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Kelly Schaffer  
*University of Central Florida*



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ANALYSIS OF COMMERCIAL ONLINE TRAINING VIDEOS FOR  
TEACHERS WHO INSTRUCT STUDENTS WITH CHARACTERISTICS OF  
AUTISM SPECTRUM DISORDER

by

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A dissertation submitted in partial fulfillment of the requirements  
for the degree of Doctor of Philosophy  
in the College of Education and Human Performance  
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## **ABSTRACT**

A deficit currently exists in teacher preparation programs for teaching students with Autism Spectrum Disorder (ASD) using evidence-based practices, specifically in the area of Applied Behavior Analysis. As communication deficits are a primary characteristic associated with the diagnosis of ASD teaching communication skills is a common educational goal for students with ASD, and this skill needs to be addressed in teacher education. Mand training is one evidence-based practice applied to teach independent requesting skills to students with ASD.

In this study, four teachers serving students with characteristics of ASD in the classroom participated in a multiple-probe across-participants study evaluating the extent to which online training videos prepare teachers in mand training procedures for students with ASD. Concurrent with teacher participants, changes in rates of student mands were evaluated for four students receiving instruction in a multipleprobe design. Data analysis consisted of visual analysis of graphically displayed results and calculation of effect sizes. Results indicate that the Online Training Videos (OTV) were not effective as a standalone intervention for preparation of teachers to teach mands, however three student participants showed improved student outcomes.

## ACKNOWLEDGMENTS

From the age of nine I recall an overwhelming sense of gratitude for my family and realized how very fortunate we were. On a family trip to China, I saw people on the street, lying on mats, missing limbs, eyes, or some portion of their body and became overwhelmed with a desire to help. I begged my mother to give them the money she had in her purse. She knew I was hurt to see such disparity and gave me the small amount of cash she had and helped me give it to a stark few of those I was forever moved by.

My sense of gratitude and generosity are my strongest attributes and developed as a collective learning experience from those around me. In my family, my father who worked tirelessly to meet and exceed all of our needs, never fails to remind me that he is proud of me and still calls me Kitty Kat. My mother a living exemplar of what is good in this world, with an unwavering strength, reminds me to love deeply and laugh hard, and often does so with rigor.

My brother who exercises faith in the purest form reminds me that despite unimaginable darkness there is always hope. Friends, Vicki Bauer, Sara Oleck, and Warren Pearce supported and encouraged me both professionally and personally, and remain my friends even after dropping off the grid to pursue a PhD. Colleagues, Barbara Serianni, Stacey Hardin, and Jillian Gourwitz showed me the value of a cohort, allowed me to trust, and became my friends on a truly unique academic journey that endlessly bonds the four of us. Mentors Dr. Eb Blakely, Dr. Jose Martinez-Diaz, Dr. Patrick McGreevy, and Dr. Timothy Vollmer taught me applications of science as a way of life and remained supportive, responding to countless questions over the years. My professors, Dr. Vasquez, Dr. Dieker, Dr. Pearl, Dr. Wienke, Dr. Martin, Dr. Little,

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PS, I love you.

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## **CHAPTER ONE: INTRODUCTION**

The prevalence of autism spectrum disorders (ASD) is rising at an alarming rate. The Centers for Disease Control and Prevention (CDC) reported a 78% increase in ASD diagnoses from 2002 to 2008 (CDC, 2012). In its 31<sup>st</sup> annual report highlighting statistics from late 2007, the United States Department of Education (USDOE) reported 9.0% of students age 6 through 21 were served under the Individuals with Disabilities Act (IDEA) Part B with close to 4% representing categories of students with ASD (USDOE, 2012). In an effort to evaluate ASD over time, the CDC established the Autism and Developmental Disabilities Monitoring (ADDM) network. The first ADDM studies (2000– 2002) were released in 2007, indicating that 1 in 150 children were affected by an ASD (CDC,

2007). A subsequent report released in 2012 (study years 2006-2008) reported an increased prevalence rate of 1 in 88, with 80% of children affected by ASD were receiving special education services. Most recently in 2013, authors of the National Health Statistics Report estimated that 1 in every 50 American children has been diagnosed with an ASD (CDC, 2013). In response to this rise in prevalence, public awareness of ASD and its defining characteristics of ASD has increased (Johnson & Myers, 2007). As awareness and an understanding of skill deficits associated with ASD has increased, social concern for child-centered support through public education also has increased. Social concern has driven the exploration and development of research-based educational practices for children with ASD. Federal legislators have funded and continue to fund these research efforts to support students with disabilities, particularly students with ASD.

### Legislative Support

Strong evidence of social concern for the implementation of effective educational practices for children with ASD is reflected in federal legislation. Since the inception of the *Education for All Handicapped Children Act* (1975), inclusive education for students with disabilities including ASD has evolved. The 1990 reauthorization of the Individuals with Disabilities Education Act (IDEA) resulted in support for increased access to quality education and outcomes for students with disabilities, naming ASD as a categorical disability. The 2004 reauthorization of IDEA identified components of evaluation and planning central educational practices for students with ASD focused on inclusion and student achievement. Components of evaluation and planning that are specified in IDEA include (a) Free and Appropriate Public Education (FAPE); (b) Individualized Education Plan (IEP); (c) Least Restrictive Environment (LRE); and (d) Response to Intervention (RTI).

Despite increases in prevalence and legal mandates for the implementation of evidence-based practices in education for students with ASD or related disabilities, teacher reports suggest a lack of preparation for special educators and general educators to adequately serve the growing population of students with ASD in educational settings (Loiacono & Allen, 2008; Loiacono & Valenti, 2010). Given the continued growth of ASD and legislative mandates to implement science-based evidence of effective practices, a clear and present need exists for measurable improvements in the preparation of educators who will serve the growing number of students diagnosed with ASD in inclusive general education settings.

## Autism Spectrum Disorders

Leo Kanner described autism as a unique disorder whose characteristics include deficits in appropriate forms of communication (Kanner, 1943). Today, the *Diagnostic and Statistical Manual for Mental Disorders 5<sup>th</sup> Edition* characterizes Autism Spectrum Disorders with two core components: repetitive stereotypical behavior and significant social communication skills impairment (DSM-5; American Psychiatric Association, 2013). Based on the defining characteristics of ASD, effective intervention for children with ASD should include practices that effectively target and teach the development of appropriate communication and social skills. Procedures for effective teaching practices are identified: established treatments based on empirical support by the National Autism Center (National Standards Report, 2009) and instructional strategies based on empirical evidence identified by the National Professional Development Center on Autism Spectrum Disorders (Barnhill, Sumutka, Polloway, & Lee, 2013). Empirical support has been demonstrated in the area of Applied Behavior Analysis for a source of interventions with individuals with ASD and is widely accepted as an evidence-based practice (Simpson, 2005).

Early research conducted by Lovaas and colleagues at the University of California Los Angeles proved to be seminal, demonstrating effective educational interventions for children with ASD (Lovaas, 1987). Lovaas conducted one of the earliest studies that used the concepts and principles of Applied Behavior Analysis (ABA) for intervention with children diagnosed with ASD. The study included 20 participants receiving 40 hours of instruction per week over the course of two years. Results of the study indicated that for the nine participants IQ scores were improved by approximately 20 points and that eight of the nine children who received

intervention were indistinguishable from their typically developing peers after receiving intensive intervention (Lovaas, 1987). A five-year follow-up to the study showed that gains in IQ scores were maintained. A second study conducted by Smith and Lovaas (1998) yielded similar outcomes for children diagnosed with ASD under the age of five. Participants received educational intervention based on prompting, fading, and shaping procedures combined with reinforcement shaping of new behaviors. Instruction occurred approximately 40 hours per week and was delivered in a one-to-one format. As participants demonstrated mastery of skills many of the children were systematically transitioned into preschool settings performing at levels equal to their peers. Additional researchers support the use of ABA-based educational instruction for children with ASD (Bourret, Vollmer, & Rapp, 2004; Carr & Durand, 1985; Hanley, Iwata, & Thompson, 2001; Smith & Lovaas, 1998; Sundberg & Partington, 1998; Wolf, Risley, & Mees, 1964).

The National Professional Development Center for Autism Spectrum Disorders (NPDS ASD, 2009) provides research-based guidelines for the evaluation of educational interventions. The NPDS ASD guidelines for qualification as evidence-based practice for individuals with ASD were established through peer-reviewed journal articles and met prescribed criteria, including (a) randomized or quasi-experimental design studies, (b) single-subject design studies, and (c) combination of evidence (Horner et al., 2005; Nathan & Gorman, 2002; Odom et al., 2005; Rogers & Vismara, 2008). Meeting the guidelines for evidence-based practices, the NPDC ASD lists multiple interventions derived from the concepts and principles of ABA, including (a) differential reinforcement, (b) prompting, (c) discrete trial training, (d) functional behavior assessment, (e) extinction, (f) task analysis, and (g) functional communication training. Applied



Behavior Analysis has been described as the most comprehensive discipline substantiated with the greatest body of empirical support (Corsello, 2005) for the education and learning of individuals with ASD.

Based on the principles of ABA, Skinner (1957) identified critical variables that elicit and maintain multiple forms of functional communication (Skinner, 1957). Skinner extended concepts of respondent and operant principles to the comprehensive variations of human language. The focus of behavior was that of the speaker in relation to external stimuli. Skinner identified verbal operations that occur in relation to specific environmental conditions. The responses Skinner included mand (request for wants and needs), tact, intraverbal, receptive, audience relations, textual, and echoic. These verbal behavior (VB) relations were later clarified and described as *mand*, *tact*, *intraverbal*, *codic*, and *duplic* behavior (Michael, 1982). Given that two defining characteristics of ASD are social and communication skill deficits, ABA VB instruction targets both deficits simultaneously.

The focus of VB instruction is the development of functional communication skills within a social context. The social context is viewed as the natural environment of the home or school or any other community settings in which a child might participate. Social mediation is achieved in the social context by an audience, or listener, providing reinforcement for speaker responses. Through research and practice, the establishment of functional communication repertoires for children with ASD and related disabilities receiving ABA VB instruction has been empirically demonstrated (Bourret et al., 2004; Carr & Durand, 1985; Hart & Risley, 1975; Sundberg & Partington, 1998). Having met criteria established in rigorous science-based peer-reviewed journals (Horner et al., 2005; Nathan & Gorman, 2002; Odom et al., 2004; Rogers &

Vismara, 2008), ABA VB instruction has been empirically validated as an evidence-based practice appropriate for the education of children with ASD or related disabilities.

### Teacher Preparation

A growing empirical record of best practices for effective teaching of students with ASD is emerging (Albin, Whelan, & Zabel, 1993; Bruin, Deppeler, Moore, & Diamond, 2013; National Autism Center, 2011). With an increasing number of children diagnosed with ASD and the legal mandates to provide evidence-based practice in education to students with ASD, the number of students receiving public education also is likely to increase. With social and communication skills identified as deficits relevant to the diagnosis of ASD the need for teacher preparation in socially appropriate verbal behavior is indicated. Meaningful and relevant treatment and educational practices have been proven effective. Teaching functional communication skills to children who present severe social and communication deficits through applications of ABA, teaching VB is suggested as an example of best practice and has the potential to produce socially significant outcomes for children with ASD or related disabilities.

This need for preparing teachers in working with student with ASD is evident in the literature. Loiacono and Allen reported that 89% of special education teachers in a recent survey stated they were not prepared to work with children with ASD (Loiacono & Allen, 2008), and 96.2% of general education teachers co-teaching with special educators were not prepared to work with children with ASD (Loiacono & Valenti, 2010). Based on teacher reports of inadequate preparation, an increasing trend in the number of children diagnosed with ASD and the legal mandates to provide services to students with ASD clearly lead to a need for measurable

improvements in the preparation of educators. As commercially available products become more available online for the professional development of teachers, the question arises: What is the empirical validity of online professional development for teachers in evidence-based practices based on ABA, supporting students with characteristics of ASD?

The purpose of this research was, first, to evaluate the impact of online training videos on teacher-implemented mand training procedures and, second, to further evaluate the subsequent impact of mand training on the rate of student mand behavior. The research questions for this study are

1. To what extent do Online Training Videos increase the percent correct implementation of procedures for teaching mands by teachers as they instruct students with characteristics of ASD in a classroom setting?
2. Given an increase in the percent correct implementation of mand training procedures, to what extent does the level of performance maintain over time?
3. To what extent will teachers' use of Online Training Videos increase the rate of mands for students with characteristics of ASD in a classroom setting?
4. Given an increase in rate of student mands, to what extent does the rate of mands per instructional session maintain over time?
5. How do teachers perceive the goals, procedures, and outcomes of the online training video for teaching mands?

## CHAPTER TWO: LITERATURE REVIEW

Research and effort by many have shaped our current understanding of students with disabilities, specifically Autism Spectrum Disorders (ASD). Autism Spectrum Disorders date back to the early 1800s with Itard's work, "The Wild Boy of Aveyron," which is viewed as the first possible reported case of ASD (Itard, 1801/1962). The term "autism" was first referred to by Bleuler at a lecture in Berlin to describe a characteristic of schizophrenia when referring to "aloneness" (Fusar-Poli & Politi, 2008). The declaration of autism as a unique psychiatric disorder developed from the work of Kanner (1943). Close to that time, Asperger published his finding on autistic psychopathy (Frith, 1991). After seeing over 100 cases, in addition to the first 11 reported in 1943, Kanner defined characteristics of ASD (1951). The characteristics Kanner described were extreme withdrawal from social interaction, compulsive insistence on routine and order, and a complete lack of language or language that does not function as communication.

In 1956, continued study of ASD revealed that children with ASD who did not demonstrate useful speech by the age of 5 made very little progress (Eisenberg, 1956). In 1964, Rimland conducted work suggesting an organic or biological cause for ASD.

Unfortunately, Bettelheim's *The Empty Fortress* emphasized poor parenting as the cause for ASD (1967). Contrary to the theory of parenting as the cause, a study comparing two groups of parents, one with children with ASD and one without, showed no difference in the interactions of parents with their children (Cantwell, Baker, & Rutter, 1977). Further support that parenting was not a cause came from a study on twins revealing a genetic relation to ASD and a genetic predisposition for ASD (Folstein & Rutter, 1977). Wing continued this line of inquiry by studying the characteristics of ASD, developing a triad of characteristic social impairments with

communication, interaction, and imagination (Wing & Gould, 1979). Wing also popularized the work of Asperger, differentiating “high functioning” autism as a category within ASD (Wing & Gould, 1979). Today a single causal factor for ASD has yet to be identified. Currently ASD is considered a neurological disorder with a variety of etiologies (Rosenberger-Debiesse & Coleman, 1986). To aid professionals in diagnosis, the APA publishes the *DSM* with a list of characteristics and traits for many disorders (American Psychiatric Association, 2013).

The American Psychiatric Association (APA) most recently defined ASD with a qualitative impairment in social communication and restricted repetitive stereotyped patterns of behavior in the 2013 edition of the *Diagnostic and Statistical Manual for Mental Disorders* (APA, 2013). King and Bearman (2009) concluded that prevalence rates of ASD increased during concurrent periods of diagnostic change, suggesting approximately one-quarter of the increase in prevalence for the group of participants investigated could be accounted for by diagnostic changes. Although no one clear cause for ASD exists, the classification as a disorder has afforded children diagnosed with ASD or characteristics of ASD the benefit of effective evidence-based practice.

### Evidence-based Practices in ASD

Evidence-based practices for individuals with ASD are defined by the National Professional Development Center on Autism (NPDC ASD, 2009) and are based on established criteria. Table 1 provides criteria for empirical research to substantiate evidence-based practices.

Table 1

Criterion for Evidence-Based Practices

Research design	Criteria
Randomized or quasi-experimental design studies	Two high quality experimental or quasi-experimental group design studies
Single-subject design	Three different investigators or research groups must have conducted five high quality single-subject design studies.
Combined	One high quality randomized or quasi-experimental group design study and three high quality single-subject design studies conducted by at least three different investigators or research groups (across the group and single-subject design studies).

The evidence-based criteria were developed from multiple sources that define outcome-based research and empirical validity (Horner et al., 2005; Nathan & Gorman 2002; Odom et al., 2004; Rogers & Vismara 2008). The NPDC ASD identified evidence-based practices substantiated by research that met the criteria above (2009). The interventions are provided with descriptions, learning modules, and substantive research. A few examples of evidence-based interventions provided by the NPDC ASD are a) antecedent-based interventions, b) differential reinforcement, c) extinction, d) functional communication training, e) discrete trial training, and f) video modeling.

Each of the interventions is presented by the NPDC ASD with research studies meeting the criteria for evidence. The NPDC ASD presents references relative to various age groups, organizing articles by relevance to preschool, elementary, and secondary levels of education.

The majority of the evidence base is empirically validated through the scientific method and described as a methodology of Applied Behavior Analysis (ABA).

ABA is the process of systematically applying interventions based upon the principles of learning theory to improve socially significant behaviors to a meaningful degree and to demonstrate that the interventions employed are responsible for the improvement in behavior (Baer, Wolf, & Risley, 1968). Skinner wrote *The Behavior of Organisms* in 1938, revealing his intellectual repertoire (Michael, 1991). Skinner conducted research using the scientific method with emphasis on reliability and repeatability in order to establish basic principles of behavior. His work continued, and when he was joined by Keller they produced a body of research large enough to generate a journal. The journal became known as the *Journal of Experimental Analysis of Behavior*. As principles were identified, components of the treatment effects were evaluated and tested for integrity. Results of effective treatments revolutionized the field of treatment for children with disabilities. The *Journal of Applied Behavior Analysis* (JABA) evolved as concern for the effective treatment for individuals with severe behavior disorders became a primary interest (Michael, 1991). The journal, *JABA*, became a means to disseminate scientific evidence for effective interventions as they were discovered by researchers. Several studies in both journals revealed effective procedures for teaching the acquisition of new skills to individuals with developmental disabilities. These new skills were often taught as replacement skills for aberrant behaviors, based on their function. Studies that assessed the principles of ABA were conducted and proven effective for establishing appropriate skills for individuals with autism.

Wolf et al. (1964) described the identification of behavior problems, the procedures for treatment, teaching caretaker implementation, generalization to the home, and follow-up monitoring for maintenance of behavior changes. They described the problem behavior for their subject, Dicky. At age three-and-a-half, Dicky exhibited self-injurious tantrums that resulted in tissue damage. It was predicted that he would lose vision if he did not begin using prescribed eyewear. He presented with skill deficits in communication and social interaction. Further, Dicky did not sleep at night, consistently requiring one parent to stay awake. Wolf et al. (1964) recommended that Dicky be hospitalized for the onset of intervention. They selected a time-out from reinforcement procedure as a consequence for tantrums. Shaping was selected for wearing glasses, combined with establishing operations procedures to maximize reinforcer values.

Researchers applied differential reinforcement contingencies to teach appropriate eating and communication skills. For sleeping they used a door open and door closed contingency, removing access to an audience when the child remained out of bed. Wolf and colleagues (1964) taught staff to implement the procedures; then they taught the parents. After changes were observed across behaviors, the procedures were generalized to the home. Dicky then transitioned home. Wolf et al. (1964) conducted follow-up after six months. They reported that according to his mother, Dicky no longer engaged in tantrums, slept at night, wore his glasses up to twelve hours a day, ate appropriately, and increasingly engaged in verbal behavior. They noted that Dicky's mother described him as "a new source of joy for his family" (p. 312). This change is one example of a detailed study that examined the effectiveness of ABA intervention for a child with autism. After over 65 years of research (Browder & Spooner, 2011), ABA has



been described as the most established evidence-based practice for students with ASD and other developmental disabilities (Corsello, 2005).

Considered a seminal work, a study by Lovaas (1977) provided early empirical evidence for ABA as a valid intervention for individuals with ASD. Lovaas published some of the earliest works substantiating the effectiveness of ABA-based intervention for children with ASD. He conducted research on Discrete Trial Training (DTT; Lovaas, 1987). He examined intensive instruction for young children with ASD that resulted in increased IQ scores and significant skills acquisition (Lovaas, 1987). Subsequently, over three decades of research provides a strong empirical rationale for the use of ABA treatment for children with ASD and related disabilities (Loiacono & Allen, 2008). Current trends in intervention research support the development of an appropriate communication repertoire relative to the natural environment (Hart & Risley, 1975). This format of intervention is provided to improve the quality of life for individuals with ASD or related disabilities and their families. Communication responses that are functional, meaningful, and person centered are targeted for acquisition. Targets for teaching include a verbal behavior repertoire that maximizes independent access to contingencies of reinforcement.

### Verbal Behavior

In 1957, Skinner wrote *Verbal Behavior*. In his seminal text Skinner described a conceptual framework of language as it occurs in relation to the environment. He identified critical variables that evoke and maintain multiple forms of functional communication and

extended concepts of respondent and operant principles to the comprehensive variations of human language. The focus of behavior was that of the speaker in relation to external stimuli.

Skinner (1957) also identified verbal operants that occur in relation to specific environmental conditions. The verbal responses described include mand, tact, intraverbal, receptive, audience relations, textual, and echoic. These verbal behavior (VB) relations were further clarified and described as mand, tact, intraverbal, codic, and duplicit behavior (Michael, 1982). Unfortunately, Chomsky's unfavorable review of VB functioned as a significant impediment to the overall acceptance of Skinner's functional analysis (Chomsky, 1959).

Despite a lack of acceptance, Michael continued to study and teach the operants of VB (Michael, 1988). Joined by other researchers, Michael's work perpetuated the evidence base for applied behavior analysis-based verbal behavior (ABA VB) gaining strength with over 30 years of empirical research (Bourret et al., 2004; Carr & Durand, 1985; Michael, 1982, 1993; Sundberg & Partington, 1998). Given that two defining characteristics of ASD are social and communication skill deficits, ABA VB functions as an ideal instructional method, targeting both deficits simultaneously. The focus of ABA VB is developing functional communication skills within a social context. The social context is viewed as the natural environment of the home or school or any other community settings in which a child might participate. Social mediation is achieved in the social context by an audience, or listener, providing reinforcement for speaker responses.

Through research and practice, the establishment of functional communication repertoires for children with ASD and related disabilities receiving ABA VB instruction has been empirically demonstrated (Bourret et al., 2004; Carr & Durand, 1985; Hart & Risley,

1975; Sundberg & Partington, 1998). Having met criteria established in rigorous science-based peer-reviewed journals (Horner et al., 2005; Nathan & Gorman, 2002; Odom et al., 2004; Rogers & Vismara, 2008) ABA VB instruction can be considered a valid evidence-based educational intervention for children with ASD or related disabilities. The need for learning socially appropriate VB is indicated as the number of children diagnosed with ASD and other related disabilities increases. Meaningful and relevant treatment has been proven effective.

Teaching functional communication skills to children who present with severe social and communication deficits through applications of ABA, teaching VB, is an example of best practice and has the potential to produce socially significant outcomes for children with ASD or related disabilities. Acquisition of verbal behavior including mands (e.g., requesting) is an educational objective of great importance for many individuals with intellectual disabilities (Sigafoos, Doss, & Reichle, 1989). Further, teaching mands is a recommended practice for individuals with disabilities (Shafer, 1995).

#### Teacher Preparation in Evidence-based Practices

According to Stormont et al. (2011), teachers are not prepared in evidence-based practices; therefore, schools today are not prepared to support students with behavioral needs. In some cases, teachers have reported that classroom management and behavior tend to be the most challenging components of their position and a subject for which the least amount of training is provided (Reinke, Stormont, Herman, Puri, & Goel, 2011). Behavior problems are a principal reason reported for teacher attrition associated with job dissatisfaction (Hong, 2012). Teachers who reported stress associated with behavior problems reported less self-efficacy with classroom

behavior management (Klassen & Chiu, 2010). Critical to the primary prevention of behavior problems, teachers report a lack of preparation and knowledge of evidence-based practices (Reinke et al., 2011).

Loiacono and Allen (2008) stressed the importance of teacher preparation in ABA, citing 12 studies and over 30 years of research empirically validating ABA as best practice for teaching children with ASD at the post-secondary level. Loiacono and Allen found that less than 26% of institutions in urban and suburban areas and 0% in rural areas offered instruction in ABA. Urban and suburban post-secondary faculty members reported that they were considering adding ABA coursework to their programs. The authors also suggested that teachers gaining preparation in ABA principles would have the skills necessary to effectively teach learners with ASD. Institutions are well positioned to provide proper training for individuals to gain preparation in principles of ABA (Barnhill et al., 2013), and distance education has developed into organized adult education (Holmberg, 1995). One method to increase the dissemination of ABA principles may be the use of technology to assist teacher preparation programs in effective preparation of future educators in evidence-based practices.

### Technology and Distance Learning

Technology has greatly enhanced the options for distance learning in education. Access to computers and the Web have generated options for synchronous and asynchronous computer-based instruction, dramatically altering the format of education and training (Welsh, Wanberg, Brown, & Simmering, 2003). However, distance learning is not new. Distance learning dates back over 100 years with early correspondence courses (Casey, 2008).

As technology has advanced from pony express to modern day on-demand instruction, research on applications of technology provides an evidence base for effective forms of instruction and distance learning through technology (Means, Toyama, Murphy, Bakia, & Jones, 2010). If further substantiated, technology may be a means for educators to acquire effective skills to teach functional language to children with ASD and other disabilities.

Through applications of technology the development of *video modeling* has emerged. Video modeling is an intervention that has been used effectively to teach skills to children with ASD, skills including social skills, communication skills, and perspective-taking skills (Charlop & Milstein, 1989; LeBlanc et al., 2003; Nikopoulos & Keenan, 2004). A comparison of video modeling and in-vivo modeling produced results that suggested that video modeling was more efficient at teaching new skills to students with ASD (Charlop-Christy, Le, & Freeman, 2000).

The success of video modeling for children with ASD suggests that other applications of video modeling may also be effective. One such application is to use this technique for teacher preparation in skills to support students with disabilities. A study evaluating the effects of video modeling on staff implementation of Discrete Trial-Instruction yielded results that suggest video modeling was effective in increasing the level of performance for discrete-trial instruction and that high levels of performance were maintained over time (Catania, Almeida, Liu-Constant, & DiGennaro- Reed, 2009). A subsequent study extended the Catania et al. (2009) findings by measuring the impact of staff performance on the skill acquisition of children receiving early intervention (Vladescu, Carroll, Paden, & Kodak, 2012). Based on these findings, it would seem that additional investigation on the effects of video modeling to enhance teacher performance is an area worthy of exploration. For example, capitalizing on the use of video modeling, online

training videos have been developed by Autism Training Solutions to develop competencies in evidence-based practices for persons providing intervention to children with ASD or related disabilities.

Research in the use of online training videos was conducted for personnel preparation in evidence-based practices for students with ASD (McCulloch & Noonan, 2013), indicating a potential method for teacher preparation. Published in March of 2013, McCulloch and Noonan investigated the effects of online training videos on the implementation of mand training for three paraprofessionals in an elementary school setting. Results of the investigation suggested a positive impact from the use of online training videos as an increase in correct implementation of mand training was observed across participants. More importantly, increases in student rates of spontaneous mands were observed and suggested favorable results identified for student outcomes and the development of communication skills. The investigation of impact on student outcomes is a unique component of this research in the field of special education. Further research is needed to evaluate external validity of the effects of online training videos (McCulloch & Noonan, 2013).

