VIDEO-BASED MAND TRAINING
FOR THREE EARLY INTERVENTIONISTS TEACHING TODDLERS WITH AUTISM:
AN ADDITIVE COMPONENT ANALYSIS

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VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

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Mahalo palena ’ole.
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ABSTRACT

Professional development remains a foundational crux for training teachers and staff in evidence-based interventions for teaching students with autism. Online training videos provide a viable component of professional development for early intervention and special education organizations facing budget constraints and challenges with complying with mandates for training their staff and teachers in evidence-based interventions for students with autism. Mand training is an effective evidence-based procedure for increasing functional language and decreasing problematic behavior associated with autism spectrum disorders. Many students with autism possess limited mand repertoires, which is an important skill for learning to communicate.

This dissertation replicated and extended with some procedural differences McCulloch (2011) and investigated the effectiveness of a video-based professional development program to teach mand training to early intervention teachers. Teacher-student dyads included two early intervention teachers and one speech pathologist who worked with students with autism. Intervention phases included (a) online training videos, (b) feedback, (c) coaching/modeling sessions, and finally (d) follow-up sessions. Outcomes in terms of student achievement, specifically the frequency of student spontaneous manding, were recorded during baseline. The teacher implementation of four-step manding procedure was also evaluated. Measuring both the student and the teacher behavior evaluated interventionists’ competency improvement following and/or during different training components and
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concurrently measured student manding changes in frequency across each training component phase.

Online training remains a valuable tool to efficiently and effectively train staff, however additional components may be necessary to result in optimal outcomes. Results indicated that student manding increased slightly when online training videos alone was used for one participant and with more significance when components of feedback and coaching/modeling were added. Social validity questionnaires suggest that both teachers and parents perceived the training effective and teachers indicated they believed that components of feedback and coaching/modeling were necessary to teach manding to their students with autism.

These results and data from social validity measures support the hypothesis that feedback and modeling and coaching are all essential for teachers to learn to use mand training to increase communication with their students with autism spectrum disorder.

Keywords: autism, verbal behavior, mand training, online training, self-directed learning program, teachers, teacher development, professional development, early intervention, inservice, teacher training.
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CHAPTER 1: INTRODUCTION

An increase in the diagnosis of autism and related disorders continues to present challenges to educators throughout our nation. On March 27, 2014, Center for Disease Control and Prevention (CDC; 2014) reported that autism affects one in every 68 American children, including one in every 42 boys, and 1 in every 189 girls, a 30% increase from the rates released in 2012. Students identified with autism spectrum disorders (ASD) constitute a large and growing part of our nationwide early intervention systems (IDEA Partnerships, 2009). This growing demographic of young children who receive special education and related services presents pervasive hurdles for educators across the country, as they strive to adhere to statutes established under the Individuals with Disabilities Education Improvement Act (IDEIA). The Bureau of Labor Statistics (2011) predicted that the number of special education teachers would increase by at least 20% by the year 2018. However, the U.S. Department of Education Executive Summary—Twenty Second Annual Report to Congress on the Implementation of the Individuals with Disabilities Act (United States Department of Education; 2000) forecasted that the number of students with disabilities would continue to grow at a rate faster than that of pre-service teachers receiving training to support these students.

Over the past several decades, educators and researchers alike have introduced behavioral and educational interventions based on the principles of Applied Behavior Analysis (ABA) into our education and early intervention systems. ABA interventions are a set of scientifically validated approaches to
developing effective strategies for teaching new skills and decreasing barriers to learning that yield socially meaningful outcomes (Baer, Wolf, & Risley, 1968). ABA interventions are surely not a panacea for this autism epidemic; however, it is undeniable that these strategies have produced prolific and unequivocal advances in the services and interventions available to teachers, students with autism (SWA), and their families.

School systems across the nation are now at a critical juncture and must develop effective teacher development approaches to ensure that students with special needs, including those with autism, receive evidence-based interventions. IDEA Partnerships (2009) asserted that the sustained implementation of evidence-based practices (EBP) leading to optimal quality of life outcomes is a critical need of the field of ASD. In recent years, federal mandates have raised the bar for high levels of accountability in our educational systems, and have made the development of effective and efficient training procedures and methods for teaching human service and educational staff a pivotal agenda item (Catania, Almeida, Liu-Constant, & DiGennaro Reed, 2009). The provision of quality professional development, training, and support for educators, service providers, and families is also an area of critical need (IDEA Partnerships, 2009). To this end, the current study provides an evaluation of an online, video-based teacher development program. Specifically, I examined a mand training program for early intervention teachers working in an early intervention setting.
Mand training is a behavioral intervention consistently identified in the behavioral literature as an evidence-based ABA strategy for teaching requesting behaviors to SWA (Sundberg & Michael, 2001). Teaching mands are imperative for the language development of SWA (Sundberg & Michael, 2001). Mands are requests for specific items or actions, based on a student's specific motivation, that allow the child to control his environment by requesting the delivery of reinforcers. Mands teach the child to initiate language to others, instead of simply responding to language.

Sundberg and Michael (2001) argued that teaching mands should be paramount and pivotal goals in intervention plans for SWA, as mands directly benefit the learner. Mand training requires teachers to be skilled at encouraging and arranging the environment to increase student motivation, utilizing effective prompts, and developing prompt fading procedures to increase independence of requesting behaviors (Sundberg & Michael, 2001). Researchers agree that teaching mands needs to be a pivotal goal in most educational plans of SWA and subsequently, teachers need professional development (PD) to learn effectively learn to teach mands with some integrity to SWA (Lerman, Vorndran, Addison, & Kuhn, 2004). Consequently, mand training serves as the training topic for this study, as well as the primary dependent variable for evaluating training effectiveness. This study replicates and extends McCulloch's 2011 study with some procedural differences.

This investigation of a multi-component training package designed to instruct teachers to implement mand training procedures with SWA addressed the following questions:
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1. Will a multi-component training package that includes on-line, self-directed training (OTV); verbal feedback; and coaching/modeling (CM) be effective in instructing teachers to implement mand training procedures to SWA?

2. Which components of the training package are most effective in producing skill acquisition among the teachers and SWA?

3. What effect do the OTV videos alone have on the SWA whom the teachers support?

Before proceeding, it is important to identify several key terms used in this study. Table 1 provides definitions that clarify and operationalize each of these terms.

The chapters that follow summarize the current literature on SWA and mand training, and describe existing research on teachers and staff in the fields of special education and behavior analysis. I chose the studies discussed in the literature review for their relevance to the topic and their design contributions to the current study. Chapter 3 provides a discussion of the methods used in the study and describes all independent and dependent variables, settings and participants, and the methodology employed to address this study’s research questions. Chapter 4 presents the outcomes of the study, and Chapter 5 provides a discussion of the study’s overall results, limitations, implications for teachers, and future research recommendations.
Table 1

*Key Terms*

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<tr>
<th>Term</th>
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<tr>
<td>Autism</td>
<td>Autism is a complex developmental disorder typically appearing before age three. It affects a person’s ability to communicate and socialize (Autism Society of America, nd).</td>
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<td>Autism spectrum disorder</td>
<td>The revision of the <em>Diagnostic and Statistical Manual of Mental Disorders (DSM-5, 2013)</em> combined autism and autism spectrum disorder under the umbrella of ASD. The term <em>ASD</em> refers a disorder that causes (a) persistent deficits in social communication and interaction and (b) restrictive and repetitive patterns of activities or behavior. The other disorders under this umbrella include autistic disorder, Rett Syndrome, childhood disintegrative disorder, pervasive developmental disorder- not otherwise specified (PDD-NOS), and Asperger syndrome.</td>
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<td>Discrete trial training</td>
<td>DTT is an intensive teaching methodology that involves the orderly presentation of four components: (a) presentation of a discriminative stimulus, (b) occurrence or approximation of the target response or behavior (B), (c) delivery of a reinforcer, and (d) an inter-trial interval (Koegel, Russo, &amp; Rincove, 1977).</td>
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<td>Discriminative stimulus</td>
<td>A discriminative stimulus is a stimulus by which a particular response was reinforced by another person (e.g., an &quot;exit&quot; sign indicates that the behavior of going through the door will be reinforced by getting out of the building; Miller, 1997).</td>
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<td>Early intervention</td>
<td>Early intervention refers to any form of therapy, treatment, education program, nutritional intervention, or family support designed to reduce the effects of disabilities or prevent the occurrence of learning and developmental problems later in life for children from birth through age 5 presumed to be at risk for such problems (Heward, 2013).</td>
</tr>
<tr>
<td>Early interventionists</td>
<td>Early interventionists include speech therapists, special educators, and occupational therapists, as well as other support personnel (Heward, 2013).</td>
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<td>Term</td>
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<td>Echoic</td>
<td>An elementary verbal operant evoked by a verbal Sd that has point-to-point correspondence and formal similarity with the response (e.g., A teacher states, &quot;Say juice,&quot; and the child repeats an approximation of &quot;juice&quot;; Heward, 2013).</td>
</tr>
<tr>
<td>Intraverbal</td>
<td>An intraverbal is verbal behavior controlled by an antecedent verbal stimulus that lacks point-to-point correspondence between the stimulus and the response (e.g., S: &quot;What do you want?&quot; R: &quot;Pizza&quot;; Sundberg &amp; Michael, 2001).</td>
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<td>Mand</td>
<td>Skinner (1957) first defined a mand as a &quot;verbal operant in which the response is reinforced by a characteristic consequence and is therefore under the functional control of relevant conditions of deprivation or aversive stimulation&quot; (pp. 35-36). A mand is a verbal response to a non-verbal stimulus (object or action) primarily controlled by an MO. Manding is asking for desired items, actions, properties, information, etc. (Sundberg, 2013).</td>
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<td>Prompted mand</td>
<td>A prompted mand is a verbal response to a non-verbal stimulus (object or action) in the presence of a verbal discriminative stimulus (echoic prompt) primarily controlled by an motivating operant. This category does not include sign mands.</td>
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<td>Spontaneous mand</td>
<td>A spontaneous mand is a &quot;verbal response primarily under the control of the MO and specific reinforcement, that occurs without a verbal prompt, but the relation can involve a nonverbal stimulus (an object or action). Responses can be part mand and part tact (multiply controlled), but mainly not prompted by others&quot; (Mark Sundberg, personal communication, December 15, 2011). For the purposes of this study, mands partially under the control of intraverbal prompts (i.e., What do you want?) were scored as spontaneous mands.</td>
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<td>Motivating operation</td>
<td>The term motivating operation describes establishing operations (EOs) and abolishing operations (AOs), and distinguishes between the EO and the AO in terms of their respective value-altering and behavior-altering effects (Michael, 2007).</td>
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<td>Verbal operant</td>
<td>Language consists of six elementary verbal operants, defined by Skinner (1957), which comprise what traditional linguists label “expressive language.” These six verbal operants include (1) mand, (2) tact, (3) echoic, (4) intraverbal, (5) textual, and (6) autoclitic. The behavior in each of these operants is verbal.</td>
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<td>Nonverbal operant</td>
<td>Nonverbal operants do not involve speech or any other verbal behavior on the part of the listener. Matching, listener responding/receptive, and imitation skills are all non-verbal operants (Barbera &amp; Rasmussen, 2007)</td>
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<td>Professional development</td>
<td>Merkle and Artman (1983) defined professional development as &quot;a planned experience designed to change behavior and result in professional and/or personal growth and improved organizational effectiveness&quot; (p.55) Beeler (1977) suggested that staff development referred to continuing education or staff training aimed at enhancing the skills, competencies and knowledge of staff to enable them to provide better services to their clients.</td>
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<tr>
<td>Students with Autism</td>
<td>Refers to students diagnosed either clinically or with an educational category of autism, pervasive developmental disorder, or Asperger Syndrome.</td>
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<td>Tact</td>
<td>The term tact refers to verbal behavior controlled by a non-verbal stimulus, and the reinforcement it receives is non-specific (Sundberg &amp; Michael, 2001). Tacts refer to the labeling or naming of some sensory nonverbal stimuli, such as an object, picture, smell, or taste (Barbera &amp; Rasmussen, 2007).</td>
</tr>
<tr>
<td>Verbal behavior</td>
<td>Verbal behavior refers to any communication involving a listener, including speaking, signing, pointing, writing, or exchanging pictures, etc. (Barbera &amp; Rasmussen, 2007). Verbal behavior can be easily observable (overt or public) or can be more difficult to detect (covert or private events; Skinner, 1957).</td>
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SWA present an array of unique challenges for special education teachers and early interventionists. While researchers have identified a number of efficacious educational and behavioral interventions for SWA over the past several decades, the best process by which teachers can adopt and implement these effective interventions with SWA remains a ubiquitous challenge in special education today. Effective PD for teachers is as critical for our teachers as much as it is for our students. This literature review will begin with a brief overview of ASD, early intervention, accountability, and some of the specific evidence-based interventions used to teach requesting behaviors with the growing population of students with this disorder, followed by a review and discussion of evidence-based PD training approaches for educators of SWA. The review will also highlight the important role of motivation in mand training. Efforts in research and subsequent outcomes will be described and offer a critique of related research on teacher training, PD, and mand training that provides clarity about the current state of knowledge and research in this area. The review concludes with a description and evaluation of evidence-based PD packages including OTV.

**Definition and Prevalence of Autism**

The *Diagnostic and Statistical Manual of Mental Disorders (DSM-5, 2013)* defined ASD as a disorder that leads to persistent deficits in (a) social communication and interaction and (b) restrictive and repetitive patterns of activities or behavior. ASD presents with a wide range of variability and can extend along a spectrum of severity.
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Researchers have demonstrated that early intervention procedures and techniques can significantly impact the lives of many SWA (Vismara & Rogers, 2008).

According to Centers for Disease Control and Prevention (CDC; 2014), one of every 68 children in the United States of America has received an ASD diagnosis (1 in 42 boys and 1 in 189 girls). CDC released these data on 3/27/2014 and extrapolated them from 14 different monitoring sites across the country. These data illustrate a 30 percent increase from 2012, over an 80 percent increase in ASD over the past five years; and over the past four decades, these numbers represent over a ten-fold (1000 percent) increase in the reported prevalence of ASD (CDC, 2014). This proliferation, and subsequent explosion, in the diagnosis of ASD has greatly heightened the need for qualified personnel to serve as early interventionists for SWA under Early Intervention Part C of the Individuals with Disabilities Education Improvement Act (IDEIA).

Early Intervention for SWA

SWA demonstrate a myriad of behavioral deficits and excesses that present many challenges to the teachers and early interventionists who serve them. These young children become eligible for services during the birth-to-three period, and then can receive early intervention services under Part C of the IDEIA (Feinberg & Vaca, 2000). These early interventionists ultimately are responsible for disseminating pertinent information about interventions to families, developing the child's (Individual Family Service Plan (IFSP), and delivering strategies for intervening early and effectively (Feinberg & Vaca, 2000).
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In the 10th edition of his book, *Exceptional Children*, Heward (2013) outlined the importance of early intervention special education, and further defined the role of these efforts in the field. Early intervention services outlined under Part C of IDEIA aimed to improve the development of infants and toddlers with disabilities, minimize their potential for developmental delay, and acknowledge the significant brain development that occurs during a child's first three years of life. Heward also illustrated a plethora of benefits IDEIA provided, including the identified goals of reducing costs to our society, minimizing the need for special education once children begin school, maximizing individual potential for an independent life, and offering families the tools to meet the unique needs of their children with disabilities. IDEIA also presented an ancillary goal of enhancing the capacity of state and local agencies to identify, evaluate, and meet the needs of all children (PL 108-466, USC 1431, Sec. 631[a]). Addressing the needs of children with special needs, particularly those under the age of three, continues to present pervasive challenges to early intervention agencies nationwide, due to the federal laws that mandate compliance and accountability.

**Accountability**

The recent reauthorization of the IDEIA in 2004 incorporated new language that highlighted the importance of using research-based interventions within instruction for students with disabilities including SWA. The new legislation mandated that "a statement of the special education and related services and supplementary aids and services be based on peer-reviewed research to the extent possible" (Wright & Wright, 2010, p. 100). Under the IDEIA, if an Individual Education Plan (IEP) team deems that
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training for personnel and teachers is essential; schools must provide the requisite supports (Eren & Kelleher, 2011). The IDEIA does not simply mandate that students receive these services; it dictates that teachers undergo the appropriate training to become qualified to provide the necessary instruction for SWA.

In 2009, the National Autism Center recommended that educational services commence as soon as family or professionals suspect ASD is present. National Autism Center suggested that students should receive services 25 hours a week, 12 months a year, at minimum. National Autism Center also specified that teachers should systematically plan services that engage the child and consist of developmentally appropriate educational activities to target identified objectives. The instructional aims should include functional spontaneous communication, such as mand training, and social instruction. Finally, National Autism Center asserted that approaches to reducing behaviors that are barriers to learning or socialization should be proactively targeted for reduction. National Autism Center recommended that schools deliver services in settings where interactions with typically developing children may occur if inclusion will assist in the acquisition of skills (p. 81).

Delivering PD to teachers for interventions that meet these requirements remains a pervasive challenge to school and early intervention systems nationwide. Successful implementation of EBPs in classrooms relies on myriad variables, including PD elements such as staff coaching and training (Fixsen, Blase, Duda, Naoom, & VanDyke, 2010), and is of undeniable and paramount importance in closing the gap between
evidence-based research and applied practice within the classroom (Cook & Odom, 2013).

**Evidence-Based Practice for Students with Special Needs**

Demands for high levels of accountability in our public education system, mandated in both the IDEIA of 2004 and the No Child Left Behind Act of 2001 (NCLB), have focused the spotlight on guidelines to improve teachers’ ability to utilize EBPs within the classroom (National Professional Development Center on Autism Spectrum Disorders (NPDC), n.d.; National Autism Center, 2009a; National Research Council (NRC), 2001; What Works Clearinghouse (WWC), 2002). EBPs are interventions, procedures, and methods established based on quality empirical research that speaks to the effectiveness of the interventions and its ability to improve student outcomes in a meaningful way (Cook & Odom, 2013). Many interventions for autism exist; however, only some of these approaches have demonstrated evidence of effectiveness through scientific research (NPDC, n.d.). Interventions that researchers have evidence to demonstrate their effectiveness are called EBPs. According to National Autism Center (2009b),

EBP has become the standard in the fields of medicine, psychology, education, and allied health. The idea that decision makers should know how much research supports a treatment that is being considered has also been important in the field of Autism Spectrum Disorders. (ASD; p. 5)

National Autism Center (2009a) conducted a four-year meta-analysis that resulted in a list of research-supported educational and behavioral interventions for SWA
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called *The National Standards Report*. In this report, National Autism Center presented recommendations for service providers, schools, and families regarding appropriate treatment for ASD and reported the established and effective interventions for treating children and adolescents with ASD. National Autism Center reviewed a total of 775 studies, the largest number of published works ever reviewed in a meta-analysis.

Through this in-depth review, National Autism Center (a) provided evidence supporting educational and behavioral interventions that targeted the core deficits of ASD; (b) described the age, diagnosis, and skills/behaviors targeted for improvement; (c) identified the limitations of the existing research targeted for this meta-analysis; and (d) provided subsequent recommendations for use of EPB for ASD. National Autism Center classified treatments and combined them into categories, rated effects of treatment, and rated strength of evidence of outcomes. National Autism Center (2009c) developed the Scientific Merit Rating Scale (SMRS) to objectively evaluate whether the methods and procedures in the study possessed strength adequate to determine whether or not the treatment was effective for SWA.

National Autism Center (2009a) defined "established" treatments as interventions that had sufficient evidence of beneficial outcomes for SWA. These established treatments provided a roadmap of strategies for schools, providers, and families to rely on during interventions. To receive the "established" designation, these studies met five dimensions of the SMRS, including (a) experimental rigor, (b) quality of the dependent variable, (c) evidence of treatment/implementation fidelity, (d) demonstration of participant determination, and (e) generalizability of reported data (National Autism
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EBPs for special education programs must meet standards of research
design, quality of methodology, and quantity of replications (Cook & Odom, 2013); and
National Autism Center based these ratings on quality, quantity, and consistency of
research outcomes for each intervention that they included in their study.
The WWC (2010) described a similar process in which they rated each study based on
criteria. WWC used objective and transparent standards and procedures to objectively
evaluate the scientific merit of studies on the effectiveness of education interventions.
The ratings included “Meets Evidence Standards without Reservations,” “Meets
Evidence Standards with Reservations,” and “Does Not Meet Evidence Standards.” Each
of these ratings demonstrated WWC’s confidence in the effectiveness of each
intervention meeting criteria. WWC used the resulting data to provide summaries of
results in an array of products such as quick reviews, practice guides, intervention
reports, and offered educators further recommendations for addressing the challenges of
teaching students with special needs, including SWA.

NPDC (n.d.) developed criteria to determine 24 interventions demonstrating
adequate evidence to be considered effective with SWA and to be deemed an EBP.
NPDC defined their unit of analysis as "focused intervention practices," as opposed to
"treatments," as National Autism Center used in their 2009 study. NPDC defined
focused intervention practices as individual strategies that teachers can use to promote
and target specific outcomes for children with ASD. These strategies may be listed on
Individualized Education Plan (IEP) benchmarks or outcomes on IFSPs. Furthermore,
NPDC recommended that the practices and strategies provide explicit information about
implementation steps, so that research translates into application and practice in the classroom.

According to Cook and Odom (2013), EBPs have proven effective for many students; however, they are not a panacea for all SWA. EBPs remain a challenge for teachers to implement in the classroom with some fidelity and the demonstration of meaningful outcomes for the SWA that they teach (Cook, Tankersley, & Harjusola-Webb, 2008). The implementation of practices that have meaningful effects is of utmost importance for special educators today (Cook & Odom, 2013); however, teachers must have acquired the skills necessary to implement an objective effectively and utilize an IEP goal to teach using procedures with some integrity.

The implementation of highly-effective practices when teaching SWA remains a huge challenge for special education teachers (Cook & Odom, 2013), and has become a critical focus of research. However, quality research that examines the implementation of EBPs is nearly absent from the existing body of literature (Cook & Odom, 2013). Special educators and students cannot afford to wait any longer for this vital research, even though policy makers have yet to establish empirically supported guidelines to support the implementation of EBPs (Cook & Odom, 2013).

**EBPs for Teaching Requesting Behaviors to SWA in the Natural Environment**

Experts throughout the field have recommended naturalistic language teaching procedures as a treatment of choice for children with disabilities (Noonan & McCormick, 1993), and have identified this strategy as an established treatment for SWA in EBP (National Autism Center, 2009). Noonan and McCormick (1993)
described naturalistic teaching approaches as "structured approaches that use the natural routines and activities in natural environments as the teaching context" (p. 22).

Naturalistic teaching approaches utilize a developmental approach to instruction and employ activities (e.g., snack time or play) that can be easily implemented in homes and other naturally occurring settings by caregivers, siblings and teachers, instead of in a clinical setting (LeBlanc, Esch, Sidener, & Firth, 2006). A number of studies on special education and behavior analysis have documented several naturalistic EBP interventions designed to teach manding to students with language delays. Such natural environment interventions include functional communication training (Schieltz, Wacker, Harding, Berg, Lee, & Dalmau, 2010), incidental teaching, Milieu Language teaching (Peterson, 2004), time-delay (Noonan & McCormick, 1993), Pivotal Response Training, the mand-model procedure, and mand training (Sundberg & Michael, 2001).

The sections below detail selected studies, most of which measured stimulus and response generalization as a hallmark of naturalistic teaching approaches and as a measure of the intervention’s effectiveness (LeBlanc et al., 2006). Researchers should make not of certain differences in terminology that exist between some naturalistic teaching strategies that retain the linguistic framework of language (e.g. receptive/expressive, labeling, mean length of utterance) and those that utilize Skinner's Analysis of Verbal Behavior according to function. Larger conceptual differences exist outside of terminology (LeBlanc et al., 2006), but the researcher did not address these differences in this paper.
Functional communication training (FCT). The determination of the function or reason for the problematic behavior is the crux of FCT, and a number of studies in the behavioral and educational fields have documented the use of this intervention (Schieltz et al., 2010). FCT teaches the student to obtain the desired item or action by initiating appropriate communicative responses (mands), rather than using problem behavior such as aggression and self-injury (Carr & Durand, 1985). FCT makes use of the functional analysis of behavior by first determining the function(s) of the problem behavior, then teaching a mand to serve the same function thus providing a functional and socially appropriate alternative to the problematic behavior (Schieltz et al., 2010). FCT uses prompting procedures to teach a request for a desired action or object, and can be a useful EBP for teachers responsible for educating students who demonstrate a plethora of behavioral barriers to learning. FCT has proven successful in reducing problematic behavior and increasing functional spontaneous language. Furthermore, National Autism Center (2009a) considered FCT an effective treatment for teaching SWA under the behavioral package topic area, and found that FCT was effective for SWA aged 0-21 years, and helpful in teaching a plethora of prosocial skills and reducing problematic behaviors.

Incidental teaching. Like mand training, incidental teaching (Hart & Risley, 1968) makes use of innately occurring activities within the natural environment and builds on the child's interest or motivation to facilitate language learning and promote generalization (Peterson, 2004). These activities are child-directed and child-selected, and the teacher follows the child's lead in the activity of interest. Hart and Risley (1968;
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1974) demonstrated that naturalistic teaching strategies were effective in teaching language to young children with language delays. Furthermore, National Autism Center (2009a) described incidental teaching as an established treatment for SWA under the topic area of Naturalistic Teaching Strategies, and reported demonstrated effectiveness with children aged 0-9 years, have produced positive outcomes for SWA, shown demonstrate effectiveness in targeting pro-social skills such as communication, interpersonal skills and play skills.

**Enhanced milieu teaching (EMT) or milieu language teaching (MLT).** EMT is another naturalistic approach used to teach language to SWA (Hancock & Kaiser, 2002). EMT utilizes behavioral and social approaches to language intervention (Hancock & Kaiser 2002), and employs naturalistic strategies like modeling, mand-modeling, and time-delay procedures (Peterson, 2004). Three components provide a foundational crux for EMT:

- environmental arrangements that promote child engagement with activities and communicative partners;
- "responsive interaction techniques" that build social and conversational interactions and model new language forms and functions; and
- milieu teaching procedures that prompt, model, and reinforce the use of new language within natural environmental contexts (Hancock & Kaiser, 2002).

Similar to mand training, the EMT environmental arrangement involves providing toys or objects to which the child is motivated to gain access. The teacher is then more easily able to prompt the child to vocalize a request for the item (Peterson,
Responsive interaction techniques in EMT encourage taking turns in conversation, following a child's lead, taking turns in play, describing and narrating the events and play, echoing the child's vocalizations, and expanding on comments and dialogue that the child previously offered within the same play session (Peterson, 2004). National Autism Center (2009a) indicated that EMT demonstrated adequate evidence to be effective for SWA aged 0-9 years. National Autism Center also indicated that this research has produced favorable outcomes, demonstrated effectiveness in increasing target aptitudes like communication, interpersonal, and play skills.

**Time delay (TD).** Halle, Baer, & Spradlin (1981) provided early accounts of prompt delay procedures as another extension of incidental teaching methods. Through this strategy, the teacher identifies a situation where a student wants an object or action, and then waits for the child to initiate a request (Peterson, 2004). If no request occurs, the teacher may use a mand-model procedure, where a time-delay is useful to teach children to initiate a verbal response to gain access to the preferred item (Noonan & McCormick, 1993). Teachers frequently use TD in mand training, because it allows them to fade the presentation of the prompt stimulus systematically by decreasing the delay between the prompt and the delivery and increasing the likelihood that the student will initiate responses that are more and more independent and free of prompts. TD is useful when a vocal prompt is presented; the teacher waits for the student to echo. The teacher intentionally fails to deliver the reinforcer, with the hope of eliciting a spontaneous mand. After waiting a few seconds, the transfer of stimulus occurs, as the student spontaneously says the word, and then the teacher delivers the reinforcer.
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Noonan and McCormick (1993) indicated that the TD was very useful for teaching SWA to initiate verbal interactions. TD is also useful in prompt fading, which the National Autism Center (2009a) indicated as an EBP within the antecedent package under errorless learning.

**Pivotal Response Training (PRT).** PRT is another naturalistic teaching strategy that utilizes "pivotal" behavioral, such as motivation and responding to multiple cues in the environment (Koegel, Bimbela, & Schriebman, 1996; National Autism Center, 2009). Outcomes of PRT can include the development of behavioral, social, play, and communicative skill sets, and the generalization of skills, as with other naturalistic strategies (NPDC, 2010). National Autism Center (2009a) reported that PRT was included as an established treatment for SWA because it employs motivation and response to multiple cues and exemplars within a natural environmental setting. PRT was shown to be effective for teaching target behaviors like communication, interpersonal skills, and play to SWA aged 3-9 years old.

**Mand training.** In his book, *Verbal Behavior*, Skinner (1957) defined the mand as “a verbal operant in which the response is reinforced by a characteristic consequence and is therefore under the functional control of relevant conditions of deprivation or aversive stimulation“(pp. 35-36). In other words, the term *mand* refers to language through which the teacher controls the student’s verbal behavior using the object or action the student wants as a stimulus (Sundberg & Michael, 2001). Mands function as requests, and students using a mand receive reinforcement specific to that particular mand. For example, the teacher reinforces the student’s use of the mand, “*cookie,*” when
he or she gives the student a cookie after the child says the word. Mands primarily operate under the antecedent control of motivation. Developmentally, mands are the first type of verbal behavior that a child acquires (Bijou & Baer, 1965; Skinner, 1957), and they typically first present when a child is hungry and/or crying (Sundberg, 2004).

Mand training is another naturalistic procedure used to teach functional communication skills within the student's natural environment. Mand training should be considered of paramount importance in early intervention language training programs (Sundberg & Michael, 2001). The literature has identified the overwhelming importance and myriad benefits of helping SWA to develop a mand repertoire (Charlop-Christy, Carpenter, LeBlanc, & Kellet, 2002; Michael, 1988; Sundberg & Michael, 2001). For SWA and related disabilities, mand training has proven effective in decreasing problem behaviors, such as self-injury and aggression (Carr & Durand, 1985; Winborn, Wacker, Richman, Asmus, & Geier, 2002); increasing spontaneous speech and vocabulary (Arntzen & Almas, 2002; Charlop & Trasowech, 1991; Sundberg & Michael, 2001); increasing social interactions or "mands for information" with parents, teachers, and peers (Sundberg, Loeb, Hale, & Eigenheer, 2002); and increasing the effectiveness of efforts to teach other verbal language and help students acquire a functional language repertoire (Arntzen & Almas, 2002; Carroll & Hesse, 1987). Mands offer a child the ability to control the delivery of reinforcers and teach the child to initiate language, not just respond to the language of teachers or others (Sundberg & Michael, 2001). Finally, mand training teaches the child that initiating communication is valuable, and produces reinforcement efficiently and effectively.
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Like incidental teaching and EMT, mand training utilizes TD procedures in prompting, in addition to other behavioral principles of chaining, shaping, fading, differential reinforcement and task analysis. In mand training, use of a time delay is effective in fading prompts when a teacher transfers stimulus control from a prompted trial to a spontaneous or independent mand (Halle, Marshall, & Spradlin, 1981; Sundberg & Partington, 1998; Touchette, 1971). Of utmost importance is the transfer of stimulus control from a prompted mand to a spontaneous mand. Without this transfer, teachers risk reinforcing prompt dependency in their learners. Sundberg (1978) and Sundberg, Ray, Braam, Stafford, Reuber, & Braam (1979) first described a quick transfer procedure to lay out procedures for transferring stimulus control between a prompted mand and a spontaneous mand.

Many SWA do not possess repertoires that include spontaneous mands, which are solely under the control of the motivative operant (MO), without prompts (Sundberg, 2004). A strong mand repertoire allows SWA to control their social environment effectively. As a result, they can access both unconditioned and conditioned reinforcers via their manding repertoire; and unlike other verbal operants, the mand works primarily for the benefit of the speaker (Sundberg, 2013; Sundberg & Michael, 2001). Research demonstrated that tacts do not automatically transfer to mands, and vice versa (Sundberg, 2013). Verbal operants are functionally independent. Consequently, teachers must be intentional and active in programming to help students acquire a mand repertoire, because a word will not likely spontaneously occur as a mand if taught as a tact (Hall & Sundberg, 1987).
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Mand training offers a host of language training benefits, and utilizes motivation similar to incidental teaching, EMT, and PRT. National Autism Center (2009a) identified mand training as an EBP, and described it as an established behavioral teaching strategy for teaching language to SWA ages 0-21 years. National Autism Center (2009a) indicated that mand training is effective for teaching an array of target skills such as academics, communication, interpersonal/social skills, learning readiness, daily living skills, play, self-regulation, problem behavior, and decreasing self-stimulatory behaviors.

Teaching mands and using motivation remains a priority in most educational plans for SWA. However, the limited number of educational staff trained in implementing ABA-based mand interventions may pose a barrier for schools and result in limited opportunities for students with ASD to learn valuable communication and social skills (Lerman et al., 2004).

Motivation and Mands

Researchers have described motivation as a primary source of antecedent control in naturalistic teaching interventions. Motivation has also been a major conceptual topic of discussion among psychologists, particularly applied psychologists; however, until recently, the topic has been notably absent from the ABA literature and empirical research studies (Sundberg, 2013). Sundberg argued that motivation is of the utmost importance to language assessment and interventions for SWA. Similarly, Michael (1993) suggested that the "neglect of motivation leaves a gap in our understanding of operant functional relations" (p. 191).
The literature on operant behavior has described motivation as a “drive,” or a change in response levels that results from a corresponding condition of satiation or deprivation (Skinner, 1938; 1957). Skinner (1938) utilized the term "drive" to describe behavior that was being observed and measured, but not the "drive" itself. According to Skinner, "A rat does not always respond to food placed before it, and a factor called its 'hunger' is invoked by way of explanation" (p. 341). In 1938, Skinner was not interested in the behaviors from which we infer hypothetical states such as hunger, but more interested in the behaviors which are responsible for the variability of hunger, such as feeding and fasting (Miguel, 2013). In 1957, Skinner replaced this conceptual term of "drive" with more descriptive terms such as of deprivation, satiation, and aversive stimulation. Both Keller and Schoenfeld (1950) and Skinner (1953) described some limitations regarding their early conceptual definitions of the construct of motivation. These authors provided readers with additional clarification and synthesis about motivation by clarifying that it was not a (a) stimulus, (b) physiological state, (c) psychic state, (d) response, or (e) pleasure directed.

According to Sundberg (2004), Skinner first presented the concept of motivation as a basic principle of behavioral stimulus control. Keller and Schoenfeld later introduced the notion as a chapter title in a book, and described the concept as an establishing operation (EO; Sundberg, 2004). Sundberg noted the further suggestion that a relationship existed between satiation and deprivation, and subsequent response strength.
Michael (1987) provided the following definition of an EO:

[A]n environmental event, operation, or stimulus condition which affects an organism by momentarily altering (1) the reinforcing effectiveness of other events, and (2) the strength of that part of the organism's repertoire that has been reinforced by those other events. (p. 30)

Michael later replaced “EO” with the term MO in the behavior analytic vernacular. This change provided a more specific description and illustration of the effects involved in establishing and abolishing reinforcement and the resulting in the evoking or abatement of the target behavior (Michael, 2007). EOs and MOs are both antecedent stimuli that evoke behavior like SDs; however, they induce such behavior for disparate reasons.

Unlike SDs, MOs possess value altering and behavior altering effects that are important for several reasons (see Table 2). First, MOs alter the value of the item, which leads a person to want something more when deprived of it (value altering effect). Second, MOs increase the likelihood that the person will engage in behaviors that produced those same reinforcers in the past (evocative effect), and make it likely that the person will do something you want them to do to get what they want (Sundberg, 2004; Sundberg, 2013). Michael’s term MO most importantly has stimulated researchers in the educational and behavioral fields to investigate applied studies which assist in producing better understanding of behavioral control in clinical and educational practices (Miguel, 2013)

**Deprivation and satiation.** An MO involves the functional relationship between (a) the level of deprivation, satiation, and aversive stimulation, and (b) its evocative
effect on behavior. For example, if a person goes without water for an extended period, they are likely to engage in a specific set of behaviors (e.g., such as getting a glass of water, going to a drinking fountain) designed to alleviate the deprivation (Sundberg, 2004, 2013; Sundberg & Michael, 2001). Skinner (1938) argued, “Deprivation is put to practical use when a child is made more likely to drink milk by restriction of his water intake” (p. 146). Skinner also explained, “Satiation is put to practical use when...an abundance of hors d’oeuvres is used to conceal the scantiness of the dinner which follows” (p. 147).

Motivation and its relationship to language training. Motivation is foundational and pivotal variables in the early language acquisition of typical children (Bijou & Baer, 1965; Skinner, 1957), and are paramount in the language training procedures recommended for individuals with developmental disabilities including SWA (Sundberg & Michael, 2011). Jack Michael added EO to the definition of a mand in 1988, and in doing so, he honed in on the importance of considering satiation, deprivation, and aversive stimulation when describing the controlling variables of the mand. Application of the EO/MO, as an independent variable in language training

Table 2

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<th>Motivation Operations</th>
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<td><strong>Value Altering Effects</strong></td>
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<tr>
<td>Establishes the value of stimuli: events or items that will serve as effective reinforcers</td>
</tr>
<tr>
<td>Abolishes the value of stimuli: events or items that will not serve as effective reinforcers</td>
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remains of significant importance to research and practice in the fields of education and behavior analysis (Miguel, 2013; Sundberg, 1993, 2013; Sundberg & Michael, 2011; Sundberg & Partington, 1998). Both EOs and MOs should be a part of the assessment and intervention implements available in teachers’ tool belts that are effective in producing behavior change (Albert, Carbone, Murray, Hagerty, & Sweeney-Kerwin, 2012; Michael, 1988; Sundberg, 1993; Sundberg & Michael, 2001). The pervasive challenge is that motivation remains a private, elusive event that one cannot observe or measure as easily as other behaviors, and sorting out this challenge is a complex process that many people may overlook (Sundberg, 2013).

**Mand training implementation.** The use of mand training procedures often involves the contrivance and capture of motivation (Skinner, 1957, pp. 253-254). Before prompting, one must "verify" the MO. However, because motivation is an internal and private event, and not directly observable, verifying its presence can be very difficult and may be present without any evident observable behaviors such as pointing, looking, reaching, or grabbing. These indicators, however, are pivotal target behaviors that teachers can observe to measure the presence of the elusive MO (Sundberg, 2004). Effective application of the MO, like the effective application of the other behavioral principles and concepts, requires special training for teachers to realize its potential as an independent variable (Sundberg, 2004, 2013).

When a teacher uses antecedent strategies and sets up an environment with a motivating situation, activity, or item to teach a mand, he is using that opportunity to teach language by requiring or prompting the student to use a mand to gain access to the
desired element. Antecedent strategies include all teaching procedures initiated before a learner emits a response and help to increase the likelihood that the learner will emit the target behavior, which the teacher will then reinforce (Albert et al., 2012). Finally, the teacher fortifies the mand behavior by providing specific reinforcement—the delivery of the requested item. Identifying, capturing, or contriving an MO is not adequate in the manding process (Sundberg, 2004). The teacher must then shape the appropriate verbal response by providing prompts and then systematically fading the prompts. For example, the moment a child expresses interest in dinosaurs, the teacher should take notice and capture the motivation. The teacher should then offer the echoic prompt "dinosaur," and if the child approximates a vocal response such as "die" or "dino," the teacher should deliver the reinforcement of the dinosaur. Later, fading the echoic prompt using prompt fading and time delay procedures, is necessary to establish the target spontaneous verbal response “dinosaur” free from the echoic prompt.

Sundberg (2004) recommended that mands should be free of verbal, non-verbal, echoic, and imitative prompts; he recommended transferring stimulus control using "quick transfer procedure" to increase acquisition of independent mands (Sundberg & Partington, 1998). According to Sweeney-Kerwin, Carbone, O’Brien, Zechin, & Janecky, (2007), teachers should always include these types of procedures designed to increase spontaneous mands and transfer stimulus control of multiply-controlled mands to the MO in language training programs aimed at helping SWA develop a mand repertoire.
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Motivation remains a ripe topic for research within the field of behavior analysis and special education, and from Skinner's point of view, it is a basic principle of behavior deserving of the same accolades as stimulus control, reinforcement, punishment, and extinction (Sundberg, 2013). Recently, some researchers have realized the relative importance of motivation and included or described motivation as an antecedent variable within naturalistic teaching strategies like mand training.

Mand Training Studies

Empirical studies that evaluated the effectiveness of mand training did not begin to receive the attention they deserved until the late 1970s. These studies set the stage for the methods educators use to teach mands to SWA today, and they built the foundation of evidence to support the effectiveness of mand training. These formidable scientific inquiries addressed teaching mands both directly to SWA, as well to the staff, teachers, and parents who support the students.

In one of the very first mand studies, Halle et al., (1979) taught mands to children with severe mental retardation living in an institutional setting. They used a time delay procedure to teach meal requesting to children who previously did not have to request to receive their food tray at meal times. After a staff member summoned the children to collect their trays at the food counter, the staff delayed delivery of the trays for 15 seconds, or until the students expressed a vocal request for the meal. If the student did not make a request during the 15-second delay, the staff provided a vocal model (prompt) of the appropriate meal request. After the student imitated the prompt, the staff member delivered the food tray to the child. Through this experiment, Halle and
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colleagues successfully increased the expression of vocal mands among three of the six participants in the study by implementing the time delay without a prompt. The remaining children initially required prompts to successfully mand; however, the researchers were able to fade the prompts over time. The researchers concluded that the time delay was an effective procedure for increasing spontaneous mands.

Halle, Baer, and Spradlin (1981) replicated these results in an alternate setting, with a decreased time delay, and across different motivational variables, such as activities and items other than meals. Results indicated that TD was effective in both teaching mands, and promoting generalization. These researchers suggested that one could use a TD to teach other types of non-verbal behavior, and possibly motor activities.

Carr and Kologinsky (1983) taught requesting for missing items or events to six SWA. The researchers manipulated motivation using prompting, prompt fading, and differential reinforcement. Carr and Kologinsky used signs as the response topography, rather than total communication (vocal and sign presentation); and training consisted of imitative prompting, fading and differential reinforcement, multiple exemplars, and incidental teaching procedures. The researchers selected the children based on their failure to acquire functional expressive speech despite many attempts. They measured the success of the sign mand training for these participants using response generalization that reduced self-stimulatory behaviors, and stimulus generalization involving the transfer of spontaneous mands to novel settings and novel adults. Most notable, towards the end of the study, the researchers concealed the objects the children were motivated to
obtain. The objects were likely under the control of the child's motivation for the item, rather than the non-verbal object itself (pure mand).

Carr and Durand (1985) taught vocal requesting for assistance to four children with developmental disabilities after first establishing the effectiveness of adult attention or help as a reinforcer and then transferring stimulus control solely under the control of the motivation. The researchers first used an echoic prompt to elicit the appropriate response, and then systematically faded the prompt. After the training, behavior problems decreased across all four children. These results offered more evidence that behavior problems and verbal communication acts may be equivalent in function but not in form. This landmark study indicated that if educators could strengthen one form (vocal) as a replacement behavior, challenging behaviors should decrease if functional equivalence existed between the two forms.

Using a time delay procedure, Charlop, Schreibman, and Thibodeau (1985) taught seven boys with autism to spontaneously mand for items without an echoic prompt. The boys ranged in age from 5-10 years old. The researchers gradually increased the time between the presentation of the item, and the echoic prompt, aiming to transfer stimulus control from the echoic stimulus to the multiple control of the object and MO. Charlop and colleagues successfully taught spontaneous manding behaviors to all children, and these results generalized across settings, people, situations, and novel items.

Hall and Sundberg (1987) taught individuals with developmental disabilities to mand for missing items under the control of the EO. With incidental teaching and time
delay procedures, target mand items were usually present and in view of the individuals, which resulted in part tact and part mand responses. This study provided evidence that educators could remove objects from the students’ view, and conduct mand training to result in mands under control of the EO alone. Hall and Sundberg arranged chains of functional responses that, when completed, resulted in the delivery of a reinforcer. The researchers trained responses in the chain until the participant could complete the entire chain independently. They then interrupted the chains by removing an item necessary for the completion of the entire chain, hence contriving the EO for the individual to mand for the specific missing item. Subsequently, the absence of the item increased its value as a reinforcer. Finally, the researchers trained the manual sign responses for the missing item using an imitative prompting and fading procedure. Post training, the participants manded for missing items under the control of the EO in the same conditions in which that item would serve as a reinforcer.

Hall and Sundberg (1987) discovered that teaching tacts of the missing items was not sufficient to produce mands for the missing items when the item was not present; in other words, the tact did not transfer to the mand automatically. These results provided additional evidence of functional independence and supported the notion that educators should teach mands specifically and independently from other operants. This was the first study that used language and analysis of contriving EOs, mands, and transfer from imitation to EO. Most notably, these researchers were able to successfully separate the mand from the tact, and demonstrate functional independence. In 2012, Albert et al. successfully replicated and extended this study with some procedural differences.
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Laski, Charlop, and Schreibman (1988) used a natural language paradigm (NLP) to teach the parents of eight SWA to require their children to speak. Researchers have described NLP as a child-directed intervention designed to improve motivation and learning by varying tasks (Dunlap, 1984), to increase responses by providing direct reinforcement (Koegel & Williams, 1980), arranging the environment to increase response acquisition (Williams, Koegel, & Egel, 1981) and to enhance generalization via the use of multiple exemplars and loose structure (Stokes & Baer, 1977). Laski et al.’s study was loosely structured and conducted in a play environment with a plethora of toys. Over the course of the study, Laski and colleagues trained eight parents to implement NLP with their children, and their efforts resulted in increased verbalizations in three non-training settings. Parent training continued for several weeks, and included five to nine training sessions.

NLP combines features of operant and natural language procedures, and incorporates reinforcement and motivation, as well as multiple exemplars (Laski et al., 1988). The researchers used four basic criteria to measure competency and proficiency to determine when training was complete: (1) direct reinforcement of verbal attempts, (2) turn-taking with the stimulus material, (3) task variation and multiple exemplars, and (4) shared control (Laski et al., 1988). Laski et al. reported that the time requirements of the training served as a potential barrier. The researchers provided many hours of training, and parents had to commit to participate throughout the duration of training to reach criterion. Researchers identified this as a potential barrier to implementation for schools and early intervention alike.
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Sweeney-Kerwin et al. (2007) taught two SWA, ages three and seven, to mand under the control of the MO. They utilized time delay and prompt fading procedures to fade the presence of the items systematically and transfer the stimulus control. They accomplished this task by transferring the multiple control of a discriminative stimulus and an MO to the solely the control exerted by the only by an MO and a listener.

Sweeney-Kerwin et al. (2007) commenced by placing the item within the student’s field of vision, and if the child manded for it, they delivered the reinforcer immediately and recorded the request as a multiply-controlled mand (part tact and part mand). Subsequently, they implemented a 2-minute time delay where after placing the item out of view. If the child manded for it within the 2-minute interval, and at least 15 seconds after the display of the item, they delivered the item and recorded the MO controlled mand. If a mand did not occur within any interval, the researchers placed the item back into the student’s view, and repeated the procedure. Sweeney-Kerwin et al. recommended that the transfer of stimulus control from part tact (in view) to pure mand (out of view/MO only) remain an important issue to address for SWA. SWA who possess mand repertoires that included multiply controlled mands needed specific programming to transfer stimulus control from a mand controlled by a tact to a spontaneous and pure mand, free of prompts and controlled solely by MO.

In 2010, Nigro-Bruzzi and Sturmey used behavioral skills training (BST) to teach staff to implement mand training with SWA. The BST training module consisted of three, 30-60 minute sessions of instructions, video modeling, role-play rehearsals, and performance feedback. The training resulted in improvements in staff performance of
mand training procedures and led to notable progress in student outcomes. Nigro and Sturmey demonstrated the effectiveness of using BST when teaching mand training to staff; however, each staff trainee required one-on-one time with an experienced behavior analyst, a variable potentially presenting another barrier for widespread implementation in school systems and early intervention training and PD efforts.

In 2011, McCulloch investigated the use of OTVs as PD to teach mand training to paraprofessionals who supported SWA. This research was the first known special education study to investigate the application of knowledge gained from online PD, and the subsequent student outcomes as a result of the PD. The results of this study demonstrated that OTVs were effective as an alternative to in-service training for paraprofessionals. During the study, three paraprofessionals received PD to teach students with disabilities to mand using the Autism Training Solutions (ATS) OTV. Three SWA participated in the inquiry. Outcomes of this study indicated that the paraprofessionals' implementation of mand procedures, with use of a procedural checklist, resulted in higher fidelity that correlated to an outcome of increased number of spontaneous mands by the three participating SWA. The percentage of integrity did not average above 80%, and potentially could have increased with the additional components PD such as coaching, feedback or modeling support for these paraprofessionals.

Research indicates that evidence-based PD that trainers can deliver efficiently and effectively is a well-recognized need in special education. School and program leaders must ensure that educators are prepared to implement effective procedures when
teaching language to SWA. The use of alternative training modalities like OTV may prove critical to the success of these efforts in schools and early intervention alike.

**Personnel Needs in Early Childhood Intervention and Schools**

As the prevalence of ASD has continued to skyrocket, the need for efficient and effective treatment options that teachers can deliver within the school setting has become even more critical (IDEA Partnerships, 2009). According to the United States Department of Education (2000), the number of students with disabilities receiving services under IDEIA is growing faster than nation can produce highly-trained teaching staff. A number of researchers have argued that the availability of adequately trained teachers is also a crucial factor directly impacting the delivery and implementation of services for students with disabilities (Fong, Wilgosh, & Sobsey, 1993; Scheuermann, Webber, Boutot, & Goodwin, 2003; Simpson, 2004; Sperry, Whaley, Shaw, & Brame, 1999; Starr, Foy, & Cramer, 2001).

Merkle and Artman (1983) defined PD as "a planned experience designed to change behavior and result in professional and/or personal growth and improved organizational effectiveness" (p. 55). According to Beeler (1977), staff development refers to continuing education or training aimed at enhancing the skills, competencies, and knowledge of staff and enabling them to provide better services to their clients. PD exists as a means to obtain growth and renewal to stay current in ones knowledge of new research or improved practice (Schwartz & Bryan, 1998). Bruder, Mogro-Wilson, Stayton, & Dietrich (2009) defined PD in education as "activities [that] enhance the knowledge and skills of those in the workforce" (p. 14). These in-service or training
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opportunities usually take place once an individual has already assumed a job role, which he or she most likely obtained through the completion of relevant coursework or training that led to credits, a degree, or a certification (Yates & Hains, 1997). Unfortunately, the availability of ongoing professional development has remained a consistent challenge for educators that provide early childhood interventions (Bruder et al., 2009).

The provision of PD opportunities for teachers that work with SWA is an area in critical and immediate need of study; however, the depth of this challenge remains unclear. According to a report by the National Research Council (NRC; 2001), no data existed on (a) the number of available ASD personnel preparation training programs, (b) the disciplines involved in such training models, or (c) the number of people who receive ASD specific training annually (Scheuermann et al., 2003).

McLaren and Rutland (2013) recently reported that states have continued to report shortages in special education personnel. These authors also reported that many existing personnel in the classrooms lack the necessary training to meet the needs of children and families within the IDEIA continuum. According to Bruder (2004a), state early intervention data indicated that, based on standards put forth in Part C of IDEIA, less than half, only 44% of states believed that their early interventionists had received adequate and appropriate training. Most egregiously, most early intervention practitioners (80%) reported not getting the training necessary through PD programs to provide an adequate education to children with disabilities, and only 39% of practitioners within 20 states admitted to even having a training system in place (Bruder, 2004c; Bruder et al., 2009). Additionally, and most alarmingly, only 50% of early intervention practitioners
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reported that their state required that they complete specialized training to work with children above and beyond their professional credentialing requirements (Bruder, 2004c).

Effective ongoing PD must be available to all early childhood interventionists (Bruder et al., 2009). Because of the demand for accountability within special education and early intervention, the interventionists who provide services to SWA must be able to reliably demonstrate the skills necessary to produce these mandated outcomes (Bruder et al., 2009), further illustrating the critical need for evidence-based PD for teachers who support SWA in early intervention settings.

The Current State of Training and PD

In 2001, the NRC reported that a dearth of research existed on the task of preparing personnel to provide support and interventions for SWA. The NRC also found that most teachers who graduated with a teaching degree received minimal-to-no training at all in EBP. This report concluded that very few special education teachers received explicit and formal instruction in research-based interventions for children with ASD (NRC, 2001). Similarly, Simpson, McKee, Teeter, and Beytien (2007) found that only a scattering of special education teachers received any formal training in EBP or training in behaviorally based interventions with ASD. Most alarmingly, Lerman et al. (2004) suggested that only 11.24% of special education teachers had training in ABA, and those training modules employed a myriad of validated procedures which had been accepted as EBPs. Despite this data, most school systems considered these same educators to be "prepared" to teach SWA using EBP. Simpson, et al. noted that experts have yet to recommend a single method or procedure for all children with ASD; however, evidence
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suggests that some ABA approaches generally lead to better outcomes when applied with fidelity by well-trained teachers. Simpson, et al. elaborated by recommending that focused and comprehensive approaches to PD are essential if teachers are to deliver EBP with integrity, and that well designed PD programs should be relatively efficient as they are effective.

Frequently, the array of individuals responsible for providing services to SWA (e.g., teachers, doctors, respite workers, therapists) lack specialized training in ASD (Dymond, Gilson, & Myran, 2007). If the provider is ineffective and inefficient in delivering these services because of a lack of adequate training, then the student is likely to achieve less than optimal outcomes (Dymond et al., 2007). Teaching the wrong or inconsequential skills well is no better than teaching appropriate or important skills poorly (Gerhardt, 2013). As Parsons, Rollyson, and Reid (2012) explained, ineffective training typically leads to the investment of additional time to correct or improve the performance of the staff member, in addition to the most egregious and direct impact on SWA.

Because of teacher shortages and attrition in special education, students often are subject to a “continual parade of ineffective teachers” (Billingsley, 2004; Darling-Hammond, 2003). Boe, Cook, and Sunderland (2008) reported that over a ten-year period, more than 19,000 special education teachers abandoned the teaching profession altogether. During this same period, 50,000 special education teachers migrated between schools and produced a number of staffing issues and inconsistencies. Research suggests that almost half of special education teachers leave the profession during their first five
years of teaching (Boe et al., 2008). PD opportunities may have offered many of these educators and teachers, who found the field too challenging, the valuable tools they needed to remain in the classroom setting. This revolving door in special education highlights the importance of offering more efficient and effective training options that help to ensure teachers are prepared to achieve meaningful student outcomes.

Federal mandates require teachers and instructors to be highly trained and qualified to provide instruction to SWA. Some federal and statewide programs have initiated discussions on the issue of training processes and standards to address the critical issue of the best way to prepare teachers to intervene with SWA in school settings in a competent manner. Both the IDEIA and NCLB updated their requirements for classroom teachers in 2004. IDEIA (2004) “requires states to take measureable steps to recruit, hire, train, and retain highly-qualified personnel to provide special education and related services” (para. 12). However, the IDEIA fails to clearly define appropriate training, nor does it provide specific information about the knowledge, skills, and abilities teachers need to demonstrate to support SWA (Rude & Brewer, 2003). Bruder et al. (2009) recommended that state early intervention agencies develop a model linking effective PD to competent interventionists and service delivery, along with child and family outcomes that ultimately address the existing research-to-practice gap.

PD for Teachers

The acquisition of knowledge, skills, and abilities are dynamic variables for teachers that require a steep learning curve in the rapidly evolving field of special education (Eren & Kelleher, 2011). Miles, Odden, Fermanich, and Archibald (2004)
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found that school districts spent an average of 1-3% of their budgets on PD activities. The National Staff Development Council (NSDC; 2010) also recommended that educators devote at least 25% of their work time to PD, and encouraged school districts to dedicate at least 10% of their budgets to PD. When teachers attend short, in-service training courses, they often receive exposure to new information and techniques. However, research suggests that teachers apply very little of the knowledge and techniques they learn during in-service trainings over long periods of time (Joyce and Showers, 2002). We know that didactic teaching does not consistently transfer to the application of educational or behavioral interventions, as 'knowing' and 'doing' are different (behavioral) repertoires (Skinner, 1974).

Researchers have recommended that new teachers receive approximately 25 to 60 hours of training and supervision before they can implement DTT accurately (Koegel et al., 1977; Smith, Parker, Taubman, & Lovaas, 1992). Educators often use DTT in conjunction with mand training, which also requires high procedural integrity (Koegel, Russo, & Rincover, 1977; Smith et al., 1992). Because of time restrictions and funding limits, many early intervention sites and schools are unable to offer or achieve this level of training and supervision to their staff or teachers (Jacobson & Mulick, 2000). Efficient and cost-effective training programs are necessary for early intervention sites to provide instruction that produces optimal outcomes in the short window of time families and teachers have during these early intervention years.

**Effective PD Components**

Simpson (2003) found that many teachers learned instructional approaches with
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questionable effectiveness, and often did not receive effective PD. The scope of PD typically includes lectures, in-services, and workshops that consist of theory and discussion instead of lessons in practical application like rehearsal or coaching in the concepts and skills explained. Joyce and Showers (2002) described five pivotal training components that they believed must be present for PD to be effective. These components included theory; demonstration; practice; feedback; and ongoing, on-site coaching. The first element entails providing trainees information about the theory of the skill or knowledge. This instruction can take the form of readings, lectures, and/or discussions. The second component involves in-vivo modeling of a skill or illustrated modeling of target skills via video clips (video modeling). The trainees then need time to practice the target skill and receive direct performance feedback during the practice situations.

Finally, Joyce and Showers highlighted ongoing consultant or peer coaching as an important component of teacher PD, because it has proven effective in the application of training and transfer to the classroom setting. Joyce and Showers’ research demonstrated the limitations of traditional PD on knowledge, skill demonstration, and classroom application; however, when trainers added coaching to the PD package, the results were significant. Unfortunately, funding may be an ongoing barrier to utilizing ongoing consultation or coaching, as it is costly and often is not practical in early intervention or school settings because of to barriers of implementation. As Table 3 indicates, with lecture only, trainees can expect to increase their knowledge by only 10%, and the application of acquired skills in the classroom will be minimal (Bennett, 1987, as cited in Joyce & Showers, 2002).
Table 3

*Teacher Training Components*

<table>
<thead>
<tr>
<th>Training components</th>
<th>Knowledge</th>
<th>Skill level</th>
<th>Application in classroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture about theory</td>
<td>10%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Lecture and demonstration</td>
<td>30%</td>
<td>20%</td>
<td>0%</td>
</tr>
<tr>
<td>Lecture, demonstration, &amp; practice</td>
<td>60%</td>
<td>60%</td>
<td>5%</td>
</tr>
<tr>
<td>Lecture, demonstration, practice, &amp; coaching</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
</tr>
</tbody>
</table>

According to Bennett (as cited in Joyce & Showers, 2002), even with demonstration and practice during training, teachers typically applied less than 5% of what they learned. Bennett conducted a meta-analysis of staff development training practices and concluded that without ongoing coaching in the classroom, teachers gain very little from lecture-based pre-service or in-service trainings (Joyce & Showers, 2002). These findings provide even more credence to the argument that a significant need exists for a coaching component within PD opportunities.

Although research suggests that lectures alone or lectures with demonstration and practice lead to little skill acquisition or application, many PD activities continue to provide little-to-no hands-on practice or ongoing coaching following training. When trainers include coaching in PD opportunities, the level of application in the classroom increases to about 95%. According to Joyce and Showers (2002), coaching increases the implementation of skills in PD, which ultimately leads to significant improvements in
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student outcomes (Joyce & Showers, 2002). The authors posited that PD modules rarely included on-site guided practice or coaching/modeling by a trained consultant or peer because of funding issues and coordination difficulties (Joyce & Showers, 2002). Knight (2007) provided the following explanation:

Quick fixes never last and teachers resent them; they resent going to in-services where someone is going to tell them what to do but not help them follow up. Teachers want someone that's going to be there, that's going to help for the duration, not a fly-by-night program that's here today and gone tomorrow. (p. 1)

Staff training is a critical variable for the effective implementation of EBP. Educators or parents typically implement a procedure without high fidelity when their trainers use ineffective procedures to teach them how to do their jobs (Allen & Warzak, 2000; Larson & Hewitt, 2005). If PD does not include a plan for skill generalization, teachers may not implement the skills that they mastered during the training for long once they return to the applied setting. Examples of failing to program for generalization include a) failing to train an adequate number of exemplars, b) training in a setting disparate from the target setting, and c) imparting skills that are not related to the abilities required during ongoing treatment delivery (Allen & Warzak, 2000). Sadly, ineffective training often utilizes a simple verbal or written description of the procedure, and does not include any direct instruction that uses established ABA-based procedures, which include modeling, corrective feedback, and differential reinforcement (Allen & Warzak, 2000). PD should not terminate until trainees have
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achieved transfer of skills and are using the new skills in the applied setting with integrity and consistency in a manner that will positively affect student outcomes.

PD Research

Existing bodies of work have effectively documented the use of video modeling, in vivo modeling, verbal feedback, and rehearsal to train staff (Dib & Sturmey, 2007; Lavie & Sturmey, 2002; Sarokoff & Sturmey, 2004). Most PD approaches for teachers fall under the umbrella of didactic workshops, video modeling, OTV, performance feedback, and procedural checklists or self-monitoring tools. When teachers attend short in-service training courses, they often learn new information and techniques derived from theory. As mentioned above, research suggests that teachers apply very little of the knowledge, strategies, and procedures they learn in in-service trainings within the classroom setting long-term (Fixsen et al., 2010; Joyce & Showers, 2002; NSDC, 2010).

In addition, the clinical conditions under which a teacher demonstrates competent delivery of an intervention may be different than those teachers in which the teacher actually works with children; particularly for educators who operate in the home setting, where they may experience challenging competing variables and other setting constraints and challenges (Neef, 1995).

Ultimately, interventions selected for implementation should be compatible with the ecology of the environment in which the interventions take place, whether it is the clinic, community or the family home environment (Heward, 2013). Allen and Warzak (2000) highlighted the importance of increasing parental adherence or fidelity of treatment by parents and caregivers in the home. Furthermore, they noted the importance
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of considering the role of behavior analysis in maintenance of delivery by parents, as well as other caregivers such as teachers, and reminded practitioners that good instructional technology has been well established. Finally, they suggested that the technology needs to include training procedures such as prompting, shaping, chaining, which could be combined into a PD package including instruction, modeling, rehearsal, and feedback.

LeBlanc, Ricciardi, and Luiselli (2005) described several pivotal elements for training teachers and staff. First, training needs to be practical, functional, and efficient. Witt, Martens, and Elliott (1984) indicated that time and efficiency of training was important for teachers. Second, LeBlanc and colleagues asserted that teachers should report the training as favorable and acceptable. Kennedy (2002) posited that acceptability by staff is critical when examining social validity of behavioral interventions. Use of supportive feedback or descriptive praise during on-the-job coaching may increase acceptability by staff (Daniels, 1994). Third, Leblanc et al. recommended that ongoing coaching and support for skills learned is a mandatory component for long-term maintenance of skills acquired in PD. Coaching from a colleague or peer on the target intervention skills is also essential for application with fidelity (Fixsen et al., 2005). Several studies support the notion that these pivotal elements aid in the maintenance of skills acquired in PD.

LeBlanc et al. (2005) utilized a 10-item performance checklist, along with verbal performance feedback, to increase the use of discrete trial instruction by three teachers supporting SWA. Feedback consisted of praise and approval immediately following each
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session. When the teachers failed to implement a skill correctly, the feedback contained verbal direction and clarification. Teachers evaluated the training and indicated that it had "high acceptability" on the social validity measure used. The teachers were somewhat competent at baseline and correctly completed some steps. The researchers did not collect data on student outcomes associated with implementation integrity.

Van Oorsouw, Embregts, Bosman, and Jahoda (2009) conducted a meta-analysis of staff training research. Van Oorsouw et al. sought to determine the procedures and components that correlated to staff behavior improvements. Fifty-five studies met their criteria, resulting in 502 single-subject studies. They found that a combination of in-service training and in vivo coaching was most effective in making a meaningful change in staff teaching behaviors. These authors also suggested that trainers add a verbal feedback component to both in-service training formats and on-the-job coaching. Finally, van Oorsouw et al. concluded that competencies acquired with these elements during training produced behaviors that staff could apply and maintain long term. PD that 1) produces outcomes which maintain over time, 2) demonstrate generalization, and 3) have some social validity would likely be highly valued by schools and teachers alike (van Oorsouw et al., 2009).

Macurik, O'Kane, Malanga, and Reid (2008) indicated that the use of a DVD (Digital Versatile Disc) using video-modeling (VM) to provide descriptions of target behaviors, demonstrations of implementation of treatment plans for individuals with challenging behaviors could be a valuable resource for PD. This type of PD vehicle permitted the staff to view the training video when their schedules permitted and the
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remaining components could be easily delivered via on-the-job training (i.e. practice, feedback, coaching). This approach requires less up front time from the trainer, and was reported to be as effective as the group training modality followed by on-the-job training. Incorporating a VM approach to the protocol may increase efficiency of training and ensure consistency of delivery across trainees (Catania et al., 2009; Collins et al., 2009; Parsons et al., 2012).

Parsons et al. (2012) investigated the use of BST model to train staff using a six-step protocol to teach seven teachers and one paraprofessional five teaching strategies to provide effective instruction for adults with severe disabilities. Observational data were obtained to determine if participants met mastery criteria for skills, as BST is based on performance skills and refers to competency-based strategies. The purpose of the study was to increase the teacher’s repertoires of prompting from least-to-most intrusive, and expand it to include competency of most-to-least intrusive prompting, as well as teach the staff 35 new signs necessary for teaching new target skills to clients. Researchers used demonstration, feedback, and practice/rehearsal to increase competencies to mastery criteria, and measured the mean percentage of overall teaching components. Results indicated that the BST was effective for both most-to-least prompting and signing skills acquired during training. All participants increased their correct implementation of most-to-least prompting and signing skills following BST training and demonstrated proficiency of these newly acquired skills within their job settings with actual clients.
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Staff Performance and Maintenance of PD Outcomes

Several researchers have pioneered studies in the field of Organizational Behavior Management (OBM) that examined the management of staff performance and training effectiveness in settings designed to educate persons with developmental disabilities, including ASD (Babcock, Fleming & Oliver, 1998; Sturmey, 1998). According to Fixsen et al. (2010), “The use of effective interventions without implementation strategies is like serum without a syringe; the cure is available but the delivery system is not” (pp. 440). Reid, Parsons, Green, and Shepis (1991) suggested that the OBM literature offered teachers a number of proven procedures for improving the quality of interventions for individuals with developmental disabilities and demonstrated sound scientific support for a wide range of procedures designed to impact and change staff performance (Sturmey, 1998). Dib and Sturmey (2007) indicated that shoddy staff performance may have unintended consequences on student progress and outcomes that teacher can avoid by taking part in evidence-based PD.

Reid and Parsons (1995) identified seven steps necessary for the effective training of the quality of staff. These steps include (a) specifying needed work skills, (b) providing staff with a checklist description of work skills, (c) describing the work skills, (d) modeling the work skill behaviors, (e) observing staff member practice the work skills, (f) providing performance feedback to trainees, and (g) continuing feedback until the staff member demonstrates competency. These crucial steps are essential and should be a part of many types of training programs within a wide variety of fields, including the education arena.
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Training Techniques

Research has long demonstrated that both parents and teachers can learn to implement behavioral interventions for SWA with integrity (Lerman et al., 2004); however, lengthy instructions and extensive time commitments may be unavoidable (Laski et al., 1988). Researchers have evaluated several training packages, and have provided foundations upon which leaders can build capacity and foster implementation within early intervention agencies nationwide.

BST. BST remains one of the most widely-known and effective training packages for instructing new staff behaviors (Miltenberger, 2003). The BST package contains a four-part training strategy that involves a) clear and explicit instructions for the target behaviors, b) modeling or demonstration of the target skill or procedure, c) rehearsal or practice of the target skill or procedure, and d) feedback on the performance that occurred during rehearsal/practice (Miltenberger, 2004). Trainers typically deliver instructions for BST through face-to-face lectures, workshop, and/or video.

BST has proven an effective training package for teaching new skills to staff (Dib & Sturmey, 2007). Additionally, some studies have described meaningful and positive outcomes related to student behavior because of BST staff training (Dib & Sturmey, 2007; Nigro-Bruzzi, & Sturmey, 2010; Parsons, et al., 1993). Researchers have also recommended that staff members consider the training package to be acceptable (Miltenberger, Larson, Doerner, & Orvedal, 1992; Parsons et al., 1993; Sarokoff & Sturmey, 2008) to provide some social validity measures for each package.
Nigro-Bruzzi and Sturmey (2010) used BST to train five teachers to implement mand training with SWA using an eight-step task analysis. During baseline, the participants received written and verbal instructions for how to conduct mand training with their students. Following baseline, the researchers implemented three 30-to-60 minute training sessions that included written instructions, video modeling, and role-play rehearsal with verbal performance feedback with participants. Teacher fidelity of training steps was low and variable during baseline. The researchers also noted an association between fidelity of mand steps by teachers and low percentages of independent mands by SWA in baseline. Overall results indicated that all five teachers demonstrated increased fidelity after BST, and subsequently all five children demonstrated increased percentages of independent mands. Generalization probes showed similarly high levels of fidelity of implementation.

Dib and Sturmey (2007) evaluated the indirect effects of discrete-trial teaching on the stereotypic behaviors of three SWA. They reported that instructions, feedback, modeling, and rehearsal led to the improvement of three implementations of discrete-trial teaching by the teacher aides. Reported results included the reduction of SWA stereotypy and an increase in procedural fidelity, which demonstrated that improvements in teaching could result in decreases in disruptive or maladaptive behavior (Dib & Sturmey, 2007). A need exists for a training package that is as effective as BST; however, viable alternatives are necessary, given the accessibility and time investment issues involved in the training package.
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The ultimate goal of staff training is to teach necessary skills and interventions that lead to client improvement following the application of interventions. While BST, as a training package, has proven to be relatively effective (Dib & Sturmey, 2007; Lafasakis & Sturmey, 2007; Sarokoff & Sturmey, 2008; Wood, Luiselli, & Harchik, 2007), some researchers have conducted experiments to identify the critical components of BST that lead to training effectiveness.

Sterling-Turner, Watson, and Moore (2002) examined the critical variables of BST for staff training using a component analysis. The authors demonstrated that instructions alone failed to produce changes in staff behavior. However, when the researchers added modeling, role-play, and feedback components, the BST procedure effectively produced the desired behavioral changes. Additionally, Roscoe and Fisher (2008) utilized BST to determine that written instructions alone were ineffective in training staff to implement preference assessments. Participating staff implemented preference assessments with high treatment integrity only after the addition of video feedback and rehearsal components to the BST component (Roscoe & Fisher, 2008).

A large body of evidence exists to support the use of BST with teach teachers, staff, and other caregivers to help them implement interventions with high fidelity. However, as mentioned previously, the training packages involve a considerable investment of time for the trainers (e.g., 8-18 hours of training), given that some portions of the training require individual rehearsal and feedback opportunities (Crockett, Fleming, Doepke, Stevens, 2007; Downs, Downs, & Rau, 2008).
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Given the high staff turnover rate in special education, it may not be cost effective or efficient to train staff using this method. Additionally, BST requires that the trainer be present to observe as each staff member rehearses the new procedure and provide feedback. This component of the training may not be practical for large or multisite agencies or when training teachers in remote schools, or in places such as home settings.

**Didactic workshops.** Workshops and large, group in-services are a popular and convenient training vehicle for PD; many individuals can attend, and the workshops can take place in multiple settings over varying time periods (Marks, Schrader, & Levine, 1999). Without ongoing coaching in the classroom, teachers gain very little from lecture-based pre-service or in-service trainings (Joyce & Showers, 2002).

Hall, Grundon, Pope, and Romero (2010) demonstrated that workshops alone rarely result in behavior change. When schools send teachers to workshop trainings, didactic instruction alone may not lead to the effective application of the methods (Joyce & Showers, 2002). Workshops may be an ineffective training strategy if provided with no other components (Hall et al., 2010; Joyce & Showers, 2002). A study by Smith, et al., (1992) provided a powerful example of the failure of skill generalization following the provision of workshop-style training for staff members. These researchers taught information to staff about the intervention, utilized role-play, provided videotapes for analysis, and then offered the opportunity to practice skills with individuals with ASD. When teachers attended the workshop alone, they displayed no evidence of generalization or receiving any benefit from the training.
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VM. VM refers to "the occurrence of a behavior by an observer that is similar to the behavior shown by a model on a videotape" (Nikopoulos & Keenan, 2004, p. 94). Furthermore VM includes the demonstration of desired skill sets in applied settings, the use of multiple exemplars, and the standardization of presentation and training materials that ensure consistency across trainees (Morgan & Salzberg, 1992). These elements provide numerous benefits to justify its use in PD. Additionally, video-based instruction, such as on-line learning that can include VM, can help to standardize training practices, improving fidelity (Anderson, Armbruster, & Roe, 1989) during PD.

VM, when incorporated into PD, is a potentially inexpensive and time efficient means of training staff on a variety of behavior analytic skills (Moore & Fisher, 2007). VM has also proven useful in promoting high fidelity in the implementation of different types of instructional techniques, such as DTT, (Catania et al., 2009; DiGennaro-Reed, Codding, Catania & Maguire, 2010; DiGenarro-Reed, Reed, Baez & Maguire, 2010; Moore & Fisher, 2007) and problem-solving (Collins, Higbee, & Salzberg, 2009). Some behavior analysts or early interventionists may work in community or home settings with children and families, posing challenges to staff training, including budget shortfalls, time limitations and staff turn-over; VM offers a solution to these obstacles by decreasing training time and the option of re-using this technology across staff (Collins et al., 2009).

Lavie and Sturmey (2002) demonstrated the efficacy of VM when training three staff members to conduct preference assessments for eight SWA. They used both simulated and applied settings. The researchers trained staff to achieve mastery of target
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skill sets by using a paired-stimulus format that included a brief instruction, a video model, and rehearsal with verbal feedback delivered to the staff. Staff quickly and accurately learned to conduct the preference assessments with the children with fidelity.

Catania et al. (2009) used VM with voice-over descriptions to instruct three new teachers on implementation of discrete-trial training. These researchers achieved high integrity in their results, which they maintained during follow-up and generalized across teaching tasks. Results indicated that VM provides an economical approach to teach staff to implement a specific protocol, such as discrete trial teaching.

Moore and Fisher (2007) used a multiple baseline across subjects design, while comparing lecture, VM, and two different intervention components (e.g., partial vs. complete video modeling) using a multi-element design. They investigated the use of VM to teach three staff members to implement functional behavior analyses (FBA) using attention, play, demand, and alone conditions. Moore and Fisher suggested that even very brief forms of VM staff could produce adequate performance. They concluded that staff training containing VM produced the largest and most consistent improvements in staff performance. Results indicated that VM that incorporated multiple therapist exemplars (complete video modeling) resulted in mastery-level performance eight out of the nine times, in contrast to staff behavior improvements that were far from notable when the researchers employed in-service type training and partial VM.

DiGennaro-Reed et al. (2010) examined the effects of VM on the implementation of behavioral interventions using a multiple baseline design with three teachers. During VM, the treatment integrity increased above baseline levels, while teacher performance
remained variable. The addition of the verbal performance feedback (VPF) component increased each participant's treatment integrity to 100%, and the teachers maintained performance at follow up one week later. DiGenarro-Reed et al. concluded that when assessing for social validity, teachers found the video modeling to be more socially acceptable with performance feedback than when used alone; but they rated both positively, which indicated that components of VM may need to include feedback on performance.

**Performance feedback.** Researchers widely agree that performance feedback is a critical component of effective coaching or supervision (Causton-Theoharis, Dyer, Williams, & Luce, 1991; Fixsen et al., 2005; Giangreco & Doyle, 2004; Giangreco, Doyle, & Vadasy, 2007; Hall et al., 2010). The term *feedback* refers to information transmitted back to the responder following a particular performance (Sulzer-Arazoff & Mayer, 1991). Performance feedback involves the observation of target behavior and the subsequent response to or evaluation of the target behavior (Noell et al., 2005).

Several researchers have documented the benefits of using performance feedback (Coddington, Feinberg, Dunn & Pace, 2005; Coddington, Livanis, Pace, & Vaca, 2008; DiGennaro, Martens, Kleinmann, 2007; DiGennaro, Martens & McIntyre, 2005; Downs et al., 2008; Hagermoser Sanetti, Luiselli, & Handler, 2007; Noell et al., 2005; van Oorsouw et al., 2009). DiGennaro et al., for example, reported that the addition of a performance feedback component to VM produced even greater implementation fidelity than VM alone. Hagermoser Sanetti et al. (2007) found that performance feedback was most effective when it included both visual and verbal elements.
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Research indicates that while traditional training packages initially may result in high levels of fidelity, this result may be temporary because of procedural drift. Many studies have shown that treatment fidelity tends to deteriorate over time, and one way to control for this deterioration is the use of performance feedback (Hagermoser Sanetti et al., 2007; Noell, Duhon, Gatti, & Connell, 2002). Although Hagermoser Sanetti and colleagues reported that teachers began implementing interventions with a high degree of fidelity after participating in PD training, the researchers found that reported fidelity levels soon deteriorated over time. However, when the teachers received feedback about their performance, their fidelity of implementation improved.

Van Oorsouw and colleagues (2009) conducted a meta-analysis of components associated with PD effectiveness. According to the researchers, programs that included verbal performance feedback were more effective than PD programs without verbal performance feedback, and programs that incorporated different types of performance feedback (e.g., praise and corrective feedback) were more effective than programs with just one type of feedback (praise or corrective feedback only; van Oorsouw et al., 2009). The researchers also concluded that VPF might be one of the most effective types of feedback; however, effectiveness did not increase when the researchers combined verbal feedback with other types of feedback styles. They concluded that a combination of on-the-job coaching with feedback and in-service PD was necessary for staff members learning skills to impact outcomes of client behavior (van Oorsauw et al., 2009).

Lerman, et al. (2004) examined the effects of a one-week training workshop followed by a period of performance feedback on four special education teachers. The
research participants displayed generalization by demonstrating their newly acquired skills with high fidelity when conducting preference assessments in public school classrooms. The teachers correctly implemented 80% of the direct teaching steps for DTT instruction when feedback was absent in the classroom. These researchers recommended that PD modules designed to impart direct teaching techniques include competency-based instruction combined with on-site follow-up and feedback (Lerman et al., 2004).

Hall, et al. (2010) evaluated the effects of a one-day workshop for six teachers and their supervising teachers that included didactic content on behavioral strategies. Using a multiple baseline design across settings, they trained the teachers on the effective implementation of strategies of using PRT. During the workshop, Hall et al. instructed research participants on the use of modeling, role-play, behavioral rehearsal, and the effective use of PRT strategies. The researchers provided VPF to participants to increase the fidelity of the use of the strategies when working with ASD students. Social validity survey results indicated that all teachers agreed or strongly agreed that feedback from their supervising teacher was valuable. This study demonstrated that performance feedback and/or coaching provided by supervising special education teacher increased the skill sets of teachers who employed behavioral strategies with young children with ASD.

Mannie (2000) suggested that feedback provided three paramount functions in PD. First, it offers an opportunity to praise the learner. Second, it informs the learner
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about changes he or she needs to make during future performances. Third, it motivates the learner to improve her future performance within the job itself (Mannie, 2000).

**Self-monitoring.** Researchers have demonstrated that self-monitoring helps to improve the accuracy with which direct service providers implement daily procedures (Seligson-Petscher & Bailey, 2006). For example, many providers frequently employ checklists as a covert way to monitor their behavior and treatment fidelity. As Wolff, Taylor, and McCabe (2004) noted, research has led to the use of reminders and checklists to increase staff compliance and adherence to evidence-based guidelines in service delivery fields. A checklist is typically a list of action items or criteria arranged in a systematic manner that allows the user to record the presence or the absence of the items or target behaviors. Such checklists have proven effective in increasing fidelity of implementation and helpful in decreasing errors (Bacon, Fulton, & Malott, 1983; Hales & Provonost, 2006; Nabeyama & Sturmey, 2010).

Seligson-Petscher and Bailey (2006) examined the effects of self-monitoring checklists on the implementation of a behavior intervention plan by instructional assistants, and found initial increases in procedural integrity. Experimenters provided performance feedback throughout, controlling for the self-monitoring checklist on procedural integrity. Results indicated that the self-monitoring component was likely responsible for both the improvement in and the maintenance of correct responding in the assistants.

Plavnic, Ferreri, and Maupin (2010) studied the effects of self-monitoring checklists on the integrity of a token economy implementation by early childhood
special education staff. The researchers also examined student outcomes, and specifically explored the intervals in which they engaged in academic readiness behaviors. This research demonstrated the efficacy of self-monitoring checklists in supporting fidelity of intervention implementation. Academic readiness behaviors following the introduction of the token economy implementation also increased as a result in this study.

**Coaching.** Behavioral coaching takes place when all training occurs in-vivo or on the job. Coaching increases the likelihood that the target skill will generalize to client work sessions (Parsons et al., 2012). During coaching, trainees apply the target skills in the workplace, and the trainers give supportive and corrective feedback. Observations and coaching sessions should continue until the trainee performs the target skill proficiently and competently (Parsons et al., 2012). Coaching is a pivotal component that Joyce and Showers (2002) highlighted as the most essential component of PD. If the added coaching component takes place on the job within an applied setting, trainees may go through the initial steps of a PD through video or visual media (Macurik et al., 2008), as with OTV.

**OTV.** OTV are interactive computer training, e-learning, or computer-based instruction programs that present training material via a computer or online web-based Internet site. OTV also requires that the learner interact with the system to answer questions about the material or engage in some activity related to the information provided (Williams & Zahad, 1996).
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Many fields have faced a similar need-service discrepancy, and have paved the way for use of OTVs to expand the availability of crucial services to those groups with the greatest need (United States Department of Education, 2010). Benson (2004) argued that online OTV could be a valuable tool in efforts to provide benefits for ongoing teacher development opportunities that begin to address the shortage of trained teachers in the field of special education.

_Benefits of OTV_. Like VM, OTV provides the learner with video descriptions and visual examples of demonstrations of target skills. According to researchers, the benefits of OTV include increased accessibility to private, self-paced instruction and increased efficiency and cost-effectiveness (Benson, 2004; Blanchard & Thacker, 2004; Ruiz, Mintzer, & Leipzig, 2006). Ruiz et al. also noted that OTV provides learner-centered and active responding activities, and presents a cost-effective, easily accessible and measurable means of providing PD. The flexibility of OTV can also offer a solution to staffing problems, PD access, time constraints, learning delivery, content updating, personalized instruction, accountability, consistency of content presentation, and training fidelity (Benson, 2004). Researchers found that other benefits of OTV included standardization of content, accountability to monitor learner progress, and completion of training on a moment-by-moment basis (Benson, 2004; Ruiz et al., 2006). To complement the standardization of content, PD professionals can break down large amounts of material into smaller modules within the OTV vehicle (Benson, 2004; Ruiz et al., 2006), which may provide additional merit for satisfaction and aid in social validity and acceptability.
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OTV users have demonstrated increased retention rates; better utilization of content; and more significant acquisition of knowledge, skills, and attitudes, and added a social validity component by reporting satisfaction with OTV methodologies (Benson, 2004; Ruiz et al., 2006). OTV can include outcome assessments to help determine whether practical knowledge and learning and generalization have occurred. This benchmark is a significant potential outcome for schools to strive for that have not previously measured PD impact on student achievement.

Disadvantages of OTV. Primary disadvantages of OTV include the initial expense and up-front time required to develop OTV materials for PD (Blanchard & Thacker, 2004). Consequently, the content must remain consistent and used widely enough for OTV to be a cost-effective PD method. Another potential disadvantage to OTV is that the responses required within the training platform (e.g., answering multiple choice questions) may not be similar to the responses required during implementation of the actual procedure; and trainers must consider challenges with navigation, multimedia use, and appropriate interactivity for the learner needs (Ruiz et al., 2006). Using of multiple exemplars and adding VM would be one way to address and control for this concern and possible limitation.

OTV studies. OTV that include VM as a demonstration component have received increased attention for their use in PD opportunities, and researchers have reported successful and meaningful outcomes in recent years (Catania et al., 2009; Collins et al., 2009; Macurik et al., 2008; Moore & Fisher, 2007; Parsons et al., 2012). OTV can also serve as vehicles for self-paced education with improved learning when paired with
interactivity. Interactivity, or interacting with the learning environment, is important because learners retain 10% of what they read, 30% of what they see, 50% of what they see and hear, and 90% of what they act on or interact with (Benson, 2004). These findings provide unequivocal support for use of OTV technologies in PD in order to provide more efficient and as effective means of PD for educators.

Zhang, Zhou, Briggs, and Nunamaker (2006) explored the effectiveness of using video, no video, or interactive video within online instruction. These researchers studied the influence of interactive video on learning outcomes and learner satisfaction in e-learning environments. The researchers selected a participant sample of undergraduate students with no prior e-learning experience. Zhang et al. chose a topic that the students were interested in learning about because it was part of the course syllabus. Results indicated that the value of using video for online instruction was contingent upon whether interactivity was present. Students in the OTV environment who received instruction via the interactive video module demonstrated better learning performance and reported more satisfaction than participants who did not receive instruction using interactive video.

Macurik and colleagues (2008) utilized BST components along with OTV. These researchers employed a DVD that demonstrated the target skills of most-to-least intrusive prompting and signing skills and provided video modeling of individuals implementing the treatment plans for challenging behaviors. Macurik et al. found that the use of the DVD required less trainer time up front, which increased efficiency, guaranteed that the training content remained consistent across trainees, and
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS accommodated the work schedules of the staff. The researchers implemented the BST components of training during the staff’s work sessions with clients. Participants reported the both applications of the training program to be acceptable, indicating social validity.

Granpeesheh, Tarbox, Dixon, Peters, Thompson, and Kenzer (2009) examined the use of an OTV tool during the instruction of ABA interventions for children with autism with a group of newly hired service providers. The researchers compared the performance of participants who received OTV training to that of a group who received traditional in-service training on the same content and concepts. The results demonstrated that core knowledge of ABA principles and procedures increased substantially for both groups, and suggested that OTV training produced similar results during the instruction of foundational concepts and knowledge, such as ABA. This study failed to evaluate the application of the learned skills in the trainees work settings with children. The researchers also did not investigate whether OTV affected the quality of the clinicians’ implementation of the principles when teaching students in a classroom, nor did it address generalization or maintenance of the acquired skills. Ultimately, however, this inquiry proved to be a landmark study for OTV that paved the way in the field of ABA and OTV, and serves as a good initial evaluation of OTV in the field of ABA.

In 2010, the United States Department of Education’s Office of Planning, Evaluation, and Policy Development (OPEPD) conducted and completed a Meta-Analysis and Review of Online Learning Studies called The Evaluation of Evidence-
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Based Practices in Online Learning. This report identified thousands of empirical studies published since 2004 with positive outcomes associated with the use of OTV. This important meta-analysis focused on 50 studies that compared OTV to face-to-face learning situations, with elements such as video, online quizzes, assigned groups or guidance for online activities. The number of participants in the included studies ranged from 16 to 1,857, and most of the investigations learner participants ranged in age from 13 to 44 years.

Nearly all of these studies involved formal instruction, with the most common subject matter being medicine or healthcare. Additional fields also included education. The meta-analysis suggested that blended and purely online learning conditions generally result in similar student learning outcomes. Only 19 of 46 studies indicated the length of instructional training, and involved instructional time frames of less than a month. The remaining 27 inquiries involved longer periods of time. OTV users typically had multiple opportunities to practice skills or assess their knowledge. Opