. It is also time efficient; the intervention itself should last no more than three minutes (Dowrick, 1999). Therefore, VM and VSM interventions may help to reduce human prompt dependence to acquire independent skills.

One of the first studies to investigate VSM and task completion was conducted by Miklich, Chida, and Danker-Brown (1977) who used a multiple baseline across participants design and investigated bed-making skills with four developmentally disabled individuals. The results indicated all of the participants successfully completed the task as a result of the VSM intervention and total gains were statistically significant.

Lasater and Brady (1995) used VSM with two males to improve their completion of self help tasks. The results of this study indicated gains in all areas, including generalization to other tasks and maintenance over time.

Cihak and Schrader (2009) compared adult modeling with VSM with four high school students with autism who were to complete various vocational tasks. They found that three out of four students made better progress with VSM and one student made equal gains with both methods.

Rayner (2010) used a VM intervention to improve task completion for a 12 year-old boy with an ASD in the "severely autistic" range based on the *Childhood Autism*

Rating Scale (Schopler, Reichler, & Renner, 1988). A non-concurrent multiple baseline across task design was used to examine the effects of a VM on unpacking the individual's own backpack and independent tooth brushing within his self-contained classroom. These tasks were deemed necessary by the student's parents and teacher. This VM intervention led to a rapid increase in the student's ability to unpack his own backpack, from a low of 8% during baseline to a high of 92% during the intervention phase. This VM intervention impacted tooth brushing by increasing the student's independence by 20%. The investigator suggested that although the student demonstrated the necessary motor skills to complete the task, sensory irregularities may have contributed to the smaller increase as the student gained reinforcement from chewing on the toothbrush rather than brushing his teeth. Rayner (2010) also indicated that with appropriate reinforcers, which would have supported the student's sensory needs, the results of the VM for tooth brushing may have been increased.

Examining independence and task completion for students with an ASD is both socially valid and urgently needed (Hume et al., 2009) to support the well-being of individuals with an ASD. Studies of adults with an ASD reveal limited independence, despite IQ score, especially in the areas of employment, daily living skills, and relationships (Howlin, Goode, Hutton, & Rutter, 2004; Hume et al., 2009). Research supports early intervention with VSM considered a viable research based intervention for individuals with disabilities (Bellini & Akullian, 2007). Despite this, there remains limited research in the area of independent task completion and individuals with an ASD. VSM has demonstrated positive results across disciplines for individuals with an ASD; however, only one study (Rayner, 2010) has examined independent task completion for children with an ASD using VSM, but the tasks were non academic and took place in a clinical, not classroom setting. In addition, few studies have examined the use of VSM through portable devices, such as an iPod™, to allow for true inclusion (Ferguson, 2008).

Delivery methods of video self-modeling (VSM). Typically, VSM interventions have been delivered via videotape or DVD viewed on a television or computer. Recently, researchers have begun using handheld devices, such as the iPod™, to deliver VSM interventions. For example, Van Laarhoven, Johnson, Van Laarhoven-Myers, Grider and Grider (2009) used a multiple probe across tasks design to determine the effectiveness of a VSM intervention using a video iPod™ to teach job related tasks to a 17 year old young man with an moderate intellectual disability. The results indicated that the participant met criterion (85%) for all three tasks within four sessions using the iPod™ and VSM.

Cihak, Fahrenkrog, Ayres, and Smith (2010) used the system of least prompts and an ABAB withdrawal design to examine the efficacy of VSM delivered via video iPod™ to four elementary-age students with an ASD in independent transitioning within their school. The results indicated that all students transitioned more independently and without problem behavior using the iPod™ and VSM intervention, however, when the device was removed, independent performance decreased. Independent transition behavior was measured nine weeks later and results were maintained at 98% when the VSM intervention remained accessible. These results suggested that the portability and social acceptability of portable devices may add to the efficacy of a VSM intervention. It may also impact the individual's independence in initiating the VSM intervention as technology devices tend to be preferred by individuals with an ASD (Van Laarhoven et al., 2009).

The use of handheld devices demonstrates a positive effect and is desirable because they are portable, relatively inexpensive, and used frequently among individuals without disabilities, which makes their use socially acceptable and reinforcing (Cihak et al., 2010). Unlike viewing a VSM intervention on a fixed device such as a computer or television, the portability and versatility of a handheld device such as an iPod™ allows the individual to view themselves performing desired behaviors or tasks easily and efficiently, without having to transition to the location of the fixed device (Cihak et al., 2010).

There are limitations to consider when using handheld devices, such as the cost of an iPod™. While relatively inexpensive, it may not be as accessible in schools as a computer or DVD player. The screen resolution, limited battery life, security limitations, and limited internal memory are lessened on a portable device versus a fixed device such as a computer or DVD player. Byrd and Caldwell (2011) examined the effectiveness of small screens on three mobile devices with 65 individuals working on computer maintenance tasks and found that there was a statistically significant difference in completion time related to the size of the screen, but no significant difference in the quality or performance of the task.

The use of an iPod™ in an elementary school may be a novelty, which may contribute to positive intervention effects. For children with an ASD who are included among typical peers in a general education classroom, the iPod™ may be socially appropriate and even a preferred activity for some students. In addition, since the iPod™ may be a preferred activity, it may aid students in moving toward increased autonomy and less adult dependence.

Promoting Independence

It is important to provide students with ASDs visual supports so that they may access core content instruction among their non-disabled peers. Many students with an ASD are often overwhelmed and unable to independently organize the steps necessary to complete assigned tasks. In order for teachers to successfully promote independence, students must be taught systematically and on their appropriate instructional level (Gickling & Armstrong, 1978). However, many general education teachers report that they have not received the necessary training and therefore do not have the knowledge to support students with an ASD (Horrocks, White, & Roberts, 2008).

As cited in Hume and Odom (2007), students with autism may not be able to independently initiate tasks and/or independently remain engaged with materials. Despite mastering new material, students with an ASD often remain dependent on adult supervision and prompting (Stahmer & Schreibman, 1992) and the removal of adult support may lead to recurrence of off-task behaviors and a decline in productivity (Dunlap & Johnson, 1985). The deficit in independent functioning may be related to prompt dependency due to the reliance on the constant presence of a treatment provider (Giangreco & Broer, 2005), difficulty with organization and sequencing due to executive function deficit (Mesibov, Shea, & Schopler, 2005), limited ability to generalize skills to new settings (Dunlap & Johnson, 1985), problems with processing and understanding auditory directives (Dettmer, Simpson, Myles, & Ganz, 2000), and/or lack of initiation of new tasks independently (Koegel, Carter, & Koegel, 2003). For students with autism, these deficits may serve as a barrier to classroom and community inclusion (Dunlap, Koegel, Johnson, & O'Neill, 1987) and limit one's potential to thrive in educational, vocational, and domestic settings (Pierce & Schreibman, 1994). Implementing instructional methods to promote independence for children with an ASD is crucial in promoting classroom and community inclusion (Dunlap et al., 1987) and enables an individual to thrive in a myriad of settings (Pierce & Schreibman, 1994).

The Importance of Instructional Level

Gickling and Armstrong (1978) examined frustration, instruction, and independent levels of first and second grade students with disabilities in general education classrooms by measuring on task behavior, task completion, and task comprehension. They found that it was imperative to provide instructional interventions to struggling students immediately and without the need of formal evaluations. Their research also helped define the construct of instructional level.

Gravois and Gickling (2002) defined instructional level as "a comfort zone created when the student has sufficient prior knowledge and skill to successfully interact with the task and still learn new information" (p. 888). Burns (2004) suggested that research has consistently supported that teaching any child at their appropriate instructional level has resulted in increased student achievement.

For students with disabilities, determining their appropriate instructional level is part of determining baseline data when developing goals for an IEP. Appropriate goals will allow students to make progress within their instructional level, as defined by Gravois and Gickling (2002). Using appropriate instructional materials, based on individualized instructional levels, has been shown to increase task completion, task comprehension and time on task (Gickling & Armstrong, 1978).

Time on-task. According to Burns (2011), previous research has demonstrated that student outcomes increase when students are actively and productively engaged in the learning task. Therefore, determining the optimal instructional level could also lead to a beneficial increase in student on-task behavior.

For students with an ASD, who may rely on adult support and prompting for many school related tasks, determining students' independent and instructional levels is crucial when designing appropriate learning opportunities that support independence without frustration. However, determining instructional levels is not enough. Many students with an ASD struggle with cognitive skills related to the executive functions of the brain, thus necessitating visual supports.

Executive Functioning

Executive functions serve as the conductor of cognitive skills including: time management, planning and organization skills, and self-management (Cooper-Kahn & Dietzel, 2008). Verte´, Geurts, Roeyers, Oosterlaan, and Sergeant (2006) found that children with high functioning autism (HFA) and Asperger syndrome (AS) were more affected by deficits of executive functioning (EF), whereas, children with PDD-NOS, were less affected than students with HFA and AS, but more affected than typical peers. Studies suggest that the EF profiles of children with HFA and AS are relatively equivalent (Klin, Volkmar, Sparrow, Cicchetti, & Rourke, 1995; Miller & Ozonoff, 2000). Therefore, students with an ASD being served within an inclusive classroom may demonstrate more challenges with organizational skills, time management, and self management, including task completion.

Task completion, ASD, and Modeling

One such way to support independence and task completion is pairing appropriate reinforcers with VM interventions. For example, Mechling, Gast, and Cronin (2006) examined the use of reinforcers with VM interventions for two middle school students with diagnoses of an ASD. Both students were able to follow a visual schedule and were being educated in a self-contained classroom modeled after the TEACCH program of structured work systems. Based on a reinforcer preference assessment (DeLeon & Iwata, 1996), students indicated preferences prior to the start of the study. These preferences were then paired with activities students had previously mastered during one-on-one teacher instruction, but not independently. Using an ABAB multi-treatment design replicated across participants, Mechling et al. (2006) found that both students improved their task completion when paired with high preference reinforcers. In fact, when video was involved, the amount of time to complete each task lessened for both students. The results suggest that when students are given a choice paired with high preference stimuli (video), their motivation to complete tasks is higher and they may work more efficiently. Students may also stay engaged in independent tasks longer and maintain accuracy.

Mechling, Gast and Seid (2009) used a multiple probe across participants to examine independent completion of cooking tasks for students with an ASD, using a personal digital assistant (PDA) as a portable, self-prompting device. Results indicated that for all students, their ability to independently complete cooking tasks and the accuracy of the tasks improved significantly with the use of the PDA and continued in the maintenance phase.

Conclusion

Research has shown that the deficits in social development and communication common among students with an ASD can make inclusion and participating in general school tasks nearly impossible and have been identified as one of the most critical areas of remediation (Krasny et al., 2003; Kroeger et al., 2007; Rogers, 2000). IDEA mandates that students with disabilities are served in the LRE with appropriate supplementary aids and services. There is evidence that research supports VSM as an effective intervention across a variety of individuals and disabilities (Buggey, 2005). However, there appears to be little research regarding the effectiveness of VSM with students with an ASD in inclusive settings. Classroom teachers report that they often feel ill-equipped to implement specialized instruction or supplementary aids and services mandated by a student's IEP (Horrocks et al., 2008). However, with recent technological advancements in digital video production and computers, virtually any teacher can design and implement a VSM intervention. The impact of VSM might provide a meaningful inclusion experience for students with an ASD and will allow the classroom teacher to play an active role in a student's integration.

It is evident from the information provided in this literature review that there is a need to articulate methods of improving academic task completion for individuals with an ASD using a VSM intervention. As noted, that there is a lack of evidence based methods that demonstrate the efficacy of video modeling to increase independent academic task completion of students with an ASD in an inclusive general education setting.

The purpose of this research study will be to use VSM to develop student's independence in the classroom. Through a VSM intervention, students with an ASD will view themselves performing a previously mastered skill and it is hypothesized that they will then independently complete a previously mastered academic tasks independently. When students complete routine or previously mastered academic tasks independently they become less dependent on adult assistance and prompting. In turn, this provides them with a more authentic inclusion experience they access curriculum and experience academic opportunities similar to their typical peers (Ferguson, 1995).

Based on extensive review of the literature, it has been found that although VSM appears to be an effective intervention for individuals with autism across disciplines, there are no studies that examine the use of VSM as a viable intervention to support academic task completion in an inclusive classroom. This study intends to add to the research base of VSM and determine if there is a functional relationship between VSM and independent academic task completion.

CHAPTER III

METHODOLOGY

The purpose of this chapter is to describe the methods that were used in this study. The major areas that were addressed include (a) experimental design, (b) inclusionary criteria for student selection, (c) materials and equipment, (d) research procedures, (e) data collection procedures, (f) reliability procedures, and (g) data analysis.

After an extensive literature review, it appeared that there were very few studies to support the efficacy of VSM with independent task completion in an inclusive academic environment. This study addressed that void in the literature by investigating the following research questions:

1. Is VSM an effective intervention to increase task completion of written work for elementary aged students with an ASD?
2. Is VSM an effective intervention for maintenance of task completion for elementary aged students with ASDs?
3. Can elementary aged students with an ASD generalize independent task completion skills using VSM?

To answer these questions, a multiple probe across participants design was used to determine if VSM was a viable intervention to increase the independent task completion of students with an ASD in an inclusive classroom.

Experimental Design

This study examined chained steps toward independent task completion using a multiple probe across participants design (Gast, 2010; Kennedy, 2005; Horner & Baer, 1978). According to Gast and Ledford (2012), a multiple probe across participants design requires that the researcher collect probe data across three or more participants. This design can be conceptualized as a series of stacked A-B designs in which the length of the baseline (probe) condition is measured repeatedly and systematically across the tiers. The multiple probe design is a practical design which is well suited for practicing teachers or clinicians to conduct research in their school or clinical environment because there is no withdrawal of intervention requirements and the design is relatively easy to conceptualize and implement (Gast & Ledford, 2010). According to Horner and Baer (1978), the main features of the multiple-probe technique, when applied to a chained sequence are: (1) an initial baseline probe session conducted on each of the steps in the training sequence, (2) an additional probe session conducted on every step in the training sequence immediately after criterion is reached on any training step, and (3) a series of probes to determine true baseline which are conducted just before each introduction of the independent variable.

The benefits to using a multiple-probe design are that it provides a procedure for collecting data that will permit a thorough functional analysis of the variables related to the acquisition of behavior across the components of a chained or successive approximation sequence (Horner & Baer, 1978). In addition, intermittent probes provide an alternative method for establishing stable baselines when continuous measurement during extended multiple baselines proves impractical, unnecessary, or reactive (Horner

& Baer, 1978).

Study Measures

Independent variable. The independent variable manipulated in this study was an individualized VSM intervention.

Dependent variable. The dependent variable that was measured in this study was the percentage of steps a student initiated and completed following the VSM training vs. following the verbal teacher prompting.

Validity

To demonstrate experimental control with a multiple probe across participants design, the researcher initially collected acceptable baseline data across each participant and then introduced the intervention to one participant (Student 1), while maintaining baseline or probe conditions with the other participants (Student 2 and Student 3) (Gast & Ledford, 2010). Acceptable baseline data were obtained when the participant's performance demonstrated a flat or downward baseline trend when graphed. After the researcher had demonstrated criterion-level performance (100% criterion three out five trials) with the first participant during the intervention phase, the researcher next probed all three participants with procedures that were the same as in the baseline condition. Next, the intervention was applied to the second participant (Student 2). Once criterion-level performance was attained with the second participant during the intervention phase, all three participants were again probed three times by the researcher with procedures the same as baseline. The intervention was then applied to the third participant (Student 3) and when criterion was met, all three participants were probed once more. According to Gast and Ledford (2010), experimental control is achieved when an acceptable baseline (pre-intervention) data trend is maintained until the intervention is introduced to the behavior in the new participant and, upon introduction of the independent variable (VSM), an immediate change in behavior is observed. This effect is replicated across three or more participants.

Threats to validity. For multiple probe designs, threats to validity, due to history, maturation, or testing are evaluated by staggering the introduction of the independent variable across the participants. Instrumentation effects and treatment fidelity can also threaten validity thus, the researcher ensured that proper training and planning was accomplished prior to beginning the study.

For the purpose of this study, the researcher met with the classroom, special education, and student teachers and requested that this study was performed at the same time each day, preferably in the morning. Since many children with an ASD receive related services (i.e. speech therapy or occupational therapy), the researcher also requested that parents and related service teachers schedule appointments in the afternoons to reduce threats to validity. The researcher was aware that some children with an ASD tend to be medically sensitive and could potentially be absent from school due to illness, which could influence history effects.

Additional considerations included the viability of the technology used in this study. The researcher was aware of the possibility that the researcher or the student could encounter malfunctions with the materials used to create or implement the VSM intervention. In order to minimize this, the researcher secured a backup video for collecting all initial raw video footage. The researcher also backed up the VSM intervention on a portable external hard drive and put the VSM intervention on a second, backup iPod™ in the event that the intervention iPod™ malfunctioned or the VSM was accidentally deleted.

Research Study

Research Approvals

Permission was granted from the University of Louisville's Internal Review Board (IRB) and the local school district research office. Parent permission was also granted by a signed subject informed consent document (see Appendix A for subject informed consent document). In addition, the researcher requested permission to conduct this project from the principal of the school where the research was conducted.

Approval for the study was completed in four steps: (1) the researcher (principal investigator) applied for permission to submit a Human Subjects Application to the Institutional Review Board (IRB) at the University of Louisville; (2) once permission was granted, the researcher contacted the local school district and requested permission through the research office's IRB procedures; (3) once approval was granted by the school, the researcher sought permission by the local school principal, and (4) the researcher gained parental consent to obtain anecdotal information from each student's teacher, implement the video self-modeling intervention, and collect intervention data. A letter and consent form describing the study was sent from the primary investigator to the parents of the potential participants (see Appendix A for subject informed consent document). The consent form described the study and requested written permission to (1) conference with the child's teacher and obtain anecdotal information about the child's learning style and level of classroom independence in the area of academic task completion, (2) implement the video self-modeling intervention with their child during school hours, (3) have their child complete a form about their opinions of the intervention, and (4) have their child's teacher complete a survey about their perceptions of the intervention (see Appendix B for social validity questionnaire student form).

Study Participants

Upon approvals from the University of Louisville IRB and local school district IRB, the researcher contacted the school principal for permission to conduct the study. It should be noted that the researcher was a teacher in the school where this investigation took place. Next, the researcher selected a general education classroom where at least 3 elementary aged students received school special education services for an ASD for at least part of the day.

Inclusionary criteria for student selection. All students participated in grade level core content instruction with individualized accommodations per their IEP. Diagnoses were confirmed by conferencing with the classroom teacher. The inclusionary criteria to participate in this study were as follows:

- Student must receive core content instruction in a general education classroom
- Student must have a teacher report of an ASD
- Student must have teacher recommendation that their independent task completion is an area of weakness.

Students were not excluded based on race, ethnicity, socio-economic status, or gender.

Recruitment Procedures

After receiving all necessary approvals, the researcher requested assistance from the local school district administration to identify a general education classroom within the local school district that serves three or more students with an ASD. After identifying the classroom, the researcher worked with the building principal to review student records against inclusionary criteria.

Research Setting

The study took place in a general education classroom at a public elementary school in a large, urban school district, which has a diverse student population.

Materials and Equipment

The researcher used a Kodak Playfull Ze1™ camcorder, a 2008 Apple MacBook™ with Mountain Lion OS X Version 10.6.8, and Apple iMovie™ software to create video self-modeling materials for all students participating in this study. The researcher saved all individual VSM interventions and uploaded them to an iPod Touch™. Each VSM was named with the child's first name; for example, "John", and placed on the first screen of the iPod Touch™ under the category of "videos".

Research Procedures

Classroom observation. Prior to taking baseline data and beginning the study, the researcher contacted the school and requested permission to observe students in the classroom at least three times in order to gain a clear understanding of the instructional level and severity of prompt dependency for each student. The researcher observed each student separately for 15 minutes completing an academic task, the morning "sponge" activity and tallied the number of times the student was prompted by an adult in order to complete the task. The researcher graphed the frequency of the prompting for each student.

Reinforcement survey. The researcher met with each child's teacher to investigate if reinforcers were a required accommodation for the student (see Appendix C for reinforcement survey). The researcher then surveyed each child with a reinforcement survey to determine motivating reinforcers should they be required during the intervention. The researcher met with each child individually to administer the survey. The reinforcement survey results suggested that Student 1 was not motivated by food, praise, or tangible rewards, such as stickers. He was very motivated, though, by playing the Angry Birds™ game on the iPod™. Student 2 was motivated by food (Skittles™) and time to play games on the iPod™. Student 3 was motivated by food (cereal), tangible rewards (stickers), and time to play games on the iPod™.

Baseline procedures. Baseline sessions were conducted across all three participants or until stable patterns of the behavior were established (Kennedy, 2005), with a minimum of three data points. Each session lasted the approximate time it took the student to complete the task, but not more than ten minutes. In the baseline condition, students were observed separately by the classroom teacher and the researcher. The students in the class were divided into three cooperative groups of eight students each. For example, Student 1 was given the academic task with one-third of his classmates while the researcher and classroom teacher observed the student teacher verbally prompt Student 1 by saying "(Student's Name), please do your work". Students 2 and 3 and the rest of the class were engaged in separate activities, such as cooperative learning groups or computer assisted learning groups. The researcher and classroom teacher each used synced stop watches and allowed 60s for the student to respond by writing something on the paper (see Appendix D for baseline and intervention data collection protocol). The researcher and classroom teacher also used a latency recording chart to measure the amount of time it took the student to begin the task (see Appendix E for latency of behavior data collection protocol). If the student did not respond in 60s the researcher gave the student teacher a silent hand signal to deliver another prompt. The researcher and classroom teacher noted the prompt on the data collection protocol. They also tallied the number of appeals the student made, either verbally (calling out for help) or non verbally (looks, hand-raising). The researcher and classroom teacher recorded the percentage of tasks each student initiated and executed independently after a verbal prompt (see Appendix D for data collection protocol) was delivered. Once the eight to ten minute time limit passed for Student 1 to complete the task, the same routine was delivered for Student 2 with one-third of the class, then to Student 3 with the final one-third of the class during the baseline phase.

Separation was maintained by placing each student participating in this intervention in a separate group and positioning groups in different areas of the classroom. For example, while Student 1 received the VSM intervention, Student 2 was engaged in his cooperative learning group across the classroom, and Student 3 was working at the computer in the back of the classroom, with his back to the students. Neither Student 2 nor Student 3 was in close proximity to Student 1 to view or listen to the VSM intervention.

Video Self-Modeling Intervention

Based on three points of data from required standardized school assessments in language arts, the researcher determined each child’s independent learning level in the area of grammar. The researcher created a full-page written grammar review activity that supported the content being simultaneously covered in the general education classroom (see Appendix F for task example). Next, the researcher created three VSM interventions individualized for each child. The narration for each child's VSM was similar, but individualized to each student's name and individual needs per IEP. The researcher, who is also a collaborative special education teacher, prepared the seatwork task based on data she had collected in accordance with each child's individual education plan (IEP) as well as three points of data from required school district standardized assessments. The seatwork for each student was the same with each task focused on grammar/nouns.

There were two parts to the implementation and data collection of the VSM intervention for each student. First, video footage was collected prior to implementing the intervention. Video recording took place in one day for approximately 15-20 minutes. Approximately 10-15 minutes of raw video footage was collected for each participant. The researcher provided participants with hidden supports, such as visual and verbal prompts, and videotaped the student executing the task accurately. Hidden supports are defined as visual and verbal prompts that are used during the initial videotaping so that students are successfully demonstrating mastery skills. During the editing process, the researcher manipulated the video and edited out all prompts, so the final VSM intervention only showed the individual performing the desired behaviors with mastery. The researcher then narrated the VSM explaining each step while the video showed the student completing it independently.

Video self-modeling materials. Each VSM intervention was no more than two minutes in duration (Buggey, 2007; Dowrick & Raeburn, 1977). Each VSM began with a title page and a still photograph of each student. The written text said, for example, "Ben: I Can Do My Work." The subsequent scenes showed video of each of the five steps necessary to initiate and execute the independent academic task. Each VSM showed a video of the child successfully completing each step and included the researcher's verbal narration describing the student's actions. The scene showed the student engaged in written work at his desk. At the end of the video, the researcher said for example, "Ben feels so proud when he completes his work!" and featured positive images of the student smiling for the camera.

Training phase. After baseline data were established across participants and before the intervention phase began, the researcher trained Student 1 to access the VSM intervention on the iPod™ independently by locating and touching the icon placed on the iPod™ home screen. The sample VSM showed a 10 second pan of the empty classroom. No students or activities were featured. The researcher modeled accessing the VSM on the iPod™ and prompted the student to access the VSM independently. The researcher observed and recorded the student's proficiency accessing the VSM on the iPod™ using a checklist (see Appendix G for iPod™ training procedure data sheet). Once the student accessed the VSM with 100% accuracy across three trials, the intervention phase began. All of the students accessed the VSM easily and efficiently.

Intervention procedures. At the beginning of class, the general education student teacher working in the inclusive classroom delivered the verbal prompt, "(Student 1), please begin your work." She then handed Student 1 his iPod™ and headphones. She stood within close proximity for the approximately two minutes of the VSM intervention if Student 1 needed assistance accessing the VSM or in the event of mechanical error. She did not prompt Student 1 again to begin working unless 60 seconds had passed and the student had not attempted any of the tasks – at which point the researcher gave the student teacher a hand signal to prompt. The classroom teacher and the researcher observed Student 1 using the checklist and marked the percentage steps Student 1 completed independently. Student 1 had a total of 10 minutes to watch the VSM and independently complete five out of the five chained tasks and 80% of the academic task. Once criterion of 100% had been met for Student 1 during the intervention phase for at least three out of five days, the researcher ended the intervention and began to collect three points of probe data for all students.

After the probe, the training and intervention phase began for Student 2, then Student 3, followed by a final collection of probe data for all three participants at least three times.

Data Collection Procedures

The study consisted of staggered baseline, training, intervention, and maintenance phases (VSM) across three participants. Baseline consisted of a minimum of three data collection probes across all participants and/or until baseline was stable. Following initial baseline collection, a training phase began for Student 1. Once Student 1 demonstrated that he can access the VSM and reached criterion of 100% across three trials, the VSM intervention began for Student 1 and continued until the student reached criterion of 100% for three of five days. Three maintenance probes for Student 1, and baseline probes for Students 2 and 3 with procedures that were the same as baseline procedures, began after the completion of VSM for Student 1. Next, training began for Student 2 followed by VSM. Once Student 2 reached acceptable criterion levels, a maintenance probe was conducted for Students 1 and 2 and baseline for Student 3. Training and VSM began for Student 3 after baseline had again been established. A maintenance probe was conducted after Student 3 reached criterion in the intervention stage and consisted of the same procedure as the initial baseline probes. Finally, two weeks following the intervention, two final maintenance probes were collected across all three students.

Generalization consisted of using a similar academic activity, independent math seatwork that was previously mastered, with a different classroom teacher, and at a different time of day (afternoon) and was measured during the maintenance procedures. The researcher looked at three points of math data from summative and formative assessments and concluded that all three students were capable of completing simple number sense activities, and addition/subtraction computation without regrouping. All three students were given the same mathematics tasks for two days in the afternoon during the maintenance probe phases. The generalization task also had one overall direction, then three sets of sub-directions, which was similar to the VSM task.

Maintenance

Maintenance probes were conducted to determine if effects endured over time. Following the intervention phase, the maintenance phase began when the first student had reached criterion of 100% for three out of five days as the student needs to reach criterion prior to implementing maintenance. Two maintenance probes were taken two weeks following the completion of all intervention sessions. Beeson and Robey (2006) suggest that two post intervention probes are considered to be an acceptable amount in single-subject research. As in the baseline phase, the probes that were used during the maintenance phase were identical in presentation to the probes presented in the baseline probe phase. The data points were visually analyzed against baseline and intervention points and are discussed in greater detail in Chapter 4. For Student 3, the final maintenance and generalization probes were conducted following a 16 day break from school (winter break).

Generalization Procedures

The researcher embedded generalization procedures into the study by creating an activity similar to the grammar task for students in Math. The researcher and general education teacher observed students in their afternoon math class, taught by a different teacher. They recorded the percentage of steps each student completed to finish the task independently without the VSM, iPod™, or teacher prompting. They also collected latency data and the amount of time it took for each student to begin the task. Data for generalization was collected after each student had completed the intervention during the maintenance phase. The generalization point on the graph is represented with a different symbol than the VSM maintenance point.

Social Validity

Teachers

The researcher asked the general classroom and special education teachers to complete a survey at the end of the intervention to give their impressions on the effectiveness and importance of VSM for their students (see Appendix H for social validity survey- teacher form). The survey measured the teachers' satisfaction with the VSM and their acceptance of the VSM procedures. The survey consisted of a series of questions using a four-point scale with items that ranged from "strongly agree" to "strongly disagree." It included questions that addressed the following concerns: (a) interference with school activities or routines, (b) the perceived effectiveness of the intervention, (c) the practicality of the intervention, and (d) the extent to which the children and teacher liked/disliked the intervention. Space was also provided on the survey for teachers to share additional comments or concerns. Data were reported on a scale from one to four demonstrating the acceptability, practicality, and effectiveness of the intervention. These data were analyzed to better inform future researchers about using VSM in the general education classroom and are further discussed in Chapter 4.

Students

At the end of the intervention, the researcher sat with each student individually and asked each to complete a brief survey about whether he thought the intervention was helpful (see Appendix B). The researcher was available to read each question and guide students in completing the survey, if needed. The survey consisted of a series of questions using a four-point scale. Items ranged from “strongly agree” to “strongly disagree.” This survey had questions that addressed the following concerns: (a) whether the VSM impedes learning (b) whether the VSM is helpful (c) if the student enjoyed the video and iPod, and (d) if a VSM would help the student in the future. Space was provided on the survey for students to share additional comments or concerns. The students were given a choice to write their own answers or dictate any additional information for the researcher to scribe. These data were graphed and analyzed to better inform future research about how acceptable a VSM intervention is for students.

Upon completion of the study, the parent/guardian received a short written description and graph that provided a visual of his or her child’s progress in the area of independent task completion.

Reliability Procedures

Reliability and Interobserver Agreement

Reliability and interobserver agreement were measured to evaluate the quality of obtained data in any behavioral research (Kennedy, 2005). In this study, the researcher controlled for threats to internal validity by training a second observer, the classroom teacher, to collect and record data during the treatment period. The second observer was a state certified elementary school teacher with a master's degree in education plus 30 additional graduate credits. The researcher provided a two-hour, after school training to the classroom teacher, the special education teacher, and student teacher. The researcher explained the purpose of the study. She modeled the procedures for each person with the teachers practicing their purpose in the study through role-playing and discussion. The teachers received a complimentary dinner and dessert for attending the training and participating in the study. In addition, the researcher and classroom teacher met each week prior to beginning the VSM for each student to review data collection procedures, discuss student progress and classroom management procedures, and analyze agreements of data collection.

Interobserver Agreement

In order to establish interobserver agreement, the researcher trained the classroom teacher on the behavior codes and data collection protocol. Together they role-played and practiced coding behavior observed in video segments and collected during the observation phase, prior to beginning the study. The researcher and classroom teacher then compared their results. Training continued until the researcher and classroom teacher achieved 95% agreement in their recordings. A criterion of 95% reliability was achieved using an exact-agreement method of interobserver agreement (Repp, Deitz, Boles, Deitz, & Repp, 1976). Agreement is defined by Repp et al. (1976) as an interval in which both observers recorded the behavior using the same behavior code. Conversely, disagreement is defined as an interval in which the observers did not agree on the behavior code for the same interval (Repp et al., 1976). Data collected by both the researcher and the classroom teacher were compared to establish their degree of consistency. The percentage of interobserver agreement was calculated by dividing the number of agreements by the number of agreements plus disagreement, and then multiplying the result by 100 (Kazdin, 1982). Acceptable reliability estimates were 95% or above (Kennedy, 2005).

Reliability measures were taken at least five times for the duration of the research study in an effort to describe the level of agreement among the observers. The reliability measure was calculated using the point-by-point or overall agreement procedure. The observer used identical data sheets as the investigator (see Appendices C, D, and I for data collection protocols). The point-by-point reliability procedure calculates reliability based on each occurrence of agreements among observers, mathematically represented by the following formula (Kazdin, 1982):

$$\frac{\text{Agreements}}{\text{Agreements + Disagreements}} \text{ X } 100 = \text{\% of Reliability}$$

Procedures for inter-rater reliability. The reliability observer was given her own data sheet in a folder and a pen. The inter-rater reliability data sheets were identical to the data sheet that the researcher used. The observer sat in a chair to the left of the researcher, approximately 2 to 4 feet away from the participant. The observer was perpendicular to the participant. The observer was silent throughout the session. The observer indicated “1” on the data sheet if the participant, per the research guidelines, responded correctly. The observer indicated “0” on the data sheet if the participant, per the research guidelines, responded incorrectly. The observer indicated “no response” if the participant, per the research guidelines, did not respond within the allotted time (see Appendix D for baseline and intervention data collection protocol).

Procedural Reliability

Data to estimate procedural reliability were collected on the researcher and research observer twice prior to the beginning of the baseline sessions and at least once per week for the remainder of the research project. Procedural reliability assessed the accuracy and completeness of the research procedures. Procedural reliability was calculated by dividing the number of observed behaviors by the number of planned behaviors multiplied by 100 (Billingsley, White, & Munson, 1980).

$$\frac{\text{Observed Behavior}}{\text{Planned Behaviors}} \text{ X } 100 = \text{\% of Procedural Reliability}$$

Procedures for Procedural Reliability. The research observer was given her own data sheet and a pen (see Appendix J for procedural reliability checklist). The observer sat in a chair to the left of the researcher, approximately 2 to 4 feet away from the participant. The observer was perpendicular to the participant. The observer was instructed to be silent throughout the session. The observer placed a check-mark in the appropriate column once the researcher completed the behavior. No check-marks were recorded if the researcher failed to follow the instructions. Data were collected on all of the steps of the instructional sessions. The procedural reliability total possible score was six.

Training. The procedural reliability observer was the special education resource teacher. The participants were familiar with the observer. The observer was trained by the researcher during the first initial training. Prior to each intervention period, the researcher met with the observer and reviewed the study procedures and worked through each of the seven points on the procedural reliability worksheet with the observer.

Data Analysis

The purpose of this study was to investigate if a functional relationship existed between a VSM intervention and independent task completion for three individuals with an ASD in an inclusive, elementary classroom. Based on review of the literature, the following research questions were developed:

1. Is VSM an effective intervention to increase task completion of written work for elementary aged students with an ASD?
2. Is VSM an effective intervention for maintenance of task completion for elementary aged students with ASDs?
3. Can elementary aged students with an ASD generalize independent task completion skills using VSM?

The researcher analyzed the data from the VSM intervention using a multiple probe across participants design that was graphed in accordance with the guidelines set forth by Gast and Ledford (2010).

Based on the graph, visible changes in trend, variability, immediacy, or levels in the results of a study suggested that the study intervention was working. A visual inspection of the data revealed trends in the data, such as the direction of change of the data points. It was important to determine whether the change was flat, or trending upward or downward.

Flat or downward data would indicate that there have been no threats to validity in the probe phase. However, if baseline data were trending upward, baseline data collection would need to continue until the data were stabilized for each student in the probe phase.

Flat or upward trending data in the intervention phase and subsequent probe phase would suggest that the intervention was successful. However, downward trending data in the intervention phase would require the use of a reinforcer for the student. Based on the literature, VSM interventions do not typically require reinforcers since the intervention itself is motivating and reinforcing for students. However, based on the literature regarding an ASD, some students with an ASD tend to be ritualistic and require reinforcement to persist through tasks. The data collected by the researcher prior to implementing the intervention (average number of prompts each student receives and the results of the reinforcement survey) would help to inform the researcher of the lowest level of reinforcement required for the student to persist through the task.

Another method that was used to make decisions regarding collected data was establishing the percentage of non-overlapping data (PND) which entails determining the highest baseline data point and drawing a line from that point straight through the intervention data points to see how many data points fall above (or below when trying to decrease a behavior) the line (Scruggs, Mastropieri, & Castro, 1987).

The researcher examined the PND based on whether the points in Probe 4 were higher than in Probes 1, 2, and 3 for each participant. PND was determined by calculating points of the intervention that fall below the highest baseline data point. PND was calculated at 100% for each student in Probe 4, which demonstrated that the reliability of change for the intervention was significant and considered very effective based on the rubric designed by Scruggs and Mastropieri (1998).

Scruggs and Mastropieri (1998) identified a rubric for determining the effectiveness of an intervention based on PND. PND scores above 90% suggest that the intervention is very effective, scores ranging from 70% to 90% mean the intervention is effective, scores 50% to 70% are questionable and scores below 50% are deemed to be ineffective interventions.

CHAPTER IV

RESULTS

The purpose of this chapter is to report the results of this research study with regard to the effectiveness of Video Self-Modeling (VSM) to increase and maintain independent task completion for elementary aged children with an autism spectrum disorder (ASD). The demographic information is presented first followed by the results for each research participant.

Demographic Information

This study took place at a large, public, suburban elementary school. The school had over 750 students in pre-kindergarten through fifth grade. More than half of the students (54%) qualified for free or reduced lunch and were considered “at-risk” for academic failure. This school had 35 students with identified disabilities who received specialized instruction, accommodations, and adaptations to general education curriculum from a special education teacher and spent at least part of their day in a general education setting.

In total, four students participated in this study. However, due to a research error at the onset of this study, only the results of three students will be reported. A discussion of the error and its possible implications will be included in Chapter 5 of this dissertation.

Study participants. The students selected for this study had an educational diagnosis of ASD. The goals on their Individual Education Program related to the need to improve task completion and independence in completing academic assignments.

Student 1 – John. Student 1, John (pseudonym), was a 10-year-old fifth grader with high functioning autism. He was new to this school this year and had spent the past five years at a different elementary school in a self-contained classroom with the same special education teacher. He had made good academic progress over the years despite severe social and communication deficits which impacted his ability to access general education academic curriculum. Academically, he was approximately on grade level with accommodations as designated by his IEP. The accommodations included reader, scribe, paraphrasing, and use of technology. Like many individuals with autism, John had very specific interests - sports and technology.

John spent part of his day in an inclusive fifth grade classroom for English language arts (ELA) and social studies. He was responsible for completing seatwork tasks in both subjects. Seatwork was modified class work, ability appropriate, and was contained in a folder in his desk. The general education teacher reported "John just sits there at his desk and won't begin working unless I go over to him and physically and verbally prompt him to get started." A special education instructional assistant accompanied John to the inclusive classroom and provided the accommodations necessary for mainstreaming. This assistant was not mandated through John's IEP, but was provided for the class since one-third of the students in the class received special education or Response to Intervention (RtI) services. Adult assistants can provide positive assistance to a child, but can also interfere with the child's development of autonomy. The latter was demonstrated in the observation data and record of prompts necessary to complete a task. In John's case, in order to get him to complete a task, the instructional assistant would continuously prompt him through the entire task or he would "sit there and do nothing." Recent test results from The Wechsler Intelligence Scale for Children®, Fourth Edition (WISC-IV®) revealed that John had a full scale IQ of 91. In addition to psychological testing, scores from the Kaufman Test of Educational Achievement- Second Edition (KTEA-II) revealed that John scored in the average range for reading fluency and comprehension and in the below average range for math concepts and applications, math computation, and writing. The researcher also referred to school-based formative assessment from Pearson's SuccessMaker data, which indicated that John was independently functioning at a mid-third grade level for overall reading skills and early third grade level for overall math skills. Based upon his reported cognitive ability and near grade level functioning with accommodations, it was thought that he was capable of completing the individualized independent work provided for him.

Student 2- Wesley. Student 2, Wesley (pseudonym), was a 12-year-old fifth grader with an ASD. He had been at this school for the past three years and was educated for most of the day in a general education classroom. Wesley was quiet, but compliant. He rarely initiated a task independently. His mother was a teacher at a different school, but in the same district, and had requested that teachers send home his unfinished schoolwork. Every day his teacher checked his desk and sent his papers home. His teacher stated that he demonstrated "anxiety" when she tried to help him by twitching his face and jerking his body. The accommodations on Wesley's IEP included reader, scribe, paraphrasing, and use of technology. It also stated to "allow unfinished work to be taken home for completion." Like many individuals with autism, Wesley had very specific interests; he loved music and technology.

Wesley spent most of his day in an inclusive fifth grade classroom for ELA, math, science and social studies. A special education teacher collaborated in his general education class for ELA and math. She provided supports, accommodations, and at times, small group instruction during collaboration. He was pulled out to the resource room for individualized instruction in writing. In all subject areas, Wesley was responsible for completing seatwork tasks. Seatwork was modified class work, ability appropriate, and contained in a folder in his desk. The general education teacher reported, "Wesley is very quiet. He stuffs a lot of his work in his desk because he knows he can take it home and his mom will help him." Recent test results from Universal Nonverbal Intelligence Test (UNIT) revealed that Wesley's full scale IQ was 95. In addition to psychological testing, The KTEA-II, was administered by the school psychologist as part of school-based testing, and revealed that Wesley scored in the average range for letter and word recognition, math concepts and applications, and written expression and the below average range for reading comprehension. The researcher also referred to school based formative assessment, Pearson's SuccessMaker, which revealed that Wesley's overall reading skills were early fourth grade level and his independent math skills were at a mid-fourth grade level. Testing data suggested that he was capable of completing the individualized independent work provided for him.

Student 3 – Luke. Luke had been at this school since kindergarten and was educated for most of the day in a general education classroom. Luke was diagnosed with an ASD in preschool, but his parents refused special education services at that time.

When he entered the fourth grade, his teacher requested an evaluation by the school psychologist due to academic and social difficulties he experienced. After a thorough school evaluation, it was found that Luke again qualified for special education services under the disability category of autism. His parents conceded and moved forward to develop an IEP. Luke's IEP reported that he struggled with group tasks, tasks involving multiple step directions, independent task completion, and initiation of tasks. Luke's teacher described him as "babyish" and said he had difficulty "staying focused, following directions, and getting his work done." While he did not demonstrate any aggressive social behavior in the classroom, Luke struggled to get along with peers. His teacher reported that he often complained of being bullied and being called names. His teacher said he was "sweet, but has a hard time getting along with the other kids. He is very literal".

Results from WISC-IV® revealed that Luke's full scale IQ was 95. In addition to psychological testing, the Wechsler Individual Achievement Test – Second Edition (WIAT-II) was administered to measure Luke's basic academic skills. Luke scored in the average range for spelling and lower end of average for word reading, numerical operations, and mathematical reasoning. The researcher also referred to school-based formative assessments, Pearson's SuccessMaker, which revealed that Luke's overall reading skills were early fourth grade and independent math skills were at an early fifth grade level. Testing data suggested that he was capable of completing the individualized independent work provided for him.

Luke seemed to get along well with adults, but had few peer friendships. He made some attempts at academic independent schoolwork, but rarely completed assignments completely or accurately. He received collaborative special education services in both of these areas, as well as weekly pull-out sessions for social skills. His teacher reported that Luke “frequently tells on the other children” and his behavior can be “rigid” and “bossy”. His teacher also reported that he often complained of being bullied by peers. The accommodations on Luke’s IEP included reader, scribe, paraphrasing, and use of technology. Like many individuals with autism, Luke had very specific interests, particularly, technology.

Luke spent half of his day in an inclusive fifth grade classroom for science and math, without collaboration with a special education teacher. The other half of his day he spent in a collaborative fifth grade class for ELA and social studies which included both disabled and non-disabled children taught by a general education and special education teacher team. He was also pulled out to the resource room every day to work on study skills in all subject areas. In all settings, Luke was responsible for completing seatwork tasks, which were independent, academic assignments. The general education teacher reported “Luke tries to complete his work, but it seems like he doesn’t know where to begin or how to attack the task. He rarely, if ever, completes work independently. Usually, he will raise his hand right away for help and I will need to go over there and re-teach it to him.” His average IQ and educational measures suggested that he was capable of completing the individualized independent work provided for him.

Table 1 provides a summary of the participants’ demographic information. The Academic Standing and LRE information was reported to the researcher based on each student’s IEP. Student 4 is included in this table for informational purposes only.

Table 1

Summary of Participant Demographic Information

Student	Age	Gender	Academic Standing	IQ	Basic Academic Skills Assessment Results	LRE
John	10	Male	On grade level with IEP accommodations (reader, scribe, paraphrasing, use of technology, extended time)	WISC-IV 91	KTEA-II Average: reading Below average: math and writing	General Education: special areas, lunch, recess Collaboration: ELA, social studies Special Education: math, ELA, science, speech
Wesley	12	Male	On grade level with IEP accommodations (reader, scribe, paraphrasing, extended time)	UNIT 95	KTEA-II Average: reading Below average: math and writing	General Education: math, ELA, science, special areas, lunch, recess, Collaboration: ELA, social studies Special Education: study skills, speech
Luke	10	Male	On grade level with IEP accommodations (extended time)	WISC-IV 95	KTEA-II Average: letter and word recognition, math concepts & applications, written expression Below average: reading comprehension	General Education: math, ELA, science, special areas, lunch, recess, Collaboration: ELA Special Education: study skills, speech
Mark	11	Male	3 years below grade level with IEP accommodations (reader, scribe, paraphrasing, use of technology, extended time)	WISC-IV 85	KTEA-II Lower Extreme: letter and word recognition, reading comprehension, math concepts & applications, written expression	General Education: special areas, lunch, recess Collaboration: ELA, social studies Special Education: math, ELA, science, speech

Results

Pre-baseline classroom observation. Prior to taking baseline and beginning the study, the researcher observed each student separately for 15 min completing an academic task, the morning “sponge” activity, and tallied the number of times the student was prompted by an adult in order to complete the task. She graphed the frequency of the prompting for each student and found that Student 1 was prompted seven times on Day 1, ten times on Day 2, and eight times on Day 3 by the special education instructional assistant in the classroom; Student 2 was prompted nine times on Day 1, eight times on Day 2, and 12 times on Day 3 by both the special education resource teacher and classroom teacher; Student 3 was prompted six times on Day 1, eight times on Day 2, and nine times on Day 3 by the classroom teacher and special education resource teacher, and Student 4 was prompted continuously: 12 times on Day 1, 11 times on Day 2, and 14 times on Day 3 by the special education instructional assistant. Figure 1 provides a visual representation of pre-baseline prompting during observations of each student.

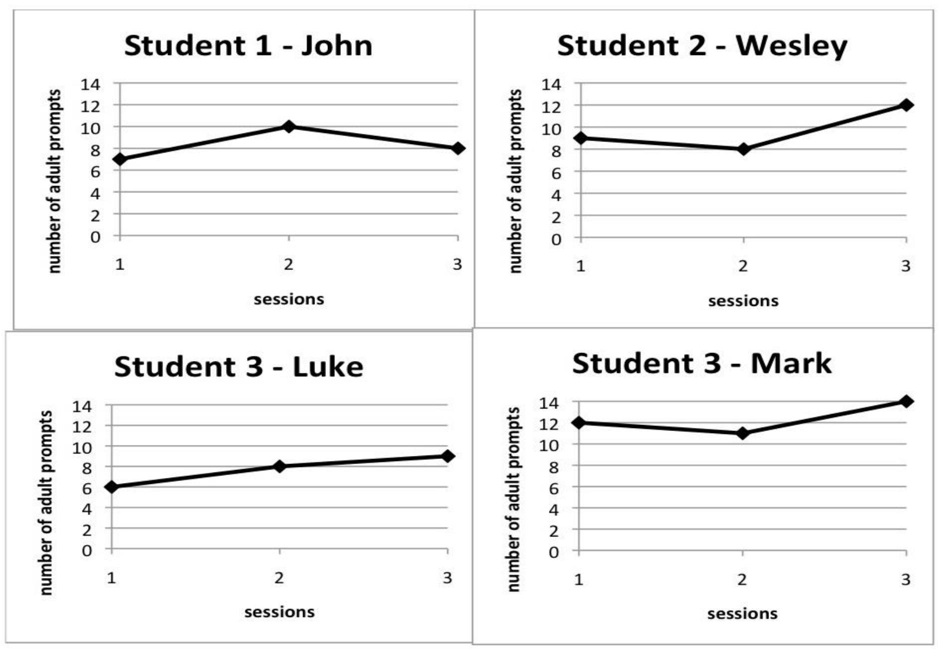

Figure 1: Pre-Baseline observations of adult prompting per student.

Baseline. The researcher and the classroom teacher observed each student during the baseline phase. During the baseline phase, both latency and duration data were collected. Table 2 provides a summary of baseline data collected for each student. During baseline procedures, the researcher and the classroom teacher observed each participant for three days.

Table 2

Summary of Baseline Data

	Prompts	Latency	Duration Average	No. of Requests	Credit for independent work
Student 1: John					
Session 1	1	60 sec	15 min	8	0%
Session 2	1	60 sec	12 min	6	0%
Session 3	1	60 sec	12 min	7	0%
Student 2: Wesley					
Session 1	9	30 sec	Avoided task	0	0%
Session 2	8	60 sec	Avoided task	0	0%
Session 3	12	60 sec	Avoided task	0	0%
Session 13	7	60 sec	Avoided task	0	0%
Session 14	6	60 sec	Avoided task	0	0%
Session 15	7	60 sec	Avoided task	0	0%
Student 3: Luke					
Session 13	0	<10 sec	9 min	6	10%
Session 14	0	<10 sec	9 min	8	20%
Session 15	0	<10 sec	9 min	9	10%
Session 24	0	<10 sec	9 min	5	10%
Session 25	0	<10 sec	9 min	6	10%
Session 26	0	<10 sec	9 min	4	10%

John. Each day John was prompted by the instructional assistant to get his work out and write his first name, last name, and date. Each day, John wrote his first name, but never his last name or the date. Also, it did not appear that he ever read the directions and instead waited for someone to read it to him and get him started. This task was written at a second grade level. John often raised his hand or waved at the teacher or assistant for help. During the baseline phase, John asked for help eight times in session 1, six times in session 2, and seven times in session 3. John did not receive any credit for independent task completion during the baseline phase.

Latency. The researcher recorded the length of time it took for John to begin the written assignment. Each time during baseline, John wrote his first name on his paper within 1 min. Afterward, he would wait or appeal for help on what to do. The researcher allowed 60s to pass before signaling the instructional assistant to administer a prompt. John requested continuous prompting to complete the task. He did not attempt to complete any academic work independently during baseline.

Duration. The researcher and classroom teacher also recorded the duration of attention to task for John. The purpose was to determine whether he showed increased independent task completion behavior during the intervention and maintenance phase as compared to baseline. During the baseline phase, John did not complete any task independently. Since he waited for help and prompting, the tasks actually took longer to complete in baseline. For session 1 it took him 15 min (6 min longer than the 9 min allotted), for session 2 it took him 12 min, and for session 3 it took him 12 min to complete his assigned task. He did, however, receive some credit (10%) for completing at least 80% of the task.

Wesley. Each day Wesley was prompted by the special education resource teacher to get out his work. She stood in close proximity to him and prompted him by reading the directions, and then verbally paraphrasing the steps required to complete the task. For example on day 1 of baseline, after reading the directions to him, she said, “Write your name and the date, then circle the nouns here and here. Then sort these words by person, place, or thing. Down here you need to write a sentence for the word ‘car’.” When the special education teacher moved away to work with another student (there were 10 students with disabilities in a class of 30), Wesley stuffed the paper in his desk. This happened every day over all six observation days. Only once, on day 2, he wrote his first name on the paper and the special education teacher was standing beside him as he wrote. He never attempted to write the date, read the directions or complete the task. Wesley has relatively good decoding skills and according to data from Pearson’s SuccessMaker, Wesley is functioning independently at a fourth grade, third month level in overall reading skills. This task was written at a 2^{nd} grade level. Unless prompted and monitored, Wesley did not attend to the task. During the baseline phase, Wesley did not directly appeal for help, but rather avoided help and attempted to escape the task. Wesley did not receive any credit for independent task completion during the baseline phase. There were two sets of three baseline days prior to beginning the intervention. Wesley never completed the task independently and consistently received a score of 0%.

Latency. The researcher recorded the length of time it took for Wesley to begin the written assignment. Once during baseline, Wesley wrote his first name on his paper within 1 min. Afterward, he sat quietly and stared at his paper. The researcher allowed 60s to pass before signaling the student teacher to provide a prompt, however, when the special education resource teacher walked away, Wesley stuffed the paper in his desk. At this point, the session had ended. Wesley did not raise his hand or ask for help. He did not attempt to complete anything independently during baseline.

Duration. The researcher and classroom teacher also recorded the duration of attention to task for Wesley. The purpose was to determine whether he showed increased independent task completion behavior during the intervention and maintenance phases as compared to baseline. During the two sets of the baseline phase, Wesley did not complete any task independently. Since he avoided help, the time it took to complete the task was maxed out at 9 min.

Luke. The researcher and the classroom teacher observed Luke during the baseline phase. Each day, when he was required to do an independent assignment, he wrote his first name immediately. He printed the letters of his name very large and at times, illegibly. Then he would stop, wait and look for the teacher. If he did not get assistance immediately, he attempted the task, usually the first one or two items, which were incorrect because he did not appear to read the directions. Then he would stop and raise his hand for help. He wrote the date on the paper only once. This pattern of behavior happened every day over the first three observation days. He completed most of the assignment, but it was incorrect and he did not appear to understand the purpose. He never attempted to write his full name, read the directions, or complete the task without appealing for help. In addition to delayed decoding skills and based on data from Pearson's SuccessMaker, Luke functioned independently at a third grade, fourth month level in overall reading skills. This task was written at a second grade level. During the baseline phase, Luke received credit for attempting the independent task and received a score of 10% on day 1, 20% on day 2 for writing the date and attempting the task, and 10% on day 3 for attempting the task.

There were two sets of three baseline days prior to beginning the intervention. For the second set of three baseline days, directly prior to beginning the intervention, Luke consistently earned a score of completing the task with 10% independence. He would write his first name, then wait for help, but if reinforcement and prompting were delayed, he would attempt the assignment. He earned credit for completing most of the task even though it was incorrect.

Latency. The researcher recorded the length of time it took for Luke to begin the written assignment. During baseline, Luke took 1-2 min to begin working. After 1-2 min, he wrote his first name on his paper. After 2 min, if reinforcement was delayed or unavailable, he would attempt the assignment.

Duration. The researcher and classroom teacher recorded the duration of attention to task for Luke. The purpose was to determine whether he showed increased independent task completion behavior during the intervention and maintenance phases as compared to baseline. During the baseline phase, Luke immediately wrote his name, but did not attempt the task independently over two sets of three trials. He never worked independently for more than 1 min before he requested teacher assistance.

Training of iPod Touch™ phase. Prior to implementing the VSM intervention, each student was assessed to determine if he could access the VSM on the iPod Touch™ with 100% accuracy across three sessions. During the training, the researcher showed each student the steps to access the VSM: insert earbuds, turn on iPod™, locate "video" icon, begin sample video, watch entire sample video. As a result of the training, all three students demonstrated that they were able to access the VSM on the iPod Touch™ with 100% accuracy for three sessions. Luke requested regular headphones because he said the earbuds hurt his ears. Also, it should be noted that the school where this intervention took place recently integrated iOS™ devices (iPods™ and iPads™) into instruction so many students had experience manipulating iPods™ at school and did not demonstrate any difficulty accessing the sample video.

VSM development phase. The researcher met with each student during a time when the other students were out of the classroom and videotaped each student as he performed the steps and completed the grammar task. The researcher prompted and praised the students through each step. Later, the researcher edited the raw video footage and created a 1 min 38s video featuring John, a 1 min 27s video featuring Wesley, and a 1 min 45s video featuring Luke, showing each student completing the steps independently. The researcher narrated the steps over the video. It should be noted that when the researcher met with Wesley she shared with him some of the observations during baseline, specifically, the fact that he stuffed unfinished work in his desk. She suggested that he probably spent more time on schoolwork because he had to finish it at home. She indicated that he probably never had time to do anything but schoolwork, with which he agreed.

VSM Intervention phase. The following results will be presented for each student during the intervention phase of this study.

John. During the intervention phase for John, the adults in the classroom included the student teacher, general education teacher, and special education teacher/researcher. The special education instructional assistant was intentionally asked not to participate since John demonstrated so much reliance on her assistance during the initial observations. Figure 2 provides a summary of the intervention for John.

Session 1. On the first day of the intervention, the student teacher handed John the iPod™ with his individualized VSM and said, "John, please watch your video." John inserted the earbuds into his ears, located the icon on the home screen of the iPod™ and

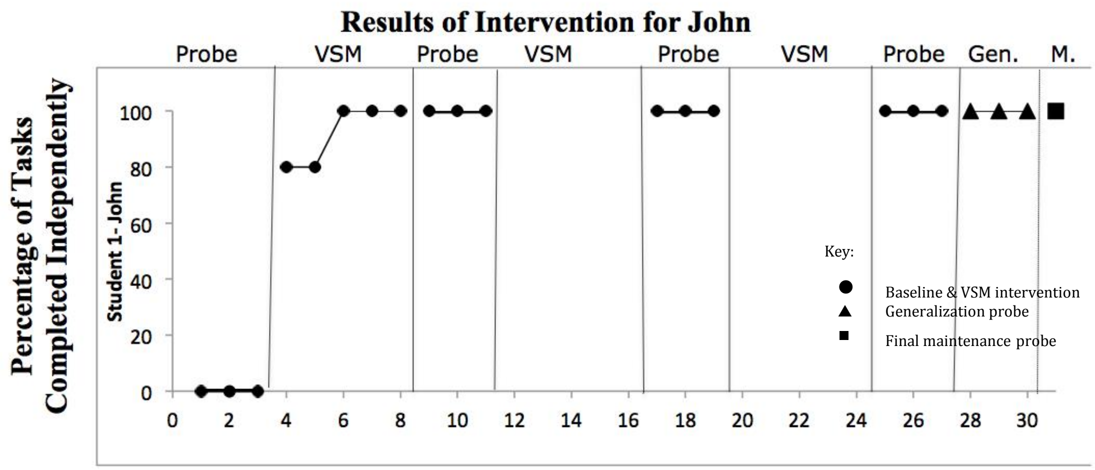

Figure 2: Intervention results for John.

watched the entire video. It took John less than 1 min to begin the VSM. He remained attentive to the video and the researcher noted his eyes scanning the video screen as he watched. When the VSM ended, John took out his earbuds and spent less than a minute wrapping the wire from the earbuds around the iPod™. After 60s had passed the researcher signaled the student teacher to provide a prompt. The student teacher walked toward John, put her hand on his desk, but she did not say anything. He finished wrapping the cord around the iPod™ and handed it back to her. In all, it took John almost 2 min to begin the written task. He began the task when he wrote his first name large, but then erased it and rewrote it smaller. Next, he wrote his last name and the date. Then he took out his folder and whispered the directions aloud as he read. After 5 min of sustained attention to task, John stopped and looked around the room. He looked directly at the special education teacher/researcher. After about 40s, John went back to the task and finished the third section of the task. After working for about a minute, he stopped, put his pencil down, and stared at the paper. He looked up at the classroom teacher and also the special education teacher/researcher. Finally, after about 35s, he read the last set of directions, wrote a sentence and completed the task. John completed the task with 80% independence in 9 min. John stopped three times during the task, each time for less than 1 min. Each time he stopped, he looked at the special education teacher or classroom teacher.

Session 2. The student teacher handed John the iPod™ with the cord wrapped around the device. John spent 1 min unwrapping the cord before inserting the earbuds, locating the icon and watching the VSM. John attended to the VSM for the entire video. After finishing the VSM, John played with the silicone cover on the iPod™ for about 1 min. Then he looked at the researcher and immediately stopped playing with the cover and took out his folder of class work. After a few minutes, John looked at the researcher and said aloud, “How do I do this?” The student teacher walked toward him and he asked her, “What page do I do?” She directed him to page 2 and stood near him while he searched in his desk for a pencil. Once John had a pencil, he began the task, but omitted writing his name, date, or reading the general set of directions. After about 8 min, John finished the task and seemed to look over his work. He wrote his first and last name and the date last. It took John less than 1 min to begin the VSM and 1 min and 30s to begin the written task. He worked for a sustained period of 6 min. John appealed for help once and looked at the researcher once. In total, it took John 7 min to complete the written task with 80% independence.

Session 3. At the beginning of class, the student teacher handed John his iPod™ and said, "John, please watch your video." He finished the VSM and looked at the researcher. John took out his folder of work, flipped to the correct page, and wrote his name. Halfway through his name, he stopped and wrote smaller so he could fit his last name on the line. Next, he wrote the date and whisper-read the directions. On this day, the classroom had many distractions as some students prepared to transition to another classroom for Advanced Placement testing. Many students sharpened pencils and talked. The atmosphere was louder and more chaotic than usual. It was also a dress down day (students usually wore uniforms) and hat day for "Red Ribbon Week." Despite the increased distractions, John maintained focus and finished the task in 7 min. When he finished, he looked toward the classroom teacher very quickly. Then he took off his hat and stared at his paper. Finally, after about a min, he said to the researcher, "I'm done." In total, it took John 7 min to complete the written task with 100% independence.

Session 4. Advanced Placement testing continued during this session. At the beginning of class, the student teacher handed John the iPod™ and asked him to watch the video. He watched the VSM immediately and following the viewing, he took out his folder and began working within a minute. For 7 min John remained focused on the task. He briefly looked at the student teacher and the researcher once at different times. When he completed the task, with 100% independence, John stood up and walked his paper over to the researcher.

Session 5. The student teacher gave John the iPod™ at the start of class. He immediately put on earbuds. He appealed for help because the iPod™ was not at the home screen. The researcher helped him locate the VSM, which he watched in its entirety. John began the task immediately after viewing the VSM and wrote his full name and date. He read the directions silently, but pointed to the words with his pencil while he read. After a few minutes, he looked at several students involved in reader's theater, who were reading very loudly and dramatically. His pencil broke midway through completion of the assignment and John found a pen in his desk, but did not appeal for help. After 6 min of sustained attention to task, he finished his work and put his class work and folder in his desk. He sat at his desk for about 30s before he said to the researcher, "I'm done." John completed the academic task in 6 min with 100% independence. During the academic task he did not appeal for help at all.

Maintenance. Following the completion of the intervention phase, the researcher observed John complete the task without the VSM or iPod™ 10 more times during the probe phase of the study. John maintained 100% independence in task completion over the course of the maintenance phase.

Generalization. In order to obtain generalization data, John completed a math task during his regular math class in another classroom, in the afternoon, with a different teacher. The math task looked similar to the grammar task in that both had a space for name, date, one general written direction and three sub-directions. The math task consisted of writing in the missing number, identifying odd/even numbers, and adding and subtracting two digit numbers without regrouping. The math task was at second grade level. Based on Pearson's SuccessMaker data, John's independent math ability was at a third grade level.

Session 1. Generalization data were collected during the maintenance phase, but later in the day, in a different classroom, with a different teacher. The researcher collected three points of data. Data were collected during the third maintenance phase following the VSM. John began the task in less than 1 min. He wrote his first and last name and the date and read the directions aloud to himself. John completed the task with 100% independence in less than 4 min.

Session 2. The researcher collected data for the second generalization probe on the next day and John began the task immediately. He said aloud, “This is easy.” He wrote his full name and date. He read the directions aloud. John did not appeal for help at all. Again, John completed the task with 100% independence in less than 4 min.

Session 3. On the third day of generalization data collection, John began working immediately and completed the assignment very quickly, within 3 min. He wrote his first name and the date and read the directions aloud. John completed the task with 80% independence, missing points due to not writing his last name.

Wesley. During the intervention phase for Wesley, the adults in the classroom included the student teacher, general education teacher, and special education teacher/researcher. Figure 3 provides a summary of the intervention results for Wesley.

Session 1. On the first day of the intervention, the student teacher handed Wesley the iPod™ with his individualized VSM and said, “Wesley, please watch your video.” Wesley inserted the earbuds into his ears, located the icon on the home screen of the iPod™ and watched the entire video immediately. When the VSM ended, Wesley took out his folder of work. Next, he took out his pencil and examined it. He got up from his

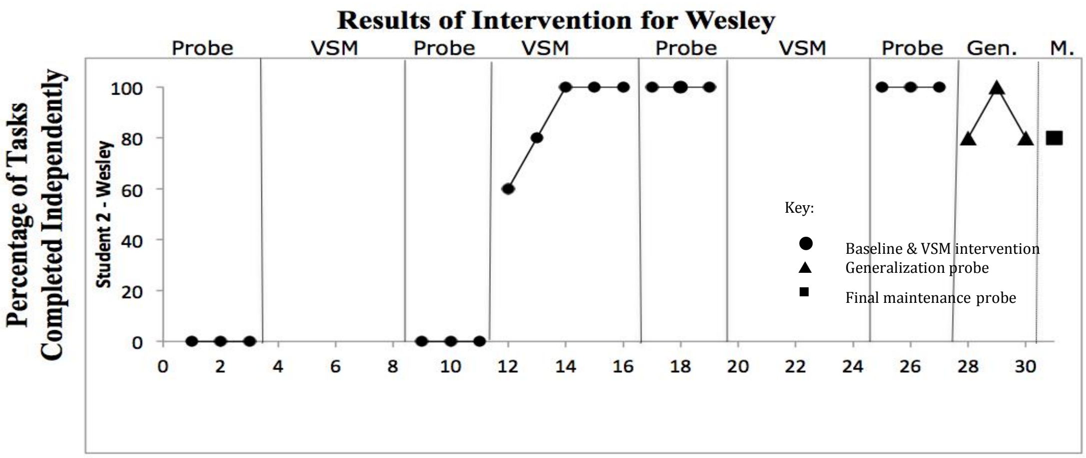

Figure 3: Intervention results for Wesley.

seat and walked across the room to sharpen his pencil. When he sat back down at his desk, he did not write his name or date. After 60s had passed, the researcher signaled the student teacher to deliver a prompt. She walked over to Wesley's desk and asked if he was "okay." He said yes and that he needed to sharpen his pencil. She said, "Wesley, get to work." After she walked away, Wesley sat at his desk and looked at his pencil for 60s. Then he looked at his paper and read the directions. In all, it took 3 min before he attempted the task. When he read the third sub-direction he tapped his pencil on the words while he read. The researcher observed as he worked very slowly; he also demonstrated few facial twitches. He finished the task and he opened his folder. It seemed as if he did not know what to do. He raised his hand, then put it down. He stared at the folder, rubbed his eyes and looked at the researcher sideways. He shoved his paper in the folder and put the folder in his desk quickly. Then he looked at the researcher and waved. In all, Wesley completed the task in 8 min with 60% independence. He missed points because he did not write his name or the date.

Following Session 1, the researcher thanked Wesley and told him that she would see him the next day. He asked her, “How long was that?” meaning that he wanted to know how long it took him to complete the task. She told him that he completed the assignment within 8 min.

Session 2. The session began when the student teacher handed Wesley the iPod™ and said, “Wesley, please watch your video” and he watched the VSM entirely. He did not twitch during the VSM. After the VSM, Wesley got up and sharpened his pencil. After 60s passed, the researcher signaled the student teacher to deliver a prompt. She walked over to Wesley and said, “Wesley, let’s get to work.” He sat still at his desk for about 45s, before he took his folder of work out of his desk and wrote his full name. Next, he read the directions and traced the words with his pencil. He took a stretch break for less than 30s and looked to his left. He completed the remainder of the assignment and looked at the researcher when he was finished. When the researcher looked down, Wesley put his paper into his folder and put his folder into his desk. Wesley completed the task with 80% independence, but missed points for not writing the date.

When the researcher stood up to leave the classroom, Wesley called out, “Mrs. Bucalos, how many minutes?” She told Wesley it took him 8 min to complete the task.

Session 3. The student teacher handed Wesley his iPod™ and said, “Wesley, please watch your video.” He immediately put in his earbuds and began watching the VSM. As he finished, the principal was completing a walk-through of the classroom. She looked at his iPod™, gave him a high five, and said, “Good job!” The researcher considered this a prompt. Next, he took out his folder and pencil and wrote his full name and date. The student teacher’s small group was louder than usual and Wesley stopped four times to watch them, but each time he stopped for less than a minute then went back to the task. Wesley completed two-thirds of the task before he stopped and hit his forehead with his pencil several times. Then he raised his hand before he quickly put it down. Finally, he asked a peer at his table, “What’s a hut?” and his friend said incorrectly, “It’s a place.” In total, Wesley completed the written task in 7 min with 100% independence.

When the researcher left, Wesley asked about his length of time completion. She told him that he completed the task within 7 min and he exclaimed, “Yes!”

Session 4. The session began when the student teacher handed Wesley the iPod™ and said, “Wesley, please watch your video.” He watched the VSM and took out his folder and began his work right away. He remained focused on the task for about 7 min and completed each step with 100% independence.

Session 5. The student teacher gave Wesley the iPod™ and said, “Wesley, please watch your video.” He watched the VSM in its entirety. Following the VSM, Wesley began the task and wrote his full name and date. He read directions silently, but pointed to the words with his pencil while he read. He completed the academic task in 5 min with 100% independence. During the academic task he did not appeal for help and worked diligently and quickly.

When he completed the task he looked at the researcher. She looked away and he stared at his paper. Then he put his paper into the folder and put the folder into his desk. When the researcher left the classroom, she told Wesley he completed the task in 5 min. He smiled and appeared very happy, but did not say anything.

Maintenance. Following the completion of the intervention phase, the researcher observed Wesley as he completed the task without the VSM or iPod^{TM} over six more sessions. Wesley worked through each step of the task independently and consistently maintained 100% independence in task completion over the course of the maintenance phase. For the final maintenance probe, Wesley completed the task with 80% independence as he only wrote his first name.

Generalization. In order to obtain generalization data, Wesley completed a math task during his regular math class in another classroom, in the afternoon, with a different teacher. The math task was the same as the task Wesley completed. Based on Pearson's SuccessMaker data, Wesley's independent math ability was at a fourth grade level. It should be noted that generalization data were collected during the maintenance phase at a different time of day, with another teacher, in another classroom. The researcher collected three points of generalization data. Each time Wesley asked for the amount of time he needed to complete the task.

Session 1. For the first generalization probe, data were collected during the first maintenance phase following the VSM. Wesley began the task in less than 1 min. He wrote his first and last name, but never wrote the date. He read the directions to himself and tapped the words with his pencil. He completed the task with 80% independence in 2 min.

The researcher observed that if Wesley could not easily see the date written in the number format of month/day/year (XX/XX/XXXX), he did not write the date on his paper. In his Math class, the teacher wrote the date, in cursive words, on the board, but she did not write the date in numbers. The researcher shared this observation with his teachers at the conclusion of the study.

Session 2. For the second generalization probe, Wesley attempted and completed the task immediately and finished in 3 min. He wrote his full name, but not the date and completed the steps of the task with 80% independence.

Session 3. For the third generalization probe, Wesley completed the task with 80% independence, but missed points because he did not write the date.

Luke. During the intervention phase for Luke, the adults in the classroom included the student teacher, general education teacher, and special education teacher/researcher. On the first day of the intervention, the student teacher handed Luke the iPod™ with his individualized VSM and said, "Luke, please watch your video". Luke put on the headphones, located the icon on the home screen of the iPod™ and watched the entire video immediately. When the VSM ended, Luke immediately took out his folder of work and wrote his first name and last initial. Then, he erased his last initial and wrote his last name. His handwriting was smaller and more legible than in baseline. Next, he wrote the date. He appeared to read the directions and questions and used his finger to track the words while he read. Luke finished the task and put his work in the folder and in his desk. In all, Luke completed the written task with 100% independence in 6 min. Luke maintained full attention to task and did not seem to get distracted. Figure 4 provides a summary of the intervention for Luke.

Session 2. The student teacher handed Luke the iPod™ and said, "Luke, please watch your video." He watched the VSM entirely. After the VSM, Luke got out his folder and pencil and immediately wrote his first and last name and the date. Next, he read the directions and traced words with his pencil. He worked continuously for 4 min, then stopped and sat quietly for 43s before he finished the last section and wrote a sentence. He completed the remainder of the assignment and finished with 100% independence. Luke completed the written task within 9 min.

Session 3. The student teacher handed Luke his iPod™ and said, "Luke, please watch your video." He finished the VSM quickly. Next, he took out his folder and pencil and wrote his full name and date. He worked quickly through the assignment. He seemed to skim the directions very quickly, using his pencil to touch the words.

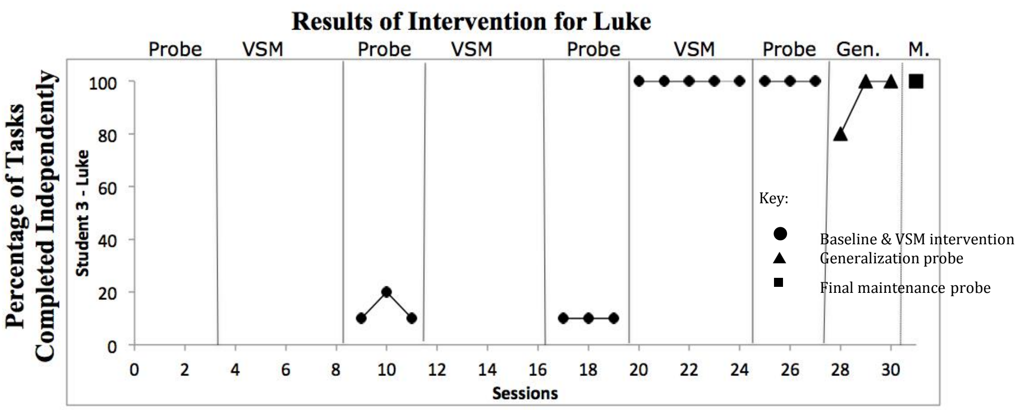

Figure 4: Intervention results for Luke.

The classroom teacher and researcher both collected data during this session. In her notes, the classroom teacher noted "seems very confident in his work today. He is focused!" In total, Luke completed the written task in 5 min with 100% independence.

Session 4. The student teacher handed Luke the iPod™ and asked him to watch the video. He watched the VSM and toward the end of the video, took out his folder. He wrote his name after he finished the VSM. He was focused on the task without distractions for 6 min. Both the classroom teacher and researcher collected data during this session. Luke completed the task within 6 min and with 100% independence.

Session 5. The student teacher gave Luke the iPod™ and said, "Luke, please watch your video." He watched VSM in its entirety. After the VSM, Luke took out his folder and began the task. He wrote his full name and date. He read directions quickly and slid through the words with his pencil while he read. Luke completed the academic task in 7 min with 100% independence.

Maintenance. Following the completion of the intervention phase, the researcher observed Luke complete the task without the VSM or iPod™ over three more sessions. The researcher and classroom teacher collected data simultaneously one more time during maintenance for Luke. He maintained 100% independence in task completion over the course of the maintenance phase.

Generalization. In order to obtain generalization data, Luke completed a math task during his regular math class in another classroom, in the afternoon, with a different teacher. The math task was the same as the task John and Wesley completed. Based on Pearson's SuccessMaker data, Luke's independent math ability was at a fifth grade level. Generalization data were collected during the maintenance phase. The researcher collected three points of data and the classroom teacher and researcher both collected data one time.

Session 1: For the first generalization probe, data were collected during the first maintenance phase following the VSM. Luke began the task immediately, in less than 1 min. He wrote his first and last name, but not the date. He read the directions to himself and tapped the words with his pencil. He completed the task in 9 min with 80% independence.

Session 2: For the second generalization probe, data were again collected after completion of the VSM. Luke immediately attempted and completed the task immediately and finished in 4 min. He wrote his full name and the date.

Luke completed the task with 100% independence.

Session 3: For the final generalization session, Luke immediately attempted and completed the task within 4 min with 100% independence. Figure 5 summarizes the results of the VSM intervention for each participant. Students 1 and 3 (John and Luke,

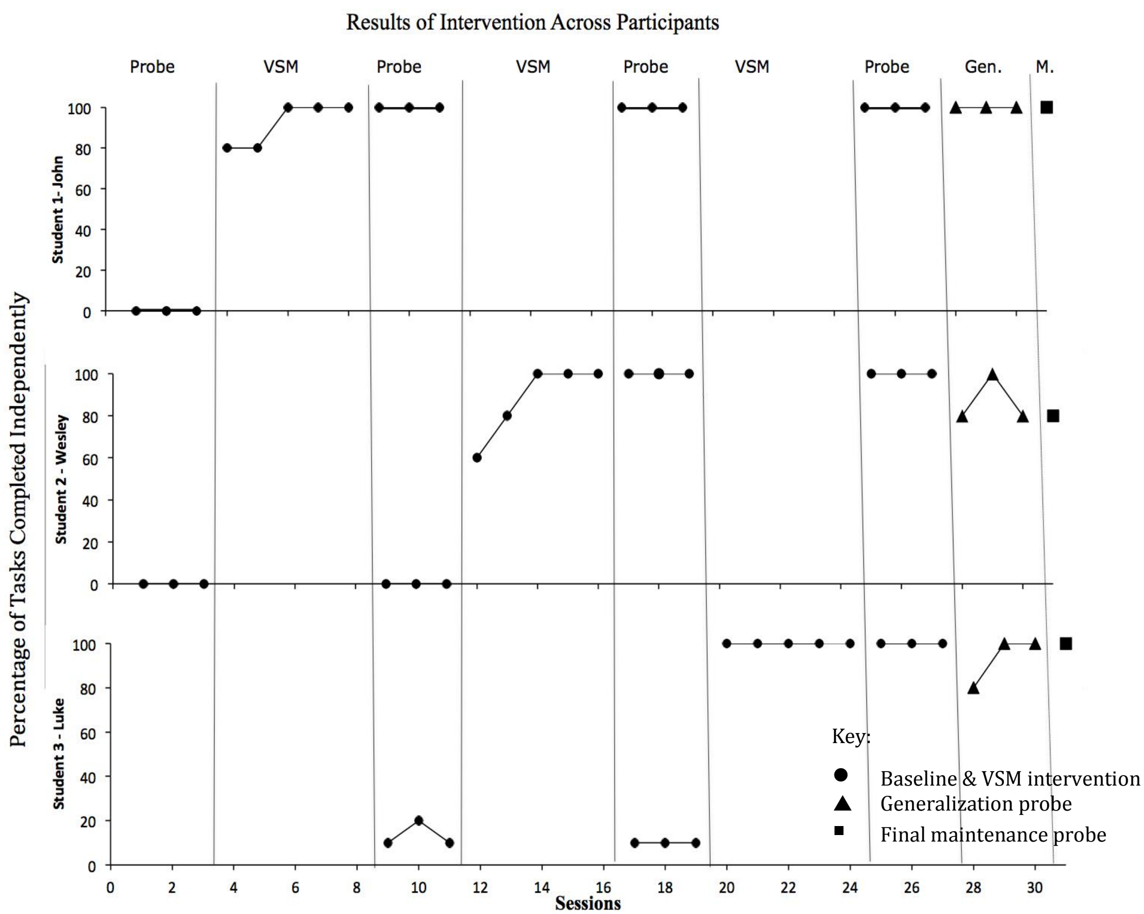

Figure 5: Results of VSM intervention across participants.

respectively) made immediate and lasting progress. They seemed to figure out the purpose of the VSM and generalized it into other areas. Student 2, Wesley, also reached criterion levels relatively quickly, but also showed a quicker decline in the generalization and final maintenance phase.

Percentage of Non-Overlapping Data Points

The researcher analyzed the collected data by establishing the percentage of non-overlapping data (PND) which entails determining the highest baseline data point and drawing a line from that point straight through the intervention data points to see how many data points fall above (or below when trying to decrease a behavior) the line (Scruggs, Mastropieri, & Castro, 1987).

The researcher examined the PND based on whether the points in Probe 4 were higher than in Probes 1, 2, and 3 for each participant. PND was determined by calculating points of the intervention that fall below the highest baseline data point. PND was calculated at 100% for each participant in Probe 4, which demonstrated that the reliability of change for the intervention was significant and considered very effective based on the rubric designed by Scruggs and Mastropieri (1998).

Social Validity

Three classroom teachers (one ELA teacher and two math teachers, respectively) and the special education resource teacher were surveyed with 11 questions regarding each student. The researcher, who was also a special education teacher to Student 1, John, did not complete a survey. Based on teacher responses, as shown in Table 3, it appears that teachers perceived VSM as an effective intervention for task completion and one which did not interfere with the learning of other students. Teachers noted an increase in individual student's independence following the intervention. Teachers also indicated that they believed VSM was a useful and appropriate strategy for their student and would consider using it again with their student or other students. Luke's homeroom teacher,

Table 3

Social Validity of VSM Based on Teacher Rating Scales (N=8)

	Strongly agree 5	Agree 4	Neutral 3	Disagre e 2	Strongly disagree 1	Response average *M =*	Standard deviation *SD =*
The target problem behaviors (independent task completion) selected for intervention for this student are important and adequate.	37.5% (3)	62.5% (5)				4.375	.52
The intervention program involving video self modeling selected for this student is important and adequate.	37.5% (3)	62.5% (5)				4.375	.52
This intervention interfered with normal classroom activity.				62.5% (5)	37.5% (3)	1.625	.52
I noticed meaningful increases in the student's independence after the implementation of the intervention.	25% (2)	62.5% (5)			12.5% (1)	3.875	1.25
I noticed meaningful improvements in the student's completion of school work after the implementation of the intervention.	50% (4)	37.5% (3)			12.5% (1)	4.125	1.36
This intervention distracted other students who were not participating in the study.				50% (4)	50% (4)	1.5	.53
I noticed meaningful increases in the student's independence during different instructional periods (or different settings) other than the intervention setting.	25% (2)	37.5% (3)	12.5% (1)	25% (2)		3.625	1.19
I noticed meaningful improvements in the student's completion of school work during different instructional periods (or different settings) other than the intervention setting.	25% (2)	37.5 (3)	25% (2)	25% (2)		3.5	1.13
Video self modeling is a useful and appropriate strategy to improve this student's independent behavior.	37.5% (3)	50% (4)	12.5% (1)			4.25	.71
I am considering the continuous use of video self modeling with this student in the future.	25% (2)	50% (4)	25% (2)			4	.76
I am considering the use of the video self modeling with other students who have similar problem behaviors in my classroom.		100% (8)				4	0

who teaches science and math stated, “It’s like a miracle. He is talking with other kids. He seems to have the steps to get started on his work and he’s trying to do more on his own. He is bringing in his homework, answering questions in class.” She hypothesized that “maybe this was the first time he felt successful on his own.” In addition, Luke’s special education teacher reported, “I noticed more homework being turned in and more work being recorded in daily agenda. He seems happier and is getting along well with the other children.”

For Student 2, Wesley, teachers reported mixed feedback. Table 4 shows teacher responses regarding their perceptions of Wesley’s progress. Wesley continued to remain prompt dependent and avoidant of independent tasks. Teachers were also very divided on seeing meaningful increases in his schoolwork. His general education teacher indicated (strongly agree) that she meaningful increases in independence in ELA, whereas his special education teacher strongly disagreed. Likewise, his general education teacher also indicated (strongly agree) that she saw improvements in the completion of schoolwork after the intervention and during different instructional periods whereas his special education resource teacher strongly disagreed. Teachers were also divided on seeing growth in Student 2’s independence. His general education teacher indicated that she noticed increases in his independence, but his special education teacher disagreed. The general education teacher also indicated that she felt VSM was a useful and appropriate strategy, whereas his special education teacher was neutral.

The three students who participated in this study were also surveyed with five questions regarding their perceptions of the intervention. As Table 5 shows, all three students reported that they enjoyed watching themselves on video and felt that the VSM

Table 4

Social Validity of VSM Based on Teacher Rating Scales Specific to Student 2 (N=2)

	Strongly agree 5	Agree 4	Neutral 3	Disagree 2	Strongly disagree 1	Response average *M =*	Standard Deviation *SD =*
The target problem behaviors (independent task completion) selected for intervention for this student are important and adequate.	50% (1)	50% (1)				4.5	.71
The intervention program involving video self modeling selected for this student is important and adequate.	50% (1)	50% (1)				4.5	.71
This intervention interfered with normal classroom activity.				50% (1)	50% (1)	1.5	.71
I noticed meaningful increases in the student's independence after the implementation of the intervention.		50% (1)			50% (1)	2.5	2.12
I noticed meaningful improvements in the student's completion of school work after the implementation of the intervention.	50% (1)				50% (1)	3	2.83
This intervention distracted other students who were not participating in the study.					100% (2)	1	0
I noticed meaningful increases in the student's independence during different instructional periods (or different settings) other than the intervention setting.				100% (2)		2	0
I noticed meaningful improvements in the student's completion of school work during different instructional periods (or different settings) other than the intervention setting.	50% (1)				50% (1)	3	2.83
Video self modeling is a useful and appropriate strategy to improve this student's independent behavior.	50% (1)		50% (1)			4	1.41
I am considering the continuous use of video self modeling with this student in the future.	50% (1)		50% (1)			4	1.41
I am considering the use of the video self modeling with other students who have similar problem behaviors in my classroom.		100% (2)				4	0

helped their learning. Wesley stated that he wished he could use the iPod™ "all the time" because he helped him "remember what to do." All students reported that they felt that the iPod™ could help them in the future.

All students' behavior throughout the study was positive toward using the iPod™ and completing the activity. Wesley, who demonstrated the most prompt dependence during the baseline phase, appeared motivated during the study to improve his task completion time. The behavior that all three participants exhibited throughout the study was consistent with their survey responses.

Table 5

Student Perceptions of the Intervention (N = 3)

	Strongly agree 5	Agree 4	Neutral 3	Disagree 2	Strongly disagree 1	Response average *M =*	Standard deviation *SD =*
The project got in the way of my learning.				33.3% (1)	66.6% (2)	1.33	.58
The project helped my learning.	100% (3)					5	0
I enjoyed watching myself on the video.	100% (3)					5	0
I enjoyed using the iPod™ to remind me when to what to do next.		100% (3)				4	0
I believe the iPod™ could help me in the future.	100% (3)					5	0

Tally of Prompts

The researcher and the classroom teacher recorded the number of prompts requested by the student with tally marks during all phases of the study. This included call outs, hand raising, overt looks at the teacher, or hand gestures. Table 6 summarizes the number of appeals each student demonstrated throughout each phase of the study. In addition, both observers recorded anecdotal notes regarding the student's behavior.

Table 6

Summary of Prompts Requested by Participants

Student	Baseline Probe	Baseline Probe	Intervention	Maintenance Probe	Maintenance Probe	Maintenance Probe	General-ization Probe	Final Maintenance Probe
John	24	n/a	9	0	0	0	0	0
Wesley	29	20	6	0	0	n/a	0	0
Luke	23	15	0	0	n/a	n/a	0	0

Treatment Fidelity

Treatment fidelity was determined by assessing whether the VSM was implemented each day of the intervention period using a checklist completed by the classroom teacher and researcher. The researcher observed the student each day during all phases of the study. The classroom teacher and researcher observed each student 3 times during the intervention phase, once during the maintenance period, and once during the generalization period. The results from the treatment fidelity checklists indicated that all participants were present and viewed the VSM in its entirety. "VSM Viewed" was checked for 100% of intervention sessions.

Reliability

Procedural reliability. The research study consisted of over 69 separate instructional, training, and observational sessions across three participants. The research study was conducted across 41 school days in eight calendar weeks. Procedural reliability data were collected twice prior to the beginning of baseline sessions and eight times for the remainder of the research project (see Appendix J for Procedural Reliability Checklist). The observer placed a check-mark in the appropriate column once the researcher completed the behavior. No check-marks were recorded if the researcher failed to follow the study procedures. Data were collected on all of the steps of the instructional sessions. The mean procedural agreement was 100 percent prior to the beginning of baseline and 96 percent throughout the course of the study.

Interobserver agreement. Interobserver agreement data were collected during 36 sessions (52%) across all three participants. The observer and researcher used identical data sheets and placed a check-mark in the appropriate column if the participant, per the research guidelines, responded correctly. The observer and researcher placed a zero in the appropriate column if the participant, per the research guidelines, did not respond. The mean interobserver agreement was 98%. The observer and the researcher also described each student's daily behaviors for the day during the video and observed task completion with anecdotal notes.

CHAPTER V

DISCUSSION

This chapter begins with an overview of the study's purpose, population, and methodology. Discussions, conclusions, and implications for practice follow the summary for each research question. This chapter concludes with an examination of the study's limitations and suggestions for further research.

Overview of Study

This study examined the use of VSM as an instructional tool with children who had an educational disability of an ASD to complete routine academic tasks independently. The students included in this study were three 10-11 year old males with a teacher report of an ASD who were mainstreamed for at least part of their day to a general education fifth grade classroom. All three students had goals on their IEP related to increasing independence, time on task, and task completion. Specifically, this study examined chained steps toward independent task completion using a multiple probe across participants design to determine if VSM was a viable intervention to increase the independent task completion of students with an ASD in an inclusive classroom.

The following discussion addresses the results in context with the research questions.

Research question 1. Is VSM an effective intervention to increase task completion of written work for elementary aged students with an ASD?

A review of the literature revealed that research that examines independence and task completion for students with an ASD is both socially valid and urgently needed (Hume et al., 2009). The results from this study suggest that VSM may be a very effective and efficient intervention to increase task completion of written work for students with an ASD. As a result of implementing the VSM intervention in this study, all students immediately increased their time on task, independent task completion, and decreased their level of prompt dependence and off-task behavior.

As Ferguson (1995) suggested, true inclusion occurs when diversity is viewed as the norm and all students are ensured a high quality education consisting of a meaningful curriculum, effective teaching, and necessary supports for each student. VSM may provide those necessary supports for students who demonstrate difficulty completing written assignments independently, but demonstrate average intellectual capacity. Based on a review of the literature, there does not appear to be any studies that address VSM and academic task completion with included students who have an ASD. The findings from this research study expand the evidence base to support the use of VSM to promote independence for students across the autism spectrum.

The results also demonstrate the efficiency of a VSM intervention by demonstrating the relative ease of creation and implementation in an inclusive classroom. The researcher created each individualized VSM in less than 1 hr including the videotaping and editing. Training of students occurred efficiently as all students had previous experience manipulating an iPod™. Implementation of the VSM intervention was also non-invasive to instructional time for the teacher or other students. Yet, the results revealed that each student increased his time on task, decreased the amount of time it took to complete written assignments, and demonstrated significant gains in their ability to complete the necessary tasks of an academic assignment. As students transition through the grade levels, the amount of written work increases, yet in many cases, the level of support decreases. Students who have relied on adult prompting in the primary grades are often left unprepared to meet the increased academic challenges. The results from this study clearly demonstrate the effectiveness of a VSM intervention to support independence in the completion of written work immediately and over time. This effect may benefit students as they move into upper grades.

Research question 2. Is VSM an effective intervention for maintenance of task completion for elementary aged students with ASDs?

The results of this study extend previous research findings about VSM, which suggests that the effects of a VSM intervention endure over time after the intervention has been removed (Bellini & Akullian, 2007). For the students who participated in this study, the maintenance phase began when the student had reached a criterion of 100 percent for three out of five sessions. All students in this study maintained 80 – 100 percent independence in executing the chained tasks necessary to complete a written assignment following the removal of the VSM. These results support previous research that suggest VSM is an effective intervention for maintenance of task completion as students demonstrated retention of skills for up to four weeks following the intervention period (Buggey, 2009; Dowrick, 2009). In addition, none of the students required adult prompting nor did they request assistance to complete the tasks.

Many individuals with an ASD acquire and demonstrate a wide range of skills, yet research is expanding to identify evidence based practices that will support the independence of individuals with an ASD over time (Hume et al., 2009). For individuals with an ASD, difficulty with independent functioning may impact lifelong outcomes and narrow opportunities for inclusion into society through higher education or vocation. Several studies indicate that adults with autism, despite IQ scores, rely heavily on others for support in employment, living, and relationships (Hume et al., 2009). In a study of 68 adults with an ASD who had IQs above 50 in childhood, over 50 percent had outcomes described as poor or very poor (Howlin et al., 2004). Research suggests that individuals with various disabilities who rely on close supervision, prompting, or contingencies by adults may experience a recurrence of off-task behaviors or a decline in engagement and productivity across settings when these factors are removed (Dunlap & Johnson, 1985). For elementary aged students with an ASD, who may be heavily conditioned to rely on adult prompting, completion of simple written tasks may be the first step toward autonomy. In fact, the results of this study support numerous investigations, which have found that following a VSM intervention, students demonstrate the ability to generalize their independence across settings and disciplines (Bellini & Akullian, 2007; Delano, 2007; McCoy & Hermanson, 2007).

Research question 3. Can elementary aged students with an ASD generalize independent task completion skills using VSM?

The results from this study add to the growing body of evidence, which supports the use of VSM as an accommodation in support of Ferguson's (1995) definition of authentic inclusion. Students who participated in this study generalized independent task completion to academics in math at levels of 80 – 100 percent. These results are consistent with the research in that VSM produces quick rates of acquisition and is generalized across disciplines (Buggey, 2007; Buggey & Ogle, 2012; Dowrick & Raeburn, 1977; Hitchcock, Dowrick, & Prater, 2003; Prater, Carter, Hitchcock, & Dowrick, 2012).

Generalization of acquired behavior across settings and disciplines may be one of the most important skills a student can demonstrate following the implementation of an intervention. IDEA (2004) mandates that special education teachers should administer specially designed instruction as well as accommodations to ensure that achievement gaps are narrowed. The ultimate goal of specialized instruction is generalization of acquired skills across disciplines and settings. Several studies have examined the effects of the generalization of various skills following a VSM intervention, but no studies have specifically investigated task completion for students with an ASD who are included in a general education classroom. Since there is not a universally applied curriculum for children with ASDs, studies suggest that teachers report feeling ill-equipped and untrained to support the specialized needs of their students (Ravet, 2011). The results of this study support the relative ease of development and implementation for teachers and rapid results and generalization of skills for students.

Implications of Findings

The results from this research study produced several indications worth noting. These implications related to the findings, the empirical knowledge base, the current practice, the field, and future research.

Implications related to empirical knowledge base. The present investigation lends support to the use of VSM as a strategy for improving independent task completion across settings for students with an ASD who are included in a general education classroom. Research suggests that in order for students with an ASD to be successful in inclusive settings, specialized instruction and supports are necessary (Ferguson, 2008; Mesibov & Shea, 1996; Ravet, 2011). Based on the findings of this study, the VSM provided the visual and auditory cues that traditional auditory-only lecturing lacked. This result was true for all of the participants who had average intellectual capabilities. One of the characteristics of an ASD, as noted in the DSM-IV (2000) is a marked impairment in communication, resulting in many students with an ASD receiving speech and language therapy. The participants, Wesley and John, received speech therapy for a moderate to severe language disorder characterized by deficits in both receptive and expressive communication skills in addition to special education services. Luke, even though dismissed from speech and language a year prior to beginning this study, scored in the lower end of the average range on a language assessment.

All three students in this study were heavily prompt dependent, including Wesley, who was conditioned to bring all unfinished work home, making his school day even longer. Despite this, all three students attended to the VSM and demonstrated high rates of acquisition and independence in task completion. Luke's teacher commented that his classroom behavior improved, he showed more independence, and his peer relationships improved. The researcher and classroom teacher both observed fewer tics and twitching from Wesley while viewing the VSM and afterward.

Implications related to current teaching practice. Consistent with the implications related to the practice of teaching, some special education teachers may subconsciously reduce opportunities for independence because they have more frequent interactions with students who have special needs than with typically developing students in inclusive settings and, therefore, a more intimate, familial relationship. This may be true especially for teachers and students who spend multiple years together. These results are consistent with the research of Cameron, et al. (2012) which examined the frequency and patterns of one-to-one interactions of general education, special education, and paraprofessionals with students who were typically developing, mildly disabled, and severely disabled in inclusive elementary and middle school settings. Their research suggested that special education teachers interacted significantly more with disabled children as compared to general education teachers, and paraprofessionals interacted significantly more with severely disabled students than with mildly or non-disabled students. This suggests that the more severe the disability, the less independent the student is encouraged to be in an inclusive classroom. The findings also suggest that special education teachers, who teach small groups of children, may rely heavily on prompting which may stifle students' independence.

General education teachers may rely heavily on delivering instruction verbally, making the assumption that children with an ASD are processing the information. Research suggests that students with an ASD require visual supports in an inclusive classroom and specialized supports are essential (Boyd & Shaw, 2010; Lovitt & Cushing, 1999; Mesibov & Shea, 1996). Some general education teachers report that they do not have the specialized training necessary to support the needs of students with an ASD (Ferguson, 2008). In this study, the three general education teachers did not have dual certification as an elementary school teacher and special education teacher of children with mild to moderate learning and behavior disorders; however, the student teacher was working toward dual certification and the special education resource teacher and researcher were both dually certified. It should be noted that the special education resource teacher was in the process of certifying to teach students with moderate to severe disabilities. VSM could serve as a viable solution to general education teachers without special education training to work more effectively with their students with an ASD. VSM may be successful in the classroom because it is individualized to the needs of the student, but requires very little training or effort to implement on the part of the general education teacher (Buggey, 2009). For this study, the VSM took approximately 25 min to create, but implementation was nearly effortless and actually eliminated the time teachers spent prompting and reteaching individual students. In addition, all students' task completion time improved as well as their on-task behavior, resulting in feelings of increased independence and success as expressed by students and teachers.

Implications related to the field. Few studies had been published which explored the use of VSM as an effective treatment implemented in the natural setting of a child's classroom among non-disabled peers. The results from this study support VSM as an effective, evidence based practice (Horner et al., 2005) where the effects are usually immediate and dramatic (Hitchcock, Dowrick, & Prater, 2003), and teacher implementation time may be minimal (Bellini & Akullian, 2007; Dowrick, 1999). In order to promote the use of VSM in the classroom, professional development must be conducted. As Buggey (2007) proposed, VSM may not be used widely because educators and caregivers are not comfortable with the technology needed to create a VSM project. IDEA 2004 requires consideration of assistive technology devices as a part of a student's IEP. Since devices such as smart-phones, mp3 players, and tablets, have become more accessible, both in cost and in numbers, more teachers are handling devices with video capabilities. VSM requires minimal training for creation and implementation, but for students with an ASD, the results of VSM may be lasting.

Implications related to future research. The body of evidence to support the effectiveness of VSM is growing, however, more studies are needed to replicate and extend the findings. Very limited research was found that investigated the use of VSM to improve independence for students with an ASD who are included in general education classrooms, particularly on academic tasks. Moreover, no research was identified that systematically measured teacher perceptions of VSM, including their willingness to create and implement individualized interventions for their general education students with disabilities. Increasingly, all teachers are expected to incorporate evidence-based practices into their teaching ensuring measurable outcomes. The No Child left Behind Act of 2001 and IDEA 2004 are very specific in their requirements that educational practices are based in research through Response to Intervention and the use of evidence based interventions for struggling students. As diagnoses of students with an ASD continue to rise, more students likely will be included in general education classrooms where research based interventions specific to students with ASDs are critical. Delivering a VSM on an iPod™ or other handheld video device benefits students as the content of the video is private and discreet. It may lessen the stigma of appearing different among non-disabled peers as it is socially acceptable and may be motivating to students.

The portability of having a VSM intervention on a handheld device could be a topic for future research. Portable electronic devices may be motivating for students with disabilities because they are socially acceptable and frequently used among peers. Several studies have been conducted recently that measure the use of handheld electronic devices, such as an iPod Touch™ to improve a myriad of classroom behavior across ages, disabilities, and disciplines (Byrd & Caldwell, 2011; Cihak et al., 2010; Van Laarhoven et al., 2009). The portability and privacy with earbuds, characterize VSM as a private intervention. If the VSM were displayed on a television or computer screen, the student with an ASD would need to be removed from his peer group to view it and the content of the intervention would most likely be exposed to peers which could compromise the student's privacy. General displays of a VSM may cause children with an ASD to feel exposed as being different and minimize their true inclusion in the classroom. The portability of the VSM allowed students access to the steps needed to carry out independent tasks. As demonstrated in this study, students did not need the VSM weeks later to generalize chained steps toward task completion in their math class. This independence and success may have led to the positive feelings students and teachers reported as a result of the study.

All of the teachers reported that the VSM intervention did not distract other students in the class. Likewise, the student participants reported that they enjoyed watching themselves on video, enjoyed using the iPod™ to remind them when and what to do next, and believed the iPod™ could help them in the future. Based on observations from the researcher and the classroom teacher, it was noted that the iPod™ was given to each student and viewed discretely. The use of earbuds and the handheld size of the iPod™ allowed the student to remain at his desk and work without the need for transitioning to a different location in the classroom or school. Furthermore, the researcher and classroom teacher noted that the iPod™ could easily travel with the student and can serve as a portable and discrete interventionist that the student can access, as needed, when requiring prompting or assistance with the organization and execution of an academic task.

Future research should also be conducted to explore more deeply the generalization of skills acquired as a result of a VSM intervention. This research should include adding a baseline condition in the alternate subject area at the onset of the study to analyze the depth of generalization by each participant. Current research suggests that VSM is generalizable, but no studies have been identified that focus on examining the degree of generalization of skills acquired as a result of a VSM intervention (Bellini & Akullian, 2007; Delano, 2007).

Finally, future research should be conducted to compare VSM with task analysis for independent task completion by individuals with an ASD who participate in general education. Task analysis is the process of describing the steps, in pictures or words, needed to complete a task. No research to date was identified that compared VSM to task analysis. Task analysis may require teacher prompting and re-teaching prior to beginning an assignment, where VSM does not; however, task analysis is time efficient and may be easier to create than VSM, therefore, more appealing to teachers. Task analysis may not be as appealing to students, though, as VSM also includes technology, such as the iPod Touch™, which students with an ASD may find motivating and less stigmatizing.

Limitations

The researcher's professional relationship to students, teachers, and school may have impacted the overall research findings in this study. Since the researcher is also a teacher at the school where this study took place, she had a long-standing professional relationship with the teachers who participated in this study. She was not the teacher of record for all of the student participants, but was known to students prior to the implementation of the VSM intervention. Experimenter bias can be avoided if all data collectors are equally familiar (or unfamiliar) to participants (Gast, 2010). However, frequent reliability checks on independent and dependent variables must be in place in ensure procedural fidelity and scoring consistency (Gast, 2010). As described in chapter four, procedural reliability measures were collected twice prior to the beginning of baseline sessions and eight times for the remainder of the research project. Interobserver agreement data were collected during 36 sessions (52%) across all three participants and treatment fidelity data were also collected each day during the intervention. It does not appear, based on the results from the social validity survey, that the classroom teachers or special education teacher were biased because they were familiar with the researcher. Prior to beginning the study, all teachers received an initial two-hour training, where the purpose of the study was explained in detail. Frequent reliability checks and weekly meetings were in place to minimize bias and ensure proper procedures were in place throughout the course of the study.

Student Assignment. The fourth student who began the study was eliminated early on because of several research errors and threats to validity. This student was a long-term student of the researcher. Mark (pseudonym) had overcome many personal and academic barriers including physical and emotional abuse, including being abruptly placed in the care of an aunt due to parental emotional factors. In addition, Mark had significant motor weakness affecting the physical aspect of writing and many characteristics of High Functioning Autism (HFA). Based on this information, along with his IEP goals to increase on task behavior and independent task completion, the researcher originally determined he met the criteria for inclusion in this study. However, during the baseline phase, Mark consistently called out for help and requested teacher prompting throughout the entire task. He never reached criterion during the baseline phase. When the intervention began, Mark stopped and started the VSM, went to other parts of the iPod™, and was off-task throughout the intervention phase. He manipulated the task and chose to draw lines to match responses rather than follow the written directions, which said, "Classify: sort the nouns by writing the correct noun in each column." For the teacher/researcher, this behavior did not seem unusual and was consistent with Mark's typical behavior as he often coped with his limitations by self-modifying his work. The teacher/researcher accepted the line-drawn answers as correct during the VSM phase. However, this error was quickly identified and Mark's results and participation were eliminated from the study. Although procedural steps were followed, research error occurred by not following the criterion steps of the study, which impacted the overall results. In retrospect, the researcher could have retrained the student, but believed that this may have compromised the data collection on Mark. The training Mark would have required may have been more extensive than for the other participants and may have compromised the treatment fidelity, validity, and procedural reliability.

Threats to Validity

There were several threats to validity that occurred with Students 2 and 3 during this study. The researcher advised Student two, Wesley, of the time it took him to complete the tasks during the intervention period. This verbal feedback was not given to the other participants and could have acted as a prompt for Wesley. Since Wesley demonstrated compliance and a desire to please, his requesting of his times may have been in an effort to please the researcher. The researcher did attempt to fade this feedback and did not continue it during the maintenance or generalization phases. A second threat to validity occurred with Student 3, Luke, when he requested larger headphones. The larger headphones covered his entire ear and blocked more sound than the small earbuds the other participants used. Therefore, Luke may have had an advantage in being more engaged in the VSM since extraneous auditory sounds may have been muffled by the larger headphones. Luke also started the study later than the other two participants due to the research error with Student 4, Mark. This late start may have given him an advantage as his baseline data were higher than the other participants, between 10 – 20 percent instead of zero percent for Students 1 and 2.

Conclusion

Video self-modeling appears to have been an effective intervention for all of the student participants. The results are consistent with the research that acquisition of skills are almost immediate, skills is maintained over time, and skills are generalized to other academic disciplines.

The results from this study add to the empirical base of research by demonstrating the efficacy and efficiency of using a VSM intervention to support the growing number of students with an ASD within an inclusive classroom. The results also support that VSM may provide a way to support the specialized needs of students with an ASD by positively affecting task completion and giving students access to general education curriculum.

More work is needed in schools to promote the implementation of VSM strategies in schools beginning with teacher professional development in various strategies to support students with ASDs who are increasingly “included” with their non-disabled peers, but require specialized instruction and supports. Such strategies should include high quality professional development for both general education and special education to use technology such as iPods™ to support the visual and auditory needs of students with an ASD through VSM. VSM interventions can support academic, social, or communicative needs and when paired with a handheld device such as an iPod Touch™ are socially acceptable, motivating, discreet and private. The portability of the iPod™ reduces the stigma of appearing different in a general education classroom, but delivers the visual and auditory supports that are necessary for students with an ASD.

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Appendix A

Subject Informed Consent Document

For IRB Approval Stamp

Subject Informed Consent Document

The Effects of Video Self Modeling on Students

with Autism Spectrum Disorder

IRB assigned number: 12.0173

Investigator(s) name & address:
Debra Bauder, Ed.D., Associate Professor and Principal Investigator, University of Louisville, College of Education & Human Development, Room 156, Louisville, KY 40292
Nicole Fenty, Ph.D., Assistant Professor and Co-Investigator, University of Louisville, College of Education & Human Development, Room 154, Louisville, KY 40292
Julie Bucalos, M.Ed., Ph.D. Candidate and Co-Investigator, College of Education and Human Development, University of Louisville, Room 156, Louisville, Kentucky 40292

Site(s) where study is to be conducted:
Malcolm B. Chancey Elementary School, Jefferson County, KY
Phone number for subjects to call for questions: (502) 485-8387

Introduction and Background Information
Your child is invited to participate in a research study. The study is being conducted by Debra Bauder, Ed.D., Nicole Fenty, Ph.D., and Julie Bucalos, M.Ed. and Ph.D. Candidate.The study will take place at Chancey Elementary School in Jefferson County, KY. Three students will be invited to participate.

Purpose
The purpose of this study is to find out if video self modeling will increase independent task completion for elementary aged students with autism spectrum disorder (ASD) in an inclusive, grade level classroom.

Procedures

Your child will be selected for this study based on information provided by his general education teacher. The investigators will interview the teacher to determine if your child has Individual Education Plan (IEP) goals or objectives that focus on increasing independence and/or task completion. In addition, Mrs. Bucalos will ask your child's teacher if he has symptoms of ASD. Mrs. Bucalos will ask your child's general education teacher the following questions:

1. Do medical or school records indicate ASD?
2. Do Benchmarks address task completion or independence?
3. Is the student between 10-12 years of age?
4. Does the student spend at least part of his day in a general education classroom?

In this study, your child will be part of a video self modeling program which involves the following steps: the co-investigator, Mrs. Bucalos, who is also an elementary special education teacher, will videotape your child in his inclusive classroom during Language Arts, edit the video, then ask your child to watch himself on video using an iPod TouchTM every day for at least 5 days. The video will show your child properly performing the steps required to participate in grade level seatwork tasks independently. Mrs. Bucalos and the special education resource teacher will observe your child each day after he watches the video. They will evaluate the degree to which he completes the steps required for participation and task completion by using a checklist.

Your child does not have to participate in anything that makes him feel uncomfortable and if he does not participate, his grade will not be affected negatively. There is minimal to no risk involved with participating in this study.

The study should take about 6 weeks to complete and will consist of 3 phases: Phase 1 will consist of Mrs. Bucalos and the special education resource teacher observing your child to determine how independently he completes independent seatwork tasks. Observations will last no more than 15 minutes at least 1-3 days per week for 1-3 weeks; Phase B will consist of intervention procedures and will last 1 week. During the intervention, Mrs. Bucalos first train your child to access a video using the iPod touch. Next, Mrs. Bucalos will videotape your child and coach him through each necessary task to complete seatwork independently. Then, she will create a short (less than 3 minute video) featuring your child completing tasks independently. Finally, she and the special education resource teacher will observe your child viewing the video and record the number of steps your child completes independently following his viewing of the video. Finally, Phase C will consist of maintenance procedures and last 1-3 weeks. Mrs. Bucalos and the special education resource teacher will observe your child completing the academic task and record the number of steps he completes independently without the use of the iPod. The behavior of independent task completion will also be measured for generalization of skills and your child will be observed by Mrs. Bucalos and special education teacher performing a similar skill, but in their math class.

Your child will not be asked to complete work in addition to his routine instruction. However, your child will be asked whether he strongly agreed, agreed, disagreed, or strongly disagreed with the following 5 questions:

1. The project got in the way of my learning.
2. The project helped my learning.
3. I enjoyed watching myself on the video.
4. I enjoyed using the iPod to remind me when to what to do next.
5. I believe the iPod could help me in the future.

Potential Risks

There are no foreseeable risks other than possible discomfort in being videotaped. Your child's assigned seat may also be moved to another part of the classroom, however, he will still be included in a cooperative group of 5 peers. There are no foreseeable risks, although there may be unforeseen risks.

Benefits

The possible benefits of this study include increased independence and increased positive personal feelings about completing assignments independently.

Confidentiality

Total privacy cannot be guaranteed. You/your child's privacy will be protected to the extent permitted by law. If the results from this study are published, your child's name will not be made public. While unlikely, the following may look at the study records:
The sponsor and companies hired by the sponsor to oversee the study,
The University of Louisville Institutional Review Board and Human Subjects Protection Program Office, and
Office for Human Research Protections (OHRP),

Your child's data will be stored in a locked filing cabinet. In addition, your child's name will be replaced with a false name to protect his/her identity.

Voluntary Participation

Taking part in this study is voluntary. You/your child may choose not to take part at all. If you/your child decide to be in this study you may stop taking part at any time. If you decide not to be in this study or if you stop taking part at any time, you will not lose any benefits for which you may qualify.

You will be told about any changes that may affect your decision to continue in the study.

Research Subject's Rights, Questions, Concerns, and Complaints

If you have any concerns or complaints about the study or the study staff, you have three options.

You may contact the principal investigator at Debra K. Bauder, Ed.D., Associate Professor Rm. 156, College of Education and Human Development, University of Louisville, Louisville, KY 40292

Phone: 502-852-0564
Fax: 502-852-1419

Email: dkbaud01@gmail.com
dkbaud01@louisville.edu

If you have any questions about your rights as a study subject, questions, concerns or complaints, you may call the Human Subjects Protection Program Office (HSPPO) (502) 852-5188. You may discuss any questions about your rights as a subject, in secret, with a member of the Institutional Review Board (IRB) or the HSPPO staff. The IRB is an independent committee composed of members of the University community, staff of the institutions, as well as lay members of the community not connected with these institutions. The IRB has reviewed this study.

If you want to speak to a person outside the University, you may call 1-877-852-1167. You will be given the chance to talk about any questions, concerns or complaints in secret. This is a 24 hour hot line answered by people who do not work at the University of Louisville.

This paper tells you what will happen during the study if you choose to take part. Your signature means that this study has been discussed with you, that your questions have been answered, and that you will take part in the study. This informed consent document is not a contract. You are not giving up any legal rights by signing this informed consent document. You will be given a signed copy of this paper to keep for your records.

____

Signature of Subject/Legal Representative Date Signed

____ ____________________

Signature of Person Explaining the Consent Form Date Signed
(if other than the Investigator)

____ ____________________

Signature of Co-Investigator Date Signed
Julie Bucalos (502) 485-8387

Appendix B

Social Validity Survey (Student Form)

Student Number: ___________________________Date: _____________________________

This survey consists of 5 items. For each item, you need to indicate the extent to which you agree or disagree with each statement. Please indicate your response to each item by writing an X in one of the five response boxes to the right.

Key: SD = Strongly Disagree D = Disagree A = Agree SA = Strongly Agree

	1	2	3	4	5
	SA	A	N	D	SD
					
This project got in the way of my learning.					
This project helped my learning.					
I enjoyed watching myself on the video.					
I enjoyed using the iPod to remind me when to what to do next.					
I believe the iPod could help me in the future.					

Additional Comments:

Appendix C

Reinforcement Survey

Student Number: ____________________________ Date: _____________________________

	Not at all	A Little	A fair amount	Much	Very Much
Stickers					
Cheerios					
Teacher help					
A teacher pat					
Smiley face					
Other ?					

Appendix D

Baseline and Intervention Data Collection Protocol

Baseline and Intervention
Procedure Data Sheet – task completion

1 = independently completed task
0 = did not independently complete task

Student Number: ___________________________ Date: ______________________

Date:	Student wrote first and last name (1 point)	Student wrote date (1 point)	Student read directions. (1 point)	Student attempted assignment (1 point)	Work is at least 80% completed (1 point)	Final Score

Appendix E

Latency of Behavior Data Collection Protocol

Behavior: Working individually on an independent academic task

Behavior Definition: Sitting at desk, with an assignment on the desk, looking at assignment, not talking to peers. Once student looks up (not looking at assignment any more), the behavior has stopped. If student begins talking to peers while looking at assignment, behavior has stopped.

Student Number: ____________

Date	Time assignment given	Enter time when behavior began	Enter time when behavior stopped	Length of time the behavior lasted.

Appendix F

Task Example

Name:_________________________________ Date:_________________________

Directions: Read each question and write the best answer.

1. Identify: circle the nouns in each sentence.

Cheetahs eat several types of animals.

Elephants eat plants.

Some dogs can be trained to do tricks.

2. Identify: circle the noun in each row.

Dogs	eat	some	their	why
When	where	cat	still	scan
DVD	step	run	planted	skip

3. Classify: sort the nouns by writing the correct noun in each column

mailman mail post office zoo keeper zoo
lion waiter restaurant hamburger

Person	Place	Thing

4. Apply: Write a sentence for this word: <u>waiter</u>

____

Appendix G

iPod™ Training Procedure Data Sheet

iPod™ Training

Student Number: ___________________________ Date: _________________________

+ = independently completed task
- = did not independently complete task

Inserts earbuds or headphones						
Turns on iPod™						
Locates sample video icon						
Begins sample video						
Watches entire sample video						

Appendix H

Social Validity Survey (Teacher Form)

Student Number: ________________________

Teacher: ___________________________ Date: ___________________________

This survey consists of 11 items. For each item, you need to indicate the extent to which you agree or disagree with each statement. Please indicate your response to each item by circling one of the five responses to the right.

Questions	Responses				
	1	2	3	4	5
1. The target problem behaviors (independent task completion) selected for intervention for this student are important and adequate.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
2. The intervention program involving video self-modeling selected for this student is important and adequate.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
3. This intervention interfered with normal classroom activity.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
4. I noticed meaningful increases in the student's independence after the implementation of the intervention.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
5. I noticed meaningful improvements in the student's completion of schoolwork after the implementation of the intervention.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
6. This intervention distracted other students who were not participating in the study.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
7. I noticed meaningful increases in the student's independence during different instructional periods (or different settings) other than the intervention setting.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
8. I noticed meaningful improvements in the student's completion of schoolwork	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

	during different instructional periods (or different settings) other than the intervention setting.					
9.	Video self-modeling is a useful and appropriate strategy to improve this student's independent behavior.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
10.	I am considering the continuous use of video self-modeling with this student in the future.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
11.	I am considering the use of the video self-modeling with other students who have similar problem behaviors in my classroom.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Appendix I

Duration of Behavior Data Collection Protocol

Behavior: Working individually on an independent academic task

Behavior Definition: Sitting at desk, with an assignment on the desk, looking at assignment, not talking to peers. Once student looks up (not looking at assignment any more), the behavior has stopped. If student begins talking to peers while looking at assignment, behavior has stopped.

Student Number: ______________________________________

Date	Time assignment given	Enter time when behavior began	Enter time when behavior stopped	Length of time the behavior lasted.

Appendix J

Procedural Reliability Checklist

Student Number: ___________________________ Date: _____________________

Please write an X in the appropriate column to indicate if the research behavior was observed or not observed.

	Planned Procedure	Observed	Not Observed
1.	Student teacher handed student iPod^{TM} and delivered verbal prompt to begin VSM.		
2.	Researcher recorded starting and ending times of VSM viewing.		
3.	Researcher recording starting and ending times of task.		
4.	Researcher recorded the number of steps the student executed independently.		
5.	Researcher recorded number of adult prompts the student received.		
6.	Researcher recorded the number of student appeals/requests for help (verbal or non verbal).		

Appendix K

Treatment Fidelity Checklist

Student Number: ____

Please write next to the day whether the student viewed the video on that day. If the child was absent, circle "absent." If school was not in session that day, circle "no school." If only a portion of the video was shown that day, circle "PS" for partial showing. Finally, if you were not able to show the student the video because of equipment failure, please circle "EF" for that day. Please also describe the student's behaviors for the day during the video and the observation.

Viewing #	Date	Video (Circle One)
		Viewed Absent No School Partial Showing Equipment Failure
		Viewed Absent No School Partial Showing Equipment Failure
		Viewed Absent No School Partial Showing Equipment Failure
		Viewed Absent No School Partial Showing Equipment Failure
		Viewed Absent No School Partial Showing Equipment Failure

CURRICULUM VITAE

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	Ph.D., Curriculum & Instruction University of Louisville 2008-2013
CERTIFICATIONS:	National Board Teacher Certification (2006-2016) Mild to Moderate Disabilities Ages Birth through 21.
	Kentucky Teacher Certifications Elementary School Teacher; Teacher of Students with Disabilities: Learning and Behavior Disorders, kindergarten – Grade 12.
	New Jersey Teacher Certifications Elementary School Teacher; Teacher of the Handicapped, Pre-kindergarten through Grade 12.
AWARDS:	WHAS Crusade for Children Special Education Scholarship Spring, 2009

	University of Louisville College of Education & Human Development Scholarship Summer, 2009
PROFESSIONAL SOCIETIES:	International Society for Technology in Education (ISTE) Special Education Technology Special Interest Group (SETSIG) 2010 – 2012
	Council for Exceptional Children (CEC) 2008 – Present
	National Association of Special Education Teacher (NASET) 2008 – 2012
	National Education Association (NEA) 1999 - Present

PUBLICATIONS:

Gately, J. (2009). Video gaming: access for all. Special Education Technology-SETSIG News, 1, 2-5.

INVITED PRESENTATIONS:	Imagining the Future of Learning Conference, Louisville, KY Summer, 2011
	International Society for Technology in Education (ISTE), Philadelphia, PA Summer, 2011