Legislation mandates the use of evidence-based practices for teaching students with ASD. These practices are well documented in the literature, including the need for teacher preparation in evidence-based practices. Researchers suggest the use technology as an effective means for acquisition of skills to implement evidence-based practices. Given the wealth of existing literature in areas related to evidence-based practices for students with ASD, the question emerges of where the literature converges. To address that question, a systematic literature review was conducted.

### Systematic Literature Review

A systematic literature review was conducted to identify existing literature examining the convergence of online instruction, ASD, and teacher preparation. Comprehensive searches in four major databases were conducted. Each database was searched separately in stages. Stages of the search included entry of key search terms in multiple search fields, hand operations (sorting by hand) for exclusion of studies that were not empirical, and hand operations to include studies that were conducted with persons providing intervention for children with ASD including staff, paraprofessionals, or teachers. A final hand operation to exclude studies conducted with professionals other than school teachers was conducted, yielding zero empirical studies that were conducted with school-based teachers.

The systematic literature review was employed to answer the question “What research in the existing literature is at the convergence of online learning, teacher preparation, and evidence-based practices in ASD for educators?” Databases selected for the search were Education Full Text, Ebscohost Eric, Ebscohost PsycINFO, and ABI/INFORM Complete. Three levels of searches were conducted including online searches: 1) a search using specific terms across four databases; 2) a hand operation to identify only empirical articles and remove redundant articles; 3) a final hand operation to identify studies that met prior search criteria (i.e., steps 1 and 2) and were conducted with school teachers as the primary participant. The first level of searches was conducted in each of the databases using three search fields. Three fields of search terms were entered one at a time in the first level of the searches for each database. The first stage of the search was completed by entering key search terms into the first field. Key search terms included in the first stage of the search included and were entered as “Video Modeling in

Education” OR “web based instruction” OR “video modeling” OR “online instruction.” The second stage of the search was completed by entering one key search term into the second search field. The key search term was entered as “autism.” The third stage of the search was completed by entering key search terms into the third field. Key search terms in the third stage included and were entered as “teacher” OR “paraprofessional” OR “student.” A summary of results is provided in Table 2

Table 2

Systematic Review of Literature Articles Identified Across Four Databases

Database	Search terms	Hand coding	Identify subjects
Level of inclusion and exclusion	Level 1	Level 2	Level 3
Education Full Text	1453	6	2
Ebscohost: ERIC	4817	10	0
Ebscohost: PsycINFO	602	12	0
ABI/INFORM Complete	13,063	17	3
Total	19,935	45	5

Five peer-reviewed, published studies were identified in the systematic literature review. (For the purposes of this investigation, dissertation studies were excluded from the pool of articles.) In the first study, researchers investigated the effects of video modeling on the accuracy of implementation of discrete-trial instruction for new direct-service staff (Catania et al., 2009).

The researchers conducted a multiple baseline design across participants to measure the percentage of correct teaching behaviors per session on 10 discrete-trial instruction skills.

Participants in the investigation were identified as three new direct-service staff supporting



students with ASD at a private school, one male and two females, ages 22 to 25 years. Researchers' investigation of the results indicated that all three participants' percentage of discrete trial instruction skills performed correctly improved from baseline to video modeling phases of the study. Further, improved performances were observed in generalization and maintenance phases. The authors concluded that there was a functional relationship between video modeling and improved accuracy of percentage correct performances of discrete trial instruction across participants. The study effect size was high, with 100% non-overlapping data, and was determined by visual review of data points. Discussion of the results included by the authors revealed video modeling with a component of voice-over as an economical approach to teaching staff the discrete trial training protocol (Catania et al., 2009).

In the second study, the effects of video modeling combined with voice-over instruction on the implementation of discrete trial instruction was further investigated in a replication of the Catania 2009 study (Vladescu et al., 2012). Participants were new staff providing early intervention services. Vladescu et al. (2012) replicated the results of the Catania study and expanded the results by demonstrating participant maintenance of accuracy with implementation of discrete-trial instruction with children. The researchers were further able to demonstrate the impact of intervention through the skills acquisition of children receiving discrete trial instruction from study participants. The percentage of non-overlapping data for the study appeared to be 100%, indicating a high effect size. Analysis of the results of the study adds to the previous research supporting the use of video modeling to effectively train staff.

A third study investigated the effects of video modeling on treatment integrity of behavioral intervention by teachers (Digennaro-Reed, Coddington, Catania, & Maguire, 2010). A

multiple baseline design was employed to evaluate the treatment integrity of behavioral interventions by three teachers. Participants were new employees providing educational and residential services to individuals with ASD, traumatic brain injury, or other developmental disabilities, all female, ages 24 to 35. Researcher review of the results indicated that improvements were observed across participants, supporting the previous research demonstrating the benefits of video modeling for improved participant performance and treatment integrity. The study effect size was high, with 98% non-overlapping data points. The effect size was calculated by totaling the number of overlapping data points in the graphic display of participant performance and dividing by the total number of data points displayed. One overlapping data point out of 45 was identified. The researchers concluded that video modeling was superior to prior training, and the addition of feedback further improved performance of participants to 100% correct (Digennaro-Reed et al., 2010).

A fourth study was designed to compare the effects of computer-based skills training with behavior skills training on accuracy of implementation of discrete trial instruction for staff teaching an adult with ASD (Nosik, Williams, Garrido, & Lee, 2013). The behavior skills training consisted of instructions, modeling, rehearsal, and feedback, and the computer-based training package consisted of modeling, rehearsal, and feedback. There were six participants, three in each training group. Nosik et al. (2013) reported that the participants in the behavior skills training group performed with overall better accuracy of implementation of discrete trial instruction following the completion of training than the group that received computer-based training. Effect sizes were not provided for the comparison. Each of the first four studies investigated the effects of video modeling on the accuracy of staff or teacher implementation of

discrete trial instruction. The fifth study was the only one found that evaluated the effects of online instruction in mand training procedures for teaching para-educators who provided services to children with ASD.

Given the increasing number of students with ASD and the lack of trained professionals, McCulloch and Noonan investigated the impact of online training videos on the accuracy of implementation of mand training procedures for paraprofessionals teaching students with ASD (2013). The participants in their study were three paraprofessionals of Hawaiian descent, ages 32 to 42, employed in a rural public elementary school setting in Hawaii. A multiple baseline design across participants was implemented to evaluate the functional relationship between online training videos and paraprofessionals' use of mand training procedures. The impact of online training on student rate of mand responses also was investigated. The author's analysis of the results indicated that there was a causal relation between the online training videos in combination with a self-management checklist and the implementation of mand training by the paraprofessionals. The effect size for this study was .92, and for one participant researchers disclosed that stability in data was not achieved post intervention (McCulloch & Noonan, 2013). See Table 3 for a summary of study effect sizes.

Table 3

Study Effect Sizes

Study number	Percentage effect size
1	100
2	100
3	98
4	(Comparison study)
5	92

To date, no identified study has been designed to investigate the impact of online training videos on the performance of pre-service or in-service teachers' implementation of mand training procedures for students with characteristics of ASD. Given an extensive review of literature across four major databases for identification of literature on the convergence of online instruction, ASD, and teachers, which yielded zero empirical literature, there is a clear and present need for research in the area of online instruction for teachers of students with ASD. Therefore, the purpose of this was, first, to evaluate the impact of online training videos on teacher implemented mand training procedures and, second, to further evaluate the subsequent impact of mand training on the rate of student mand behavior.

## CHAPTER THREE: METHODS

Currently no empirical analyses exist investigating the effects of online training videos on the performance of pre-service or in-service teachers' implementation of mand training procedures for students with ASD. A *mand* is an independent request for a specific reinforcer resulting in student access to the reinforcer. A reinforcer is a consequence that increases the future rate of a response, in this case a reinforcer-specific response, a *mand*. Given the wealth of information on the impact of video modeling on students with ASD (Charlop-Christy et al., 2000; LeBlanc et al., 2003; Nikopoulos & Keenan, 2004) and improved staff performance with video modeling and feedback (Catania et al., 2009; Vladescu et al., 2012) the researcher sought answers to the following questions:

1. To what extent do Online Training Videos increase the percent correct implementation of procedures for teaching mands by teachers as they instruct students with characteristics of ASD in a classroom setting?
2. Given an increase in the percent correct implementation of procedures for teaching mands, to what extent does the percent correct implementation or procedures maintain over time?
3. To what extent will teachers' percent correct implementation procedures to teach mands increase the rate of mands for students with ASD in a classroom setting?
4. Given an increase in rate of student mands, to what extent will the rate of mands per instructional session maintain over time?
5. How do teachers perceive the goals, procedures, and outcomes of the online training videos?

### Setting and Participants

The setting for this research was a Pre-K and elementary charter school in Orange County, Florida. The Orange County Public School (OCPS) district is the 11<sup>th</sup> largest school district in the nation and the fourth largest school district in the state. The district comprises 123 elementary schools and three K-8 schools providing public school services to elementary students in the district. The district is divided into five learning communities, including the East, West, North, Southwest, and Southeast, with 175 schools and over 170,000 students. Each learning community provides public education services for students with ASD. Operations of this study were conducted in Orange County Public Charter School pre-kindergarten classrooms staffed with teachers who provide educational services for students with characteristics of ASD.

This study engaged two types of participants. The first was teachers ( $N = 4$ ) identified from a participating school that supports students with ASD or other related disabilities. Teachers selected for participation were 1) in-service Pre-K or elementary school teachers; 2) they reported no prior training in teaching mand procedures; and 3) they work with at least one student with characteristics of ASD. The second type of participant were students selected by the teacher with characteristics of ASD, who 1) had special education services from the teacher participants selected above; 2) had an echoic repertoire; and 3) had an active goal to increase skills in communicating wants and needs., for example and IFSP or an IEP goal. A diagnosis of ASD was not required as students were under the age of five and diagnosis often occur after age five (Howlin & Asgharian, 1999)

### Independent Variable

The independent variable was a series of Online Training Videos from Autism Training Solutions™. For the purpose of the study the researcher used the Introduction to Verbal Behavior (VB) and Mand Training videos from the series. The videos were chosen from Autism Training Solutions relative to prior validation research conducted by McCulloch and Noonan (2013) with paraprofessionals. McCulloch and Noonan were able to use these materials to increase the correct implementation of mand training procedures for paraprofessionals, demonstrating an increase in student mands. The researcher sought to systematically replicate and extend the validation line of research by examining whether similar outcomes could be demonstrated with in-service teachers and their students. The investigation consisted of procedures and protocols developed by McCulloch and Noonan (2013). The extension of research occurred with new types of participants to enhance the generalizability and broaden the impact of the program with regard to procedures for teaching mands. The intervention included multiple steps outlined below.

### Steps of Intervention

1. Pre-test of 20 questions to measure baseline of knowledge of teaching mands.

This pre-test is a competency measure of content for the intervention (See Appendix A.)

2. Eighteen 2-to-6 minute high-definition videos with classroom demonstrations, studio-produced voice-over, and supporting graphics and text (Autism Training Solutions, 2010).

3. A competency check following each 2-6 minute video relevant to material presented in the video.
4. A post-test (identical to pre-test; see Appendix A).
5. A certificate of completion for participants achieving at least 88% accuracy on the post-test. (Eighty-eight percent was a pre-determined measure of competence based on the intervention design and the criterion established.)
6. In the event that a participant did not meet the mastery criterion, the program automatically returned to the specific point in the program where the participant did not demonstrate mastery and was followed by a repeat of the post-test. During the post-test, if a participant committed two or more errors, the units linked to the errors were reopened for completion. After completing the units, repeat post-tests were administered.
7. Finally, participants contacted the primary investigator to indicate completion of the modules and acquisition of the certificates of completion.

#### Implementation with Fidelity

Fidelity of implementation of the intervention was accomplished in two ways. First, the PI replicated the procedures prescribed by the provider of the intervention. Each teacher participant was provided with an instructional packet and guided by the P I to create an individual user account. Instructions were made available by the P I upon request with permission granted by administrators of the Autism Training Solutions program. Second, an



independent observer validated the pre-test and post-test scores posted for the teacher participants through the website and verified that the administration of certificates of completion.

To set up an individual account, each teacher participant was asked to establish an account without revealing password information, log off and log on independently. Teacher participants were given instructions individually in a private office area of their choice, isolated away from other teacher participants. Teacher participants were given the option to complete the new user orientation module. First, teacher participants were instructed to go to and click on behavior interventions and open the introduction to verbal behavior module. Second, teacher participants were instructed to go to teaching procedures and open the teaching to request mand module. Third they were instructed to close the module and log off. Finally, they were instructed to independently go to the website and go to a module to demonstrate their ability to access the intervention independently. Teacher participants were then instructed to complete the modules within 3 to 4 days and to contact the researcher at [kelly.schaffer@knights.ucf.edu](mailto:kelly.schaffer@knights.ucf.edu) when they completed the modules and had acquired certificates of completion for each module. The researcher remained uninformed of the passwords and account information established by individual teacher participants. Observation of the teacher participants' access to the website was available to the researcher, as a group administrator.

#### Validity of Treatment Integrity

Validation of the teacher participant completion of the modules was accomplished by an independent observer through observation of teacher participant pre- and post-test scores and certificates of completion administered to teacher participants. As the OTVs were

preprogrammed, the opportunity to vary implementation was not applicable. Access to contents of each module was contingent upon completion of a pre-test. Access to the post-test was contingent on correct answers to content questions for each unit within the module.

Administration of a certificate of completion was contingent on a teacher participant post-test competency score of 88% or greater. These measures were used for inter-observer agreement to determine implementation with fidelity and teacher participant interaction, with and completion of, the modules. Inter-observer agreement was measured at 100%.

#### Dependent Measures

The primary dependent variable for this study was percent correct implementation of procedures for teaching mands by in-service teachers. The first dependent measure of procedures to teach mands was a percent correct measure for accuracy of implementation of procedures for teaching mands by teachers as they instructed students with characteristics of autism in a classroom setting. Teaching mands was defined as the implementation of the following component skills: a) sanitize the environment, b) identify an Establishing Operation, c) prompt or require mand, and d) deliver reinforcer. Component Skills are outlined and defined in Table 4. Teaching mands was measured with a percent correct implementation of component skills.

Table 4

Task Analysis of Component Skills for Teaching Mand

Component skill	Description
1) Sanitize the environment	Removal of free access to items/activities, while maintaining items/activities in student view.
2) Identify an EO	Conduct an in-situ motivational assessment, or identify student trying to get a reinforcer.
3) Prompt mand	Provide prompt. Note: If independent mand occurs, a no opportunity for prompt will be recorded and the next step in the sequence marked as yes or no.
4) Contingent delivery of a reinforcer	Give specific reinforcer to student.

A secondary dependent variable, student mands, was assessed based on student outcomes relative to procedures for teaching mands. The dependent measure was mean rate of mands per minute for students with characteristics of autism. Rate of student mand responses were calculated during baseline and post-intervention phases. As previously mentioned, *mand* was defined as an independent request for a specific reinforcer resulting in student access to the reinforcer. Reinforcement was defined as a consequence that increased the future rate of a response, in this case a reinforcer-specific response, a *mand*. Observations and data collection for rate of mand responses were conducted during baseline and post-intervention phases by the primary investigator.

A third set of dependent measures was used to evaluate teacher perceptions of goals, procedures, and outcomes of the OTV. A social validity questionnaire was provided to primary

teacher participants at the end of the experimental phases of the study to evaluate their level of agreement with goals, procedures, and outcomes of the intervention in accordance with recommendations for assessment of social validity (Wolf, 1978).

A social validity questionnaire was administered following the completion of the maintenance phase of the study. The questionnaire was provided for teacher participants using an online platform, Qualtrics software. Teacher participants were emailed a link to access the survey and an invitation to complete the survey. Three out of four teacher participants completed the survey within 2 days of the distribution. A follow up email was sent to assess teacher participant concerns or questions. The final survey was completed within the next 24 hours. All four teacher participants completed the survey, a return rate of 100%.

#### Inter-observer Agreement

The primary investigator collected all data for each phase of the study. A second trained graduate research assistant collected data on dependent measures for a minimum of 20% of each phase of the study. Using a point-by-point comparison, inter-observer agreement (IOA) was calculated for the primary and secondary measures by dividing the total number of agreements by the total number of agreements plus disagreements multiplied by 100. Figure 1 presents the equation used for calculation of IOA.

$$\frac{\text{Agreements}}{\text{Agreements} + \text{Disagreements}} \times 100$$

Figure 1: Equation for the Calculation of IOA

### Training for Data Collection

A task analysis for the first dependent measure was used to record the total percent correct steps for teaching mands during baseline and post-treatment conditions (see Appendix D). Video exemplars of mand training procedures by nonparticipants were used to teach independent observers data collection procedures. Observation and data collection training included review of definitions for dependent measures and practice with identification of pre-recorded behaviors. Criteria for competency were 100% correct accuracy of recording for three successive opportunities. Accuracy was determined by comparing graduate assistant results against pre-determined accuracy.

For the second dependent measure (rate of student mands), a research assistant was trained in data collection for the total number of independent mands per session using a frequency counter. The rates of mands per session were recorded using video exemplars of nonparticipants. Criterion for competency was 100% correct calculation of frequency of mands for three video observations.

For teacher responses, an independent rater was taught to identify component skills targeted for teacher implementation of mand training procedures. For training, videos of teaching procedures with non-participants of the study were selected. Utilizing videos of correct teaching procedures, the independent rater demonstrated competency by correctly identifying procedures at a criterion of 100% over three successive opportunities.

For student responses, the independent rater was taught to identify prompted versus independent mands. Videos of student mands with non-participants of the study were selected. Utilizing videos of a child learning to mand independently, the independent rater demonstrated competency by correctly recording the number of independent mands at a criterion of 100% over three successive opportunities. Videos used by the researcher for training are available upon request..

### Procedures, Experimental Design, and Conditions

The primary research question—the extent to which use of Online Training Videos increases the percent correct implementation of procedures for teaching mands to teachers as they instruct students with characteristics ASD in a classroom setting—was addressed with a multiple-probe across-participants design. The secondary research question—the extent to which teachers’ increase in percent correct implementation of procedures for teaching mands increases the rate of mands for students with ASD in a classroom setting—was addressed with a multiple baseline probe across participants design. Phases of this study included baseline, intervention, and maintenance conditions for data collection and evaluation of teacher performance and

student outcomes. A social validity survey was administered following the maintenance phase of the investigation.

### Baseline Phase

Before scheduling observations, teacher participants were asked what time of day was best for the teacher and students. Observations were scheduled according to the information provided by the teachers, targeting times that teachers reported were most convenient. Scheduling for observations was targeted for times based on teacher participant responses in order to minimize the intrusiveness of observations. Duration of observations was scheduled for 30 minutes per day. Baseline sessions of teachers working with their students were conducted by the PI through direct observation. A set of baseline data was collected for a minimum of five sessions or until stability was observed. Stability in data points was achieved when little variation in responding was observed. When stability in responding was observed, relative predictability of similar responding was possible, thereby minimizing confounding explanations for changes in responding after introduction of the intervention phase (Johnston & Pennypacker, 1993). One observation consisted of only three data points as the PI terminated the session early. The decision to terminate was made based on signs of distress to the teacher participant and the student. Further, extinction of an existing repertoire appeared to be in operation.

Each observation during baseline consisted of two parts, a trial to record percent correct implementation of mand teaching procedures followed by a 3-minute observation period to record the mean frequency of student mands. Approximately 5 minutes was required for each

observation. The cumulative duration of observations did not exceed 30 minutes total.

Observations were conducted at times when participants reported it was best for the participant and the class.

During baseline the onset of the first trial began with an instruction to “show me how you teach requesting skills/mands.” Once the instruction had been given a timer was set for 1 minute (see Appendix D). Each step in the task analysis was recorded as correct or incorrect.

Termination of the trial occurred with the contingent delivery of a reinforcer or when the time limit of 1 minute was reached. The 1-minute time criterion was selected to minimize the time to practice errors. Next, the timer was set for 3 minutes, and the number of independent student mands was recorded. The mean numbers of student mands per minute were calculated by dividing the total count by 3. Approximately 5 minutes were required for each unit of data collection. Multiple sessions for data collection occurred in one visit for observation. Flexibility in times scheduled for observations was necessary to adapt to changing events, including absences, other therapies not previously scheduled, and student illness.

### Intervention Phase

Following the establishment of stability in baseline for one participant, the PI instructed participant 1 in how to access the OTV. A time period of two to three school days was given for completion of the OTV for Introduction to Verbal Behavior and Teaching Mands. The process of setting teacher participants up to complete the OTV was repeated one at a time across teacher participants pending the completion of OTV by a previous teacher participant. Just prior to the instruction provided by the PI to access the OTV, a probe was conducted to establish levels of



performance prior to intervention. Teacher participants completed the OTV on any computer they chose at any location of choice. The researcher monitored the completion of the OTV through the Autism Training Solutions program. Teacher participants were required to produce the competency certificate awarded for completion of the OTV.

#### Post-intervention Phase

The PI resumed observations within one school day of the teacher participant's completing the online training videos to criterion. The observations were scheduled at the same times they were scheduled during baseline. The onset of the first observation began with the instruction to "show me how you teach requesting skills/mands." The parameters for observation units in the post-intervention phase were identical to the parameters in the baseline condition.

#### Maintenance Phase

Post-intervention probes for maintenance were completed approximately two weeks after the post-intervention phase of data collection. Probes were conducted for teacher participants whose data indicated increased levels of performance. Probes were not conducted for teacher participants whose data did not indicate increased levels in performance. Parameters for maintenance probe observations were identical to the parameters in baseline and post-intervention conditions.

## Social Validity

Validation of the social importance of goals, procedures, and outcomes of the OTV was assessed by asking teachers to rate their level of agreement and satisfaction with the OTV. Teachers were provided a link to complete the social validity questionnaire online at their convenience. In one case a questionnaire was not completed within 24 hours of the first request; therefore, a second request was provided. Data provided by teacher participants were used to evaluate the social validity of the intervention.

## Data Analysis

### Visual Analysis

Traditionally, single-subject designs use a systematic visual analysis of graphic display of data in adjacent conditions to analyze the effects of treatment on the dependent measures. Data points in two adjacent conditions were analyzed across four teacher participants with teacher participants acting as their own controls. Visual analysis of the display of data included analysis of (a) level, (b) trend, and (c) variability in data points, described as a cornerstone of single-case experimental design (Gast & Ledford, 2010).

A within-condition and adjacent-condition analysis of data was used in accordance with literature-based guidelines (Lane & Gast, 2013). Seven steps to complete within-condition analysis followed by five steps to complete the between-condition analysis defined by Lane and Gast (2013) are provided as follows:

## Steps to Conduct a Within-condition Analysis

1. Letter A is assigned to the baseline condition and letter B is assigned to the treatment condition representing the introduction of the independent variable, OTV.
2. The number of sessions are counted and assigned a value for each condition.
3. The mean, median, range, and stability are calculated for each condition. The mean is calculated by adding the sum of all data and dividing by the number of data points for each condition. The median is calculated by listing values of data points from least to most. For an odd number of data points the middle value will equal the median. For an even number the average of the two middle values is equal to the median. The range is determined from the least value to the greatest value. A stability envelope is determined with 80% of the data points within  $\pm 0.25\%$  of the median. A percent of total data points on or within the stability envelope is calculated. Stability is evaluated for each condition.
4. The level is calculated for each condition. Relative level is calculated by dividing data into halves in each condition. The median for each half is calculated and the smaller subtracted from the larger. A deteriorating or improving level is noted.
5. The split-middle method is used to calculate the estimate of trend. The data for each condition are divided in the middle and marked with a dotted line. The data in each half are divided in the middle once again and marked with a solid line or mid-date line. If there are an odd number of values, the middle value is not included; if there is an even number of values, the number of data points for each half is divided by two. The median is determined for each half of each condition. If there is an even number of values, the

two middle values are added and divided by 2. A line is drawn that passes through the mid-date and median rate or mid-rate for each half of each condition. This reveals a trend line within each condition.

6. The percent of data points within the range of stability (80%) is calculated. The stability envelope calculated in step 3 is laid over the trend line generated in step 5.
7. Data paths are evaluated. Review of direction is evaluated and designated as accelerating, decelerating, or no change. Review of variability is evaluated and data described as stable or variable in each condition. And finally, observation of multiple data paths is recorded as yes or no within each condition.

#### Steps to Conduct a Between-conditions Analysis

1. One variable, OTV, is introduced between baseline and treatment conditions.
2. The type of change in direction of trend is evaluated across adjacent conditions A and B. Changes in trends are described as accelerating or decelerating and improving or deteriorating.
3. Stability across conditions is summarized as stable or variable for each condition.
4. The median value of the second half of baseline is subtracted from the median value of the first half of intervention to calculate a relative change in level. A median level change is calculated by subtracting the median value of baseline from the median value of the intervention condition. A mean level change is calculated by subtracting the mean value of baseline from the mean value of the intervention condition.
5. A percentage of non-overlapping data (PND) is calculated first by identification of the

highest value in baseline and counting the total number of data points in the intervention condition above that value. Second, the total number of values in the treatment condition above the highest value in baseline divided by the total number of sessions multiplied by 100 is used to calculate the PND value.

## Effect Size

Gast and Spriggs (2008) recommended the combination of more than one measure for effect size. This study used two forms of effect-size analysis: a percentage of non-overlapping data (PND) and a Tau-U. The percentage of non-overlapping data (PND) is commonly used in single-case research for analysis of effect size. Computation of PND is completed by identifying the highest or lowest data point in baseline, counting the number of data points in an intervention phase that do not overlap with the baseline data point identified, dividing by the total number of data points in intervention and multiplying by 100 ( Scruggs, Mastropieri, & Casto, 1987; Scruggs, Mastropieri, Cook, & Escobar, 1986). One flaw with PND is that if a therapeutic trend occurs in baseline and continues in treatment a strong effect size may be calculated that is not the result of intervention (Gast & Spriggs, 2009). This study used the Tau-U analysis for the second type of effect-size analysis. A Tau-U is an emerging guide for analysis of single-case research that combines non-overlapping data and trend (Parker, Vannest, Davis, & Sauber, 2011). Tau-U is named from a combination of Kendall's Tau and Mann-Whitney-U. Figure 2 presents the formula for Tau U presented by Parker et al. (2011). This measure includes level and trend. The Tau U was combined with the traditional PND for a more rigorous measure of treatment effects.

$$u = \frac{(C - D)}{n}$$

C = Number of concordant pairs  
D = Number of non-concordant pairs

Figure 2: Kendall's Tau (Tau-U) Formula

### Limitations

This study may have had internal and external validity threats to experimental control given this design. Limitations to internal validity may include a lack of strength in a causal relationship between the independent variable and dependent variable. This limitation is due to effects identified in a multiple baseline design having been inferred by a change in level of performance for participant one concurrent with no change in levels of performance for participants two, three, four, or five who are not receiving concurrent intervention (Gast & Ledford, 2010). While a reversal or withdrawal designs may be stronger experimental causal designs, there is no option to withdraw the level of knowledge acquired by participants. Despite this limitation, the primary goal of the intervention by design is to build teacher skills, thereby making the multiple baseline research design appropriate for this investigation.

Further limitations may include the lack of external validity. Due to a small sample size (N = 4), generalization to a larger population is not plausible. Outcomes of the proposed investigation are limited to the participants of this study. Replication of the study across settings,

participants, or behaviors may be one way to improve the strength of findings from this study, (Odom et al., 2005; Rogers & Vismara, 2008).

### Strengths

Strengths of this design include compliance with standards that minimize several threats to internal validity. Single-case experimental design is touted as one of the strongest designs for isolation of the effects of an independent variable through experimental control and ruling out other possible explanations for findings (Gast & Ledford, 2010). Threats that are addressed in this design include (a) history, (b) maturation, (c) attrition, (d) the Hawthorne effect, (e) instrumentation, (f) multiple treatment effect, (g) stability of data, (h) adaptation, and i) fidelity of implementation (Cooper, Heron, & Heward, 2007). Replication of previous research conducted by independent researchers combined with replication of effects across participants meet two of the standards advised for single-case research (Horner et al., 2005). Further, this design incorporated the recommended standards for data collection, including inter-observer agreement with a goal of at least 80% or better, collection of a minimum of 3-5 data points per condition, and replication across 3-5 participants prior to reporting results (Horner et al., 2005; Kratochwill et al., 2013).

This study was designed to add to the body of research evaluating the impact of online training videos for the preparation of educators serving children with characteristics of ASD or other related disabilities. The study was designed to determine whether a meaningful change occurred and, if so, to what extent the change was attributable to the intervention, the OTV (Cooper et al., 2007). Second to the impact of OTV on teacher behavior, this study was

designed to assess the impact of improved teacher competencies in teaching mands through demonstration on the rate of mands exhibited by students receiving their instruction. Students with characteristics of ASD receiving educational support require educators who are prepared in evidence-based practices.



## **CHAPTER FOUR: RESULTS**

### Chapter Overview

This chapter includes an overview of percent correct implementation of procedures for teaching mands, rate of student mands, data collected across each phase of the study, visual analysis of data, and effect sizes. Measures of social validity of the online training modules will also be presented.

This study was designed to investigate the effects of online training videos on the performance of in-service teachers' fidelity of implementation of mand training procedures for students with characteristics of ASD, the impact of improved fidelity of implementation on student mand responses, and the extent to which improved fidelity of implementation, if observed, was maintained. The following questions were addressed:

1. To what extent does an Online Training Video increase the percent correct implementation of mand training procedures for teachers as they instruct students with ASD in a classroom setting?
2. Given an increase in the percent correct implementation of mand training procedures, to what extent does the level of performance maintain over 2 weeks?
3. To what extent will teachers' use of Online Training Videos increase the rate of mands for students with ASD in a classroom setting?
4. Given an increase in frequency of student mands, to what extent does the rate of mands per instructional session maintain over 2 weeks?
5. How do teachers perceive the goals, procedures, and outcomes of the

online training videos for teaching mands?

### Fidelity of Implementation

Treatment integrity was assessed for 100% of pre-test scores, post-test scores and administration of certificates of completion across teacher participants. The mean teacher participant pre-test score  $\bar{X}$  was 66% correct; scores ranged from 50% to 84%. The mean teacher participant post-test score  $\bar{X}$  was 93% correct; scores ranged from 89% to 100%. Contingent on a post-test score of 88% or higher, each teacher participant was awarded a certificate of completion for each of two modules completed as indicated for intervention. Inter-observer agreement for treatment integrity was measured at 100% with 0 disagreements.

### Inter-Observer Agreement

Inter-observer agreement (IOA) was assessed for 25% of data collected in each phase of the investigation for each dependent measure. Assessments of dependent measures were completed for teacher implementation of mand training procedures and student frequency of mands per minute. For teacher implementation of mand training, the mean IOA was calculated at 100% across phases, revealing zero disagreements in data collected. For student rates of mands per minute, the mean IOA was calculated at  $\bar{X} = 98.5\%$  and ranged from 80% to 100% concurrence, revealing only one disagreement and 11 agreements out of 12 opportunities for agreement. Figure 3 displays the equation for calculation of point-by-point IOA for teacher and student responses across each phase of the investigation.

$$\frac{\textit{Agreements}}{\textit{Agreements} + \textit{Disagreements}} \times 100$$

Figure 3: Equation for Calculation of Point by Point Inter-Observer Agreement

Question 1: Effect of Online Training Video on Correct Implementation of Mand Training Procedures

To what extent does an Online Training Video increase the percent correct implementation of mand training procedures for teachers as they instruct students with ASD in a classroom setting? Figure 4 provides a graphic display of teacher participant implementation of procedures for teaching mands.

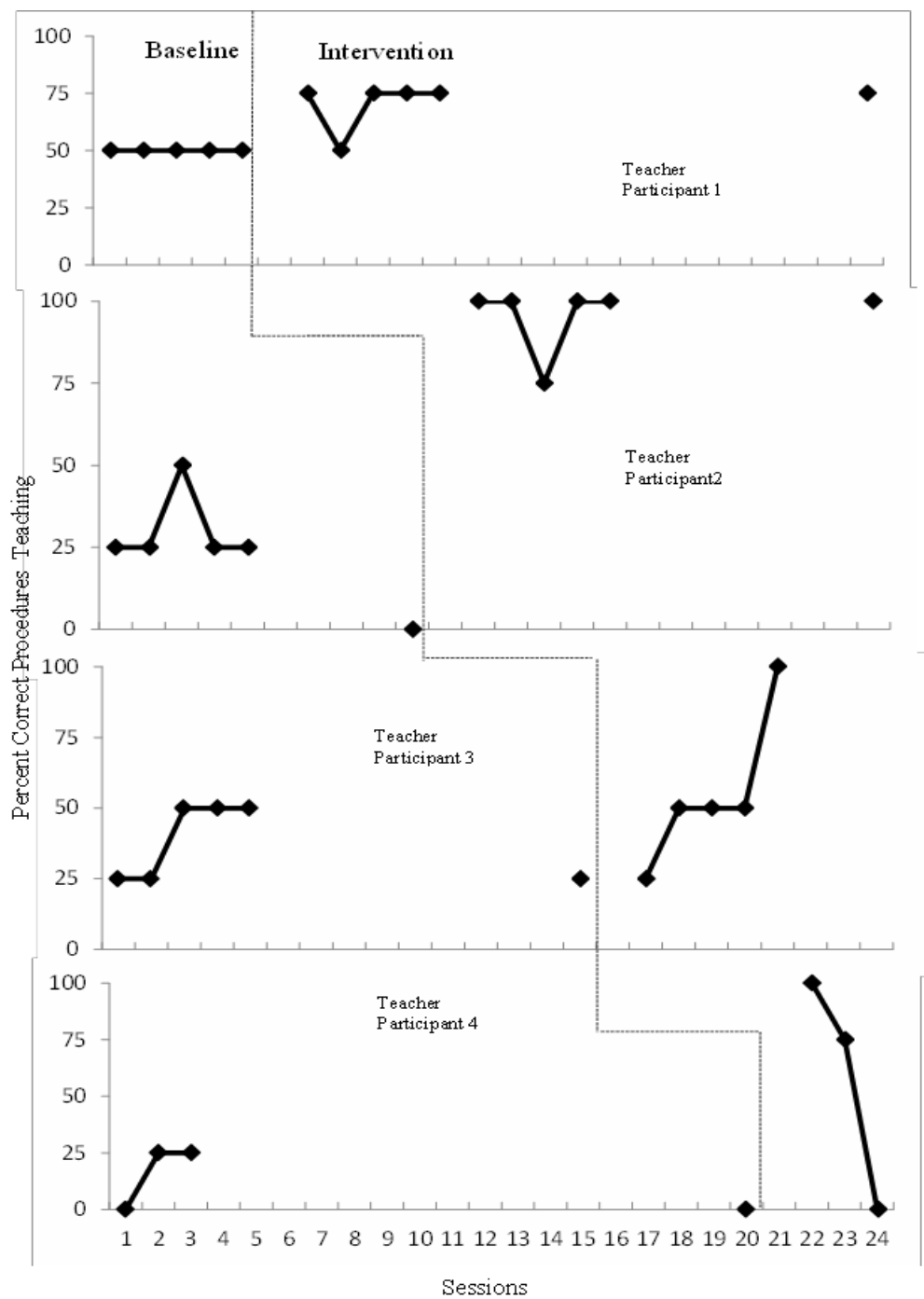


Figure 4: Teacher Participant Percent Correct Mand Teaching Procedure

### Teacher Participant One

First, baseline measures for teacher participant one revealed a consistent implementation of mand training procedures at a mean level of 50% correct, with zero variability. Following the completion of the online training videos, teacher participant one demonstrated an increase in mean level of performance from 50% correct to a mean level of  $\bar{X} = 71\%$  correct with a range of 50% to 70%. Through visual analysis, stability in data was observed, revealing a reliable and predictable pattern of performance. Therefore, there was an observed increase in the correct implementation of mand training procedures following the completion of OTVs for teacher participant one.

### Teacher Participant Two

Baseline measures for teacher participant two indicated a mean level  $\bar{X} = 25\%$  correct with a range of 0% to 50%. Following completion of the OTV, data for teacher participant two revealed an immediate increase in the mean level of performance to  $\bar{X} = 96\%$  correct, with a range of 75% to 100%. Through visual analysis stability in data was observed. Therefore, there was an observed increase in the correct implementation of mand training procedures following the completion of OTVs for teacher participant two.

### Teacher Participant Three

Baseline measures for teacher participant three showed a mean level of  $\bar{X} = 38\%$  correct with a range of 25% to 50%. During post intervention, there was an increase in the mean level of

–

performance at  $X = 55\%$  with a range of 25% to 100%. However, the data in the post-intervention phase appeared almost identical to the data during baseline, with the exception of one data point indicating 100% correct. Visual analysis did not reveal stability in data or trend. An increase in variability was observed with an increasing trend. Therefore, there was not a reliable repeated increase observed in the correct implementation of mand training procedures following completion of the OTVs for teacher participant three.

#### Teacher Participant Four

Analysis of baseline measures for teacher participant four exposed a mean level of  $\bar{X} = 13\%$  correct with a range of 0% to 25%. Due to escalating signs of distress displayed by the student, data collection was terminated after three data points. Following completion of the OTVs, teacher participant four performed at a mean level of  $\bar{X} = 56\%$  correct, with a range of 0% to 100%. During post intervention the first data point indicated 100% correct implementation, revealing an immediate increase in level. This increase was immediately followed by a decreasing trend to 75%, 0%, and back up to 50%, revealing a great variability across data points. Therefore while an immediate increase was observed, a repeated and reliable increase was not observed in the implementation of mand training procedures following completion of the OTVs for teacher participant four.

#### Effect Size

Two forms of effect size were assessed for each of the teacher participants in this study. The percentage of non-overlap data (PND) and Tau-U, with a confidence interval of 90%, were

calculated with data from across phases of the investigation. Results for teacher participant one revealed a PND of 83% and Tau-U of .83. Results for teacher participant two revealed a PND of 100% and a Tau-U of 1.00. Results for teacher participant three were a PND of 20% and a Tau-U of .40. And finally, results for teacher participant four were a PND of 75% and a Tau-U of .63.

Findings across teacher participants indicated a strong effect size for teacher participants one and two, a weak effect size for teacher participant three and a moderate effect size for teacher participant four. The strong effect sizes for teacher participants one and two bolster the findings of a functional relationship between the intervention and the increase in teachers' percent correct implementation of procedures for teaching mands. Table 5 presents a summary of effect sizes across teacher participants.

Table 5

Percentage of Non-Overlapping Data and Tau-U Effect Sizes for Teacher Participants

Teacher participant	PND %	Tau-U
1	83	.83
2	100	1.00
3	20	.40
4	75	.63

In summary, data analysis for teacher participant one revealed an increase in percent correct implementation, with an observed increase in level of performance by 25% and stability of data over time. Analysis of data for teacher participant two exposed a greater increase in

correct implementation compared to teacher one, with an increase in level of 50% and stability of data over time. Data for teacher participant three showed no initial change in level of performance, with only one data point indicating 100% correct implementation, which was not demonstrated repeatedly and reliably. Data for teacher participant four indicated an initial increase in level of performance from 0% to 100% correct; however, a decreasing trend followed. A repeated and reliable increase was not observed for teacher participant four, with great variability in data points and a lack of stabilization. Overall, two of the four teacher participants demonstrated increased levels of percent correct implementation of mand training procedures following the completion of OTVs, while two of the four did not show a reliable increase in percent correct implementation of mand training procedures. The researcher revealed from data in this investigation a stable and reliable improvement in performance of teachers implementing procedures for teaching mands for two of the four teacher participants in this study. The extent to which online training videos increased teacher implementation of mand training videos was observed for one half of the teacher participants in the study and the other half showed ???.

#### Question 2: Maintenance of Increased Accuracy of Teacher Implementation

The second question of the investigation addressed the maintenance of increased accuracy of teacher implementation of procedures for teaching mands. Therefore the two teacher participants with data revealing an increase were given maintenance probes. Probe data for teacher participant one occurred at 75% correct implementation of procedures. Probe data for teacher participant two indicated a 100% correct implementation of procedures. Probe data for



both teacher participants revealed performances similar to previously measured increases in accuracy of implementation, suggesting maintenance of improved performances for a period of time exceeding two weeks post completion of intervention. Therefore, given an increase in implementation of procedures to teach mands, teachers improved performances were maintained over time.

### Question 3: Impact of Teacher Accuracy of Implementation

To what extent will teachers' accuracy of procedural implementation to teach mands impact the frequency of mands for students with ASD in a classroom setting?

The third research question addressed the impact of teacher accuracy of implementation with procedures to teach mands on the frequency of student mands. Three of the student participants demonstrated increased mean frequency of mands per minute. One of the student participants demonstrated a decrease in the mean frequency of mands per minute. Figure 5 presents a multiple probe graph of independent mands for student participants across phases of the investigation.

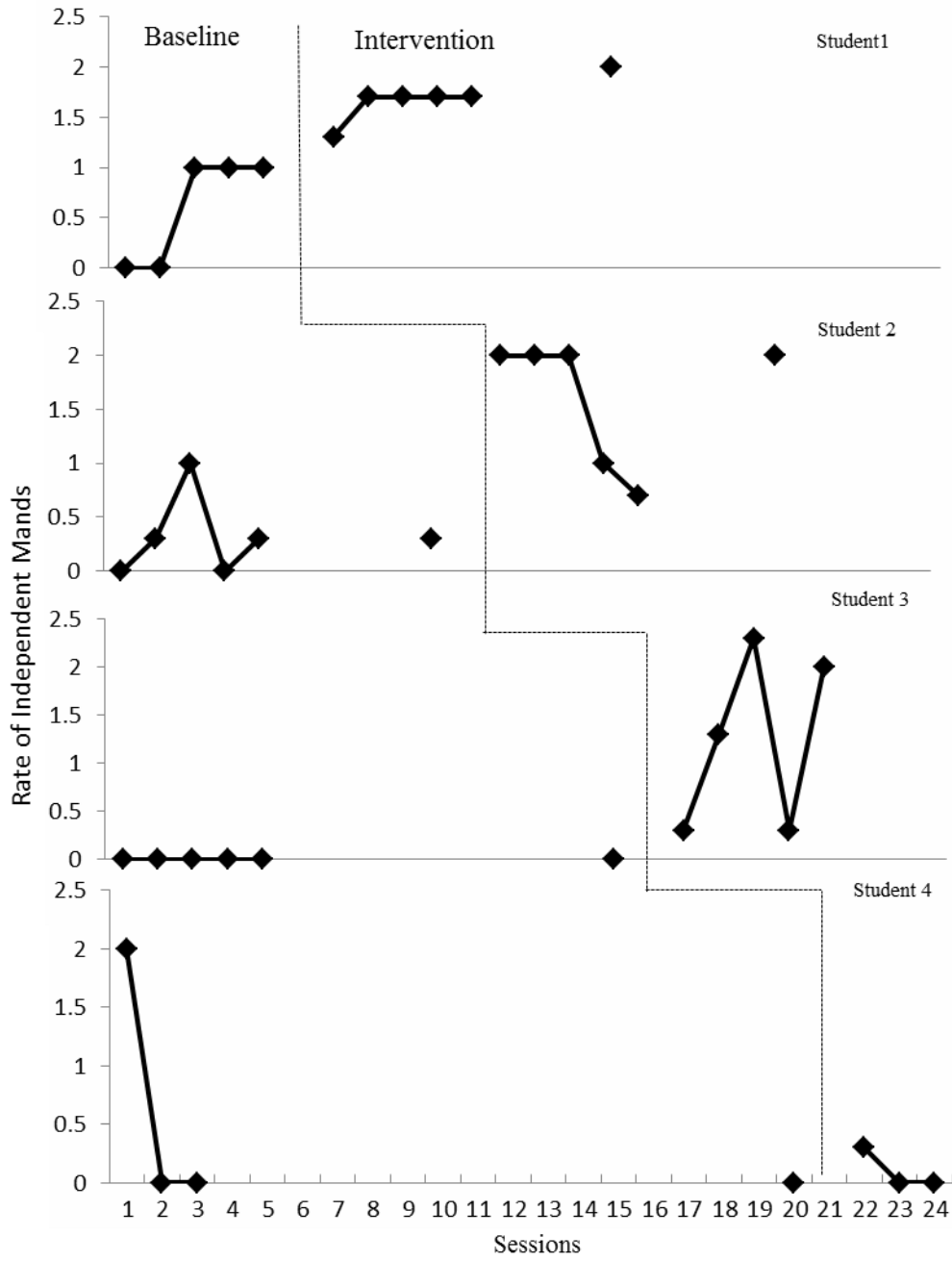


Figure 5: Multiple Baseline Graph for Student Rates of Independent Mand

### Student Participant One

During baseline, student participant one demonstrated a mean rate of  $\bar{X} = .6$  independent mands per minute with a range of 0 to 1. Post-intervention measures revealed an increase in the mean rate to  $\bar{X} = 1.6$  with a range of 1.3 to 1.7 mands per minute. Visual analysis revealed stability in data, indicating a reliable and predictable pattern of responding for student participant one.

### Student Participant Two

Student participant two demonstrated a mean rate of  $\bar{X} = .3$  independent mands per minute with a range of 0 to 1 during the baseline phase of the investigation. An increase in the mean rate of independent mands for student participant two was observed at  $\bar{X} = 1.6$  with a range of 0.7 to 3. Increased variability in responding was observed for participant two during the post-intervention phase, with initial stability for the first three data points followed by a decrease in responding.

### Student Participant Three

The mean frequency of independent mands for student participant three was recorded at 0 mands per minute and remained at 0 throughout the collection of baseline data. Following the teachers' completion of the OTVs, an increase in the mean frequency of independent mands per minute was observed at 1.1, with a range of .3 to 2.3 per minute. A high degree of variability in responding was observed with first an increasing trend, second a decreasing trend, and finally an

increase. However, a return to a frequency of 0 was not observed at any time in the post-intervention phase. Therefore an increase in frequency of independent mands was observed; however, a reliable predictable pattern of stability or increase in student responding was not observed for student participant three.

#### Student Participant Four

Baseline measures of the frequency of independent mands per minute for student participant four revealed a mean rate of  $\bar{X} = .5$  mands per minute, with a range of 0 to 0.7. Differing from the results of first three participants, post-intervention measures revealed a decrease in student responding at a mean rate of  $\bar{X} = .25$  independent mands per minute, with a range of 0 to 0.7. Stability in data for student participant four was not observed through visual analysis.

#### Summary of Student Participant Data

In summary, analysis of student participant data revealed increased frequency of independent mands from baseline to post-intervention phases for two of the student participants. Student participants one and two were observed with increased mean frequencies and stability of data. Analysis of data for student participant three revealed an overall increase in rate from 0 to 1.1, with a large range of variability and bounce observed in the direction of the data. The bounce in data facilitates a finding that is inconclusive for student participant three. Finally the data analysis for student participant four revealed a decrease in the mean rate of responding. Overall, two of the four student participants demonstrated increased rates of independent mands

per minute from baseline to post-intervention phases of the study, while one was inconclusive and one decreased.

### Effect Sizes

Consistent with effect sizes calculated for teacher participants, effect sizes were calculated for changes in responding demonstrated by student participants. The PND and Tau-U were utilized. Results for student participant one revealed a PND of 100% and a Tau-u of 1. Results for student participant two indicated a PND of 67% and a Tau-U of .92. Results for student participant three exposed a PND of 100% and a Tau-U of 1. Finally, results for participant four showed a PND of 0% and a Tau-U of .12. Findings across participants indicate a strong effect size for participants one and three, a moderate effect size for participant two, with inconsistencies across measures, and a weak effect size for participant four. Table 6 presents a summary of effect sizes across student participants.

Table 6

Percentage of Non-Overlapping Data and Tau-U Effect Sizes for Student Participants

Participant	PND percentage	Tau-U
1	100	1.0
2	67	.92
3	100	1.0
4	0	.12

#### Question 4: Maintenance of Observed Increases

Secondary to question three, the fourth question of this investigation addresses the maintenance of observed increases in student rate of independent mands. As gains in rates were observed for participants one and two, probes for rates were conducted approximately two weeks following the teacher participants' completion of the OTV. Participant one demonstrated a rate of 1.7 independent mands per minute. When compared with the initial increase observed of 1.6 independent mands per minute, maintenance of the increase is observed. Participant two demonstrated a rate of 1.6 consistent with the mean rate observed post intervention of  $X = 1.6$ . In conclusion, given an observed increase in student frequency of independent mands per minute, observed increases were maintained over a two-week period of time post intervention.

#### Question 5: Social Validity Survey

The fifth question assessed teacher participant perceptions of the goals, procedures, and outcomes of the OTVs. An email was sent to individual teacher participants with a link to complete an online social validity survey. Table 7 presents teacher participant responses to each question provided in the survey.

Table 7

## Social Validity Survey Teacher Participant Responses

Survey item	Percentage response
1. The Learning Management System was easy to navigate	
No, it was confusing	0
Sort of, it took getting used to	0
Yes, it was self-explanatory	100
2. Was the look of the site aesthetically pleasing?	
No, I didn't like it.	0
It was okay.	0
Yes.	25
I really like it.	75
3. If you experienced technical problems they were related to:	
Videos	25
Competency checks	0
Notes	0
Chapter quizzes	0
Registration	0
No problems	50
No response	25
4. The speed of the video was:	
Fast	25
Medium	75
Slow	0
Very slow	0
5. The notes functionality was useful	
Strongly agree	50
Agree	50
Somewhat agree	0
Disagree	0
Didn't use	0
6. The competency checks after each short module were helpful.	
Strongly agree	75
Agree	25
Somewhat agree	0
Disagree	0

Survey item	Percentage response
7. The chapter tests were easy to use.	
Strongly agree	75
Agree	25
Somewhat agree	0
Disagree	0
8. The resources were useful	
Strongly agree	75
Agree	25
Somewhat agree	0
Disagree	0
9. The training content was presented in an organized way.	
Strongly agree	100
Agree	0
Somewhat agree	0
Disagree	0
10. The content seemed up to date and accurate.	
Strongly agree	100
Agree	0
Somewhat agree	0
Disagree	0
11. The videos were engaging.	
Strongly agree	50
Agree	50
Somewhat agree	0
Disagree	0
12. The competency checks truly tested my understanding of the material in the module.	
Strongly agree	75
Agree	25
Somewhat agree	0
Disagree	0
13. How effective was the training in helping you understand the concepts it presented?	
Extremely effective	100
Effective	0
Somewhat effective	0
Not effective	0



Survey item	Percentage response
14. What part or aspect of the training was most helpful and why?	
The videos where you get to see real life situations	N/A
The videos of therapist working with the child	N/A
I'm a visual learner so being able to see the training was very useful to me	N/A
The real life scenarios helped (me) understand a concept better	N/A
15. What part or aspect of the training was least helpful and why?	
Not applicable	100
16. To what degree were you able to apply the information in the training video to your work or daily life?	
None	0
A little	0
Used some of the concepts right away	75
I was able to apply many concepts right away	25
17. Would you recommend that your school continue to train using this online training platform?	
Yes	100
No	0

All four teacher participants evaluated the OTV. Teacher participants reported that the OTV was self-explanatory and aesthetically pleasing. One teacher participant indicated a technical problem with the videos; two teacher participants indicated no problems; one teacher participant did not provide a response to this item. Three out of four teacher participants reported the speed of the videos as medium and one reported the speed as fast. Teacher participants either agreed or strongly agreed that the notes functionality was useful, competency checks were helpful, chapter tests were easy to use, and resources were useful. All teacher participants, (100%) reported that they strongly agreed that the content seemed up to date and accurate and was presented in an organized manner. Half (50%) of the teacher participants

agreed and 50% strongly agreed that the videos were engaging (give which participants as you need to include in chapter 4 if they didn't like as much and they had less experience could that explain anything – not a fact but more of a qualitative to think about in the next study – use all novice teachers for example). One quarter (25%) agreed and three-quarters (75%) strongly agreed that the competency checks truly tested their understanding of the material presented in the module. All of the teacher participants, (100%) reported the training as extremely effective in helping them understand the concepts presented. The most helpful aspect of the training was identified as “real life” exemplars and models across all four teacher participants. Furthermore, teacher participants reported the least helpful aspect of the training as “not applicable”. Three out of four participants (75%) reported that they used some of the concepts right away and one (25%) reported the ability to apply many concepts right away. Finally, all four teacher participants, (100%) responded that they would recommend the school continue to use the online training platform. Overall, responses indicated favorable results to the goals, procedures, and outcomes of OTV.

## CHAPTER FIVE: DISCUSSION

### Introduction

The purpose of this investigation was to assess the impact of online training videos on the implementation of evidence-based practices, specifically procedures for teaching mands, by teachers of students with characteristics of autism, and the subsequent impact on student outcomes. This chapter includes a summary of findings, limitations, implications, and recommendations for future research.

With over 65 years of empirical evidence (Browder & Spooner, 2011) ABA has been touted as the most evidence based practice (EBP) for teaching individuals with ASD (Corsello, 2005). In light of this evidence, one might expect that teachers of students with characteristics of autism to be fluent in the implementation of evidence based practices based on the concepts and principles of ABA. However, despite the proven effectiveness of ABA when teaching this population of students, ABA practices were not readily observed in the classrooms of participants for this study. This is further evidence substantiating the need to support in-service teachers in the acquisition and use of EBP for teaching students with autism.

Originally presented in 1957 as a conceptual framework (Skinner, 1957), VB has evolved into researched practice in the literature meeting criteria for EBP (Bourret et al., 2004; Carr & Durand, 1985; Michael, 1982, 1993; Sundberg & Partington, 1998). As Skinner, (1957) presented the framework of functional language, Functional Communication Training (FCT) become descriptive terminology of practices for teaching verbal operants including mands. This practice has been empirically validated and is listed by the NCPDASD as an EBP. During the course of this investigation, teacher participants were asked to demonstrate how they taught

requesting. Baseline measures revealed a startling truth about EBP for teaching requesting skills or mands to students with a hallmark characteristic of autism. Students with a marked deficit in social communication skills (DSM-5; American Psychiatric Association, 2013), were not being provided with evidence-based instruction to meet their educational needs.

We have been remiss in the lack of emphasis we have placed on providing teachers with the appropriate skills to effectively teach all learners. We have a moral and ethical responsibility to our pre-service and in-service teachers to prepare them with effective teaching skills. Even more importantly those responsibilities extend to the students they teach.

Despite the lack of empirical validity of OTV for teacher implementation of procedures for teaching mands, researcher analysis of results revealed a functional relationship between OTV and improved student outcomes. This is a strong rationale to require the inclusion of student outcomes, through measurable observable demonstration, in future studies that are directly related to teaching practices we are targeting for teachers. Student outcomes are critical to our ability to measure the effect of our teaching practices. Our students, the teachers we prepare, must demonstrate competency in EBP. We must be effective teachers when preparing others to support students in public education. It is not enough to talk about what we do or introduce a concept. Competency based demonstration must be added to our evaluation methods. It is simply unacceptable to say we prepare teachers in EBP based on what they write about or what they say they do. We must require our students to practice new skills with corrective feedback in order to build fluency in utilizing the skill with fidelity, to demonstrate the mastery necessary to take those skills into the classroom once they graduate.

The use of technology has opened doors and destroyed barriers to access information and is evolving into a platform for virtual practices. This study examined the impact of OTV on teacher acquisition of skills to teach mands. While measures of competency were provided as part of the OTV package, they were limited to assessment utilizing the selection of multiple-choice answers. While it is a start and analysis of the impact on student outcomes indicate a very positive outcome for students, a measurable change in teacher behavior was not empirically validated.

#### Summary of Findings

Similar to previous studies, (Catania, Almeida, Liu-Constant, & DiGennaro Reed, 2009; Vladescu, Carroll, Paden, & Kodak, 2012), this study included a component of video modeling. This study differed from those investigations as the component of video modeling was isolated as an independent variable, the participants were teachers as opposed to staff, and the setting was the classroom environment. The previous investigations showed favorable results that the combination of video modeling and feedback were effective in the improvement of staff performance. It is possible that staff evaluated in the previous research worked in conditions that vary greatly from the classroom. Specifically, staff may be provided more frequent opportunities for feedback on a regular basis, or staff may have specific tasks identified and targeted as opposed to a teacher who may have ongoing concurrent tasks assigned. This study varied from previous research in the participants, the components of the intervention and the settings of the investigation.

This investigation consisted of five questions to assess the impact of OTV on teacher implementation of procedures for teaching mands, the impact on student outcomes, maintenance of any observed changes, and teacher perceptions of OTV. A single-subject multiple-probe research design was implemented to measure baseline levels of participant responses, post-intervention levels of participant responses, and maintenance of changed levels of responses.

### Teacher and Student Participants 1

Data analysis for responses by the first teacher participant revealed a higher percent correct implementation of procedures for teaching mands following the completion of the OTV. The favorable change in responding indicated an effect between the OTV and improved performance for teacher participant one. Despite the increase in performance, teacher participant one continued to perform at a level of 75% correct following intervention. The level of 100% correct was not observed.

During post-intervention observations, teacher participant one consistently performed three out of four steps to teach mands correctly. The third step of prompting was consistently marked as incorrect and identified as a repeated error. The teacher was not observed identifying her own error and self-correcting. Without implementation at 100% correct, it is possible that the instruction was less efficient and the rate for student acquisition of independent mands subsequently affected. For example, when a prompt of “say cracker” was appropriate a question was asked, “What is this called?” which evoked of the student response “cracker.” If questioning is repeatedly and reliably used to evoke the word cracker, it is possible that the child’s behavior will come under the controlling stimulus of the question. This may be

problematic as the question may be more difficult to fade than a directive to say cracker, thereby increasing the level of difficulty to acquire an independent mand for cracker under stimulus control of simply wanting a cracker. This poses a strong rationale for provision of in-situ follow-up feedback immediately following the completion of the OTV.

Despite the continued error in teacher implementation, concurrent with improved teacher performance and increase in independent mands for student participant one was observed. It appears that the OTV had a favorable effect on teacher performance and a subsequent favorable effect on student outcomes. Overall a favorable effect was observed for both teacher and student participants one.

#### Teacher and Student Participants 2

The second teacher participant responded with the greatest improvement in performance measured at 100% correct post-intervention when compared to baseline measures. Concurrent with the improvement in teacher implementation of procedures for teaching mands, an increase in independent mands was observed for student participant two. This indicates a favorable effect on both teacher and subsequent student responses. An effect was demonstrated between the OTV and improved performance of procedures for teaching mands by teacher participant two and subsequent independent mands observed for student participant two. In addition, improvements were maintained over time, suggesting natural contingencies of reinforcement in operation. Overall a favorable effect was observed and maintained for teacher and student participants two.

### Teacher and Student Participants 3

The third teacher participant responded with little change from baseline to post-intervention conditions with the exception of the last data point. The materials used during instruction were all task related, including matching colors of pictures of snakes and sorting of colored bears. While the student was cooperative in selecting an activity it is not clear whether the activities were truly reinforcing of student behavior. It is also unclear whether the ultimate completion of the task functioned as the reinforcer for cooperation with the task. Given the possibility that reinforcement may have been weak in value, it is possible that the pictures of colored snakes and colored bears had properties of conditioned establishing operatives transitive (CEO-T), temporarily increasing their value during the task. Regardless, an increase in the rate of independent mands was observed post-intervention for student participant three.

It is unexpected to see little change in teacher responses while observing an increase in student responses. One explanation for this is the possible lack of sensitivity of the measurement of teacher responding, resulting in no opportunity to capture and measure prompt fading. During baseline, 100% of student responses were prompted and no pauses in prompting or opportunities for independent mands were observed. Following the completion of the OTV, teacher participant two was observed to provide multiple pauses in prompting and opportunities for independent mands to occur. Greater sensitivity in operational definitions of component skills for teaching mands may improve investigation of accuracy with teaching procedures.

An interesting observation occurred with teacher participant three when all of the tasks she provided were completed. She began to look around for items of interest. A ball was given as a possible choice in combination with another task. The ball was selected and an immediate



increase in student responding was observed. The ball appeared to have greater value as a reinforcer than the tasks. The percent correct implementation of procedures for teaching mands was measured at 100% correct when using the ball. It is possible that conducting a motivational assessment prior to the onset of teaching mands may improve the practice and the outcomes for students.

#### Teacher and Student Participants 4

During baseline observations of teacher participant four and student participant four, the researcher was able to identify a conditioned establishing operation reflexive (CEO-R). It appeared that the onset of instruction evoked escape-motivated behavior, including crying, dropping on the floor, and running away from the teacher. The opportunity for the instructor to pair herself with reinforcers and condition instruction as appetitive was not a part of this study. As this was one of four teacher student participant dyads, consideration may be given to assess conditions of cooperation between teacher and student prior to the onset of similar investigations. In the event that a CEO-R is identified, a period of pairing and conditioning the teacher and learning environment as appetitive may be an appropriate prerequisite to instruction. While teaching mands may present opportunities for teachers to be paired with the delivery of reinforcers, teaching mands may not be strong enough to reverse a CEO-R, as requiring a mand is a form of demand. Pairing is advised free from demand and teacher-associated removal of reinforcers, (Sundberg & Partington, 1998).

Following completion of the intervention, immediate results revealed a 100% correct implementation of procedures for teaching mands by teacher participant four. Unfortunately,

opportunities for continued implementation the procedures were substantially diminished by the presentation of a large quantity of a specific reinforcer at one time, i.e., an entire apple. The instructor worked to present additional fruit with value that appeared to compete with the value of the apple and successfully evoked a prompted mand for fruit when presented with a slice of orange. However, teacher participant four was ineffective in repeated and reliable teaching trials. One added variable of in-situ error correction may have been effective in reestablishing the teacher's 100% correct response. For example: if she had been advised to provide small pieces of apple one at a time rather than a whole apple, she may have been able to increase the number of teaching opportunities. With increased teaching opportunities it is plausible that with prompting and prompt-fading procedures an independent mand for apple may have been evoked. It is clear that the serving size of the apple as a reinforcer inhibited additional teaching opportunities.

In summary, while favorable results were observed for teacher participants one and two, and an initial increase in level of performance observed for teacher participant four, results do not support a functional relationship between OTVs as an independent intervention and accuracy of implementation of procedures for teaching mands across participants. Nonetheless, for participants with observed improvement in performance, the natural environment appeared to maintain accuracy of performance over time.

When assessing the extent to which student independent mands were affected following teacher completion of the OTV, results indicated initial increases across all student participants. However, reliable and predictable patterns of improved rates of independent mands were only identified for student participants one and two. This finding is consistent with improvement in

performance by teacher participants one and two. Therefore, it appears that given an increase in teacher performance of procedures for teaching mands, there was a relative increase in spontaneous mands for student recipients of instruction. Further, increased rates of spontaneous mands for student participants one and two were effectively maintained over time.

Perceptions of goals, procedures, and outcomes of OTV by teacher participants were overall favorable. Technical difficulties were reported by one participant; however, problem solving was provided by Autism Training Solutions. All participants responded favorably to the ease of navigation for the OTV and real life exemplars included in the OTV. This favorable response suggests the material provided in the videos is relevant to teachers' providing instruction for students with characteristics of autism. All teacher participants indicated that they were able to use some or many of the concepts presented in the OTV immediately following the completion of the modules. This result suggests at least some competencies modeled in the videos were immediately applicable in the classrooms of the teacher participants.

Most importantly, all four teacher participants reported that they would recommend the school continue the use of OTV for professional development. This finding suggests that based on teacher participant opinions, OTV is a preferable platform for professional development. Despite the variability in study results across participants, based on teacher feedback suggesting a preference for OTV, the use of OTV to develop competency-based skills in evidence-based practices demonstrated by teachers supporting students with characteristics of autism is worthy of future investigation.

### Limitations

Limitations to both internal and external validity of this investigation are worthy of attention. One limitation in the design of this study presents a threat to internal validity. The results of a functional relationship between the independent variable, OTV, and the dependent variables, percent correct implementation of procedures for teaching mands, are inferred (Gast & Ledford, 2010). A second limitation to this study is the extent that generalization is plausible. Due to a small sample size, results are limited to the participants of this study. Further, within the given population in the study there is sufficient variability to limit generalization.

Conversely, a primary strength of this investigation is that single-case experimental design is the strongest for identification of a functional relationship between an independent variable, OTV, and independent variable changes in teacher performance (Gast & Ledford, 2010). The design was structured to eliminate extraneous variables as causal relative to changes in participant behavior. For example, each condition was constructed to be the same across all phases of investigation. In baseline phases, the researcher was present, and in post-intervention phases, the researcher was present. The design controlled for reactivity. Any changes in behavior due to the presence of the researcher were indicated in baseline data collection. The intervention was selected as an isolated variable and identified as the only variable modified between baseline and post-intervention conditions. Further, the change in behavior observed for the participant one dyad with no change for the remaining participants implies the intervention as the causal variable for the observed change.

In addition to limitations by design, a number of subtle weaknesses emerged during the course of investigation. Variations in levels of student cooperation with teacher, accuracy with

applications of reinforcement, and prompting and fading techniques were observed and identified as possible contributing factors to variation in outcomes. Because of these variations, a lesser degree of homogeneity within the sample of student participants was identified.

First, with the identification of a CEO-R observed in one of the student-teacher dyads, it became clear that variability in levels of student cooperation was high. Levels of variability in cooperation ranged from students readily approaching the teacher and the work environment to running away from the teacher, crying, and displaying aggressive behavior when approached. Second, knowledge in the application of reinforcement was not evident across participants. Variations ranged from selection of preferred items used to teach to removal of preferred items to teach, the latter being a specific error described in the literature for the establishment of instructional control (Sundberg & Partington, 1998). Third, the group varied in the type of prompts and prompt fading procedures they used. Variations ranged from correct use of echoic prompts and prompt fading to using an intraverbal prompt without ever fading the prompt.

This study may have been greatly improved by provision of prerequisite participant eligibility requirements evaluated by the researcher prior to the onset of the study. For example, a prerequisite of student cooperation (to the level of “student readily approaches the teacher”), a required demonstration of accuracy in the application of reinforcement, and a demonstrated competency with prompt fading procedures may have improved the overall homogeneity of the group. With variations in those three areas, it is difficult to rule out possible competing contingencies with motivation to escape, lack of a true establishing operation, or no opportunity for an independent mand (failure to fade prompt) as possible causes for lack of measurable changes in the teacher and student participant responses.

### Implications

As the prevalence of autism continues to rise (CDC, 2014), the need for teachers with demonstrated skills in evidence-based practices continues to rise (USDOE, 2012). Absence of access to professional development may be a significant barrier for many in-service educators (Loiacono & Allen, 2008). An online platform for professional development is one that is designed for accessibility at individual convenience (Halsne & Gatta, 2002; Holmberg, 1995).

Thousands of commercial applications of technology are available for consumers (Abroms, Padmanabhan, Thaweethai, & Phillips, 2011). Currently, the level of empirical evidence required for use of these applications for professional development is limited. Consequently, what applications or combination of treatment packages are effective for professional development that results in acquisition of teaching skills and improved student outcomes is yet to be substantiated. Clearly there is a serious and present need for this type of analyses, to inform, protect, and support the consumers served by both educators and students.

Previous research has shown that video modeling and feedback (Catania et al., 2009; Vladescu et al., 2012) are an effective combination of components resulting in acquisition of discrete trial training skills for persons supporting individuals with autism. It is unclear how feedback may have improved the performance of teacher participants in this study who did not master accuracy of implementation of procedures for teaching mands. Given that only one participant reached 100% correct implementation, future research may be improved with the investigation of an OTV combined with feedback model.

### Recommendations for Future Research

Recommendations for working with students with ASD and generalization of online video modeling are limited due to the nature of single subject research. Yet from the researcher's background, the extensive review of the literature and from both the results and social validity questionnaires the following recommendations are for consideration for teacher education and for future replication of this investigation.

#### Recommendations for Future Replication

As the PI discovered limitations through the process of this investigation, recommendations are provided by the researcher for improvement of methods for future replication. Three primary recommendations for adjustments to the study relevant to replication are suggested. Recommendations include changes in criterion for inclusion and exclusion of participants, changes to criterion for termination of post-intervention phase data collection and changes to the tool used to measure teacher implementation of mand training.

First, validation of instructional control between the teacher and student participant dyads is recommended prior to the onset of future replication of this investigation. This may be accomplished by conducting brief assessment of instructional control and verification of a cooperative relationship between teacher and student prior to inclusion in the study. For example a researcher may conduct brief observation of five discrete trials of simple directions given within the natural context of the classroom. A criterion of four out of five trials or 80% correct responding by the student may be validated by the observer therefore establishing a specific measure of cooperation prior to the study.

If the researcher is not able to validate a minimum level of cooperation at 80%, then repeated presentation of reinforcers by the teacher free from demand may be practiced until the criterion for cooperation is validated. This may minimize the inclusion of teacher participants who have limited opportunities to engage in the behavior of teaching mands due to competing behaviors exhibited by students. In addition, a set criterion for addressing signs of distress exhibited by student participants is recommended. For example if a student is observed running away from the teacher, crying, dropping to the floor, hiding under the table, or engaging in aggressive behavior against the teacher, the researcher might terminate the observation and the inclusion of that participant in an investigation.

Second, letting post intervention phases of performance continue is recommended. Due to conducting a brief assessment limited to five data points per teacher participant, a significant question emerged. After demonstration of 100% correct implementation of procedures for teaching mands in the fifth and final post intervention session, would teacher participant 3 have continued to perform at 100% correct showing an effect over time? The rationale for the limited data collection was to minimize the possible intrusion of the investigation for the teacher and the class and to minimize the possible continuation of practicing errors. However, analysis of data for teacher participant three revealed a behavioral process going on. It is possible that the OTV may have been a setting event for the teacher to learn from her student.

Given that a performance of 100% correct was observed, it is worth investigation over a longer period of time to further evaluate an ongoing behavior process and determine if sustained increases occur over time. Setting a stability criterion as opposed to a set number of data points collected may provide a means to continue data collection for a reasonable period of time until



stability of performance is observed. This would allow a researcher to identify a transition state revealed in visual analysis and continue measurement until stability in performance is observed, thereby allowing more confidence in findings and conclusions of an investigation.

Third, the tool used in this study to measure the change in teacher behavior did not provide a measure for prompt fading procedures, which are necessary for independent student responses to occur. As change in student behavior was evident and supportive of a functional relation between the OTV and measurable increases in student mands, it is recommended that more sensitive tools for measurement of teacher behavior be developed and validated. Such validated tools would be useful in future investigations and more globally as a tool to measure accuracy of teacher implementation of effective teaching procedures. One way to accomplish this may be to examine effective mand training procedures in practice and develop a more comprehensive task analysis based on multiple observations across practitioners. In addition, a panel of experts to provide professional feedback and further validation of such a tool is recommended.

Overall the feedback from teacher participants indicating they would recommend the online platform for professional development by the school combined with results of improvement by half of the teacher participants and half of the student participants is promising. As promising practices require further investigation, it is recommended to continue investigations of this nature.

### Recommendations for Future Studies

Three types of studies are specifically recommended. First, investigation of other modules, either in isolation or combinations of modules and their impact on teacher implementation of practices and subsequent changes in student outcomes is recommended. Second, a study to examine the impact on teacher performance when the entire series of modules is completed and subsequent impact on student outcomes is recommended. Third, investigation of components including OTV combined with feedback, added to the intervention in cases that have not reached 100% correct is recommended. Further, an exit criterion for participants that includes a measure of 100% correct implementation is a recommended goal for all future investigations. This goal may lead researchers toward finding the components of effective professional development for teachers who are providing services for students with characteristics of autism. Further, an exit criterion for the outcomes of students is also recommended. As students respond correctly, natural contingencies of reinforcement for accuracy of teacher implementation may begin to operate and provide natural contingencies that maintain changes in responding for teachers and ultimately students.

In conclusion, an overwhelming amount of evidence substantiating the need for teacher preparation in empirically validated procedures for students with ASD exists. As preparers of teachers in higher education we have a responsibility to prepare pre-service and in-service educators in EBP to the degree that it is applied with students. Our practices may be greatly improved through the addition of demonstrated competency based measures that are observable. As we prepare educators we must consider the ongoing evaluation of our own practices, including the use of online platforms of instruction and modeling, and strive to build an evidence

base of our effects in practice. It is not enough to simply say we have taught, we need to see evidence in student outcomes. For students with ASD, a primary student outcome that can no longer be ignored is the acquisition of basic requesting skills or a mand repertoire.

There is evidence that the need to effectively prepare teachers in EBP continues. As a wealth of empirically valid evidence supports the practice of teaching based on applications of ABA, including mand training, there has been little evidence that basic requesting skills have become important in the education of students with ASD. It is not enough to suggest that this be considered.

Impairment in social communication is one of the defining characteristics of ASD. We have knowledge of how to implement EBP based on decades of research substantiating the practice. It is time to recognize the need for mand training as an EBP critical to the need of teachers to be effective in teaching students with ASD and to demand that it become part of teacher preparation programs. This is the time to effectively prepare teachers in the practice of teaching mands for students with ASD and to measure our effects as we prepare teachers through competency based demonstration and ultimately student outcomes that provide students with a socially significant improvement in quality of life.

For far too long we have ignored a basic need and factor in the quality of life for a rapidly growing population of students. The law requires FAPE, Free Appropriate Public Education. For a student identified with a hallmark characteristic of ASD, established over 65 years ago, defined today as a deficit in social communication, it is no longer possible to argue that mand training is anything other than appropriate education. Methods for teaching mands meet the criteria of

EBP, also required by law. It is not only remiss but borders on a legal violation of student rights not to teach mands to students with ASD.

It is not acceptable to have a student learn to spell drink and not be able to ask for one when thirsty. In the words of world renowned consultant on teaching language to individuals with disabilities, Dr. Patrick McGreevy, “we have taught poor communicators to be better listeners”. Let us not limit our focus on teaching poor communicators to be better listeners, but instead focus on teaching students to be active participants in dialogue for learning.

**APPENDIX A**  
**PRE-POST TEST FOR ONLINE TRAINING VIDEOS**

1. Why do most professionals in the field of ABA recommend to start teaching language by teaching an individual to mand?

- Because mands are the easiest operant to teach
- Because mands are automatically reinforcing
- Because mands benefit the speaker; they say it, they get it.
  
- Because all children learn to mand first.

2. Teaching your student to mand can decrease problem behaviors because

- they become nicer when they start manding.
- they can now use functional communication to get their needs met instead of problem behaviors.
- they have no time to engage in problem behaviors anymore.
- mands are aversive and decrease behavior over time

3. Which of the following BEHAVIOR is an example of a mand?

- Antecedent: Lucy smells popcorn and wants it. Behavior: Lucy says, "popcorn". Consequence: teacher gives Lucy some popcorn
- Antecedent: Jose sees a bird and doesn't want it. Behavior: Jose says, "bird". Consequence: Jose's friend looks at the bird
- Antecedent: Sara's friend says, "Gross!" Behavior: Sara says, "Gross!"  
Consequence: Both girls laugh.
- Antecedent: Jackson's teacher asks, "Who is it?" Behavior: Jackson says, "me."  
Consequence: Jackson's teacher says, "nice job!"

4. Which of the following BEHAVIOR is an example of a mand?

- Antecedent: Kari sees her doll but doesn't want it. Behavior: Kari says "this is my doll." Consequence: Kari's friend picks up her doll.

- Antecedent: Kari's mom says, "Put your doll away" Behavior: Kari puts her doll away. Consequence: Kari's mom says, "Thank you"
- Antecedent: Kari's mom says, "where is your doll?" Behavior: Kari says, "I don't know." Consequence: Kari's mom says, "ok"
- Antecedent: Kari wants to know where her doll is. Behavior: She asks her brother, "Where is my doll?" Consequence: Her brother says, "out in the garden"

5. All of the following are important benefits of mand training EXCEPT

- Mand training will increase receptive language skills.
- Mand training can decrease problem behavior
- Mand training can assist in developing the value of social interaction.
- Mand training can help condition teachers as reinforcers.

6. A mand is controlled by

- motivation
- Discriminative Stimuli
- prompts
- reinforcers

7. Motivating Operations are

- antecedents for all language.
- changes in the environment that temporarily increases the value of a particular object or event.
- reinforcers that motivate people to increase the rate of mands.
- ways to arrange the environment so that the student will want to mand more.

8. True or False: If there is no MO or motivation, there is no mand.

- True
- False

9. True or False: Typical children mand hundreds of times per hour.

- True
- False

**APPENDIX B**  
**TASK ANALYSIS DATA SHEET TEACHING MANDS**



## Data Collection Sheet

Teaching Mands (Teacher)      Participant 1 2 3 4 5      Observation 1 2 3 4 5 6 7 8

9 10 Review of terms:

- 1.) Sanitize the environment- Remove free access to reinforcers
- 2.) Identify EO – conduct assessment or ID student trying to get
- 3.) Prompt/ require mand – provide echoic prompt
- 4.) Deliver Reinforcer – give reinforcer within 5 seconds

Instructions:

- 1.) Set timer for 1 minute.
- 2.) Give instruction: “Show me how you teach requesting”. 3.) Start timer.
- 4.) Record each step as correct or incorrect.
- 5.) End session with reinforcer delivery if correct steps are observed. If incorrect steps are observed terminate the session at 1 minute.

<b>Step</b>	<b>Correct</b>	<b>Incorrect</b>
1. Sanitize the Environment		
2. Identify and EO		
3. Prompt Mand		
4. Contingent Delivery of a Reinforcer		
TOTAL		

/4 = \_\_\_\_\_ X 100 = \_\_\_\_\_ % correct

Rate of mands (Student) Set timer for 3 minutes.

Record the number of independent mands observed.

Independent mands	( Total/3 = ave. frequency of mands per minute)
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**APPENDIX C**  
**SOCIAL VALIDITY SURVEY QUESTIONS**

## Technology

1. The Learning Management System was easy to navigate.
  - No, it was confusing
  - Sort of, it took getting used to.
  - Yes, it was self-explanatory
2. Was the look of the site aesthetically pleasing?
  - No, I didn't like it
    - It was okay.
    - Yes.
    - I really liked it.
3. If you experienced technical problems, they were related to:
  - Videos
  - Competency checks
    - Notes
    - Chapter quizzes
    - Registration
    - No problems
4. The speed of the video was:
  - Fast
  - Medium
    - Slow
  - Really slow

## Learning Management System

5. The notes functionality was useful.
  - Strongly agree
  - Agree
    - Somewhat agree
    - Don't agree
    - Didn't use
6. The competency checks after each short module were helpful.
  - Strongly agree
  - Agree
    - Somewhat agree
    - Don't agree
7. The chapter tests were easy to use.
  - Strongly agree
  - Agree
    - Somewhat agree
    - Don't agree
8. The resources were useful.

- Strongly agree
- Agree
- Somewhat agree
- Don't agree

### Training Content

9. The training content was presented in an organized way.

- Strongly agree
- Agree
- Somewhat agree
- Don't agree

10. The content seemed up-to-date and accurate.

- Strongly agree
- Agree
- Somewhat agree
- Don't agree

11. The videos were engaging.

- Strongly agree
- Agree
- Somewhat agree
- Don't agree

12. The competency checks truly tested my understanding of the material in the module.

- Strongly agree
- Agree
- Somewhat agree
- Don't agree

13. How effective was the training in helping you understand the concepts it presented?

- Extremely effective
- Effective
- Somewhat effective
- Not effective

14. What part or aspect of the training was the most helpful and why?

15. What part or aspect of the training was least helpful and why?

16. To what degree were you able to apply the information in the training video to your work or daily life?

-None

- A little

- I used some of the concepts right away

- I was able to apply many concepts right away

17. Would you recommend that your school continue to train using this online training platform?

-Yes

-No

18. If your answer is “no,” why?

**APPENDIX D**  
**IRB LETTER**



University of Central Florida Institutional Review Board  
 Office of Research & Commercialization  
 12201 Research Parkway, Suite 501  
 Orlando, Florida 32826-3246  
 Telephone: 407-823-2901 or 407-882-2276  
[www.research.ucf.edu/compliance/irb.html](http://www.research.ucf.edu/compliance/irb.html)

### Approval of Human Research

From: **UCF Institutional Review Board #1  
FWA00000351, IRB00001138**

To: **Kelly D. Schaffer**

Date: **January 15, 2014**

Dear Researcher:

On 1/15/2014 the IRB approved the following human participant research until 1/14/2015 inclusive:

Type of Review: Submission Response for UCF Initial Review Submission Form Expedited Review  
 Project Title: Analysis of Commercial Online Training Videos for Teachers Who Instruct Students with Characteristics of Autism Spectrum Disorders  
 Investigator: Kelly D. Schaffer  
 IRB Number: SBE-13-09863  
 Funding Agency:  
 Grant Title:  
 Research ID: N/A

The scientific merit of the research was considered during the IRB review. The Continuing Review Application must be submitted 30 days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form **cannot** be used to extend the approval period of a study. All forms may be completed and submitted online at <https://iris.research.ucf.edu>.

If continuing review approval is not granted before the expiration date of 1/14/2015, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s).

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Patria Davis on 01/15/2014 04:30:02 PM EST

IRB Coordinator



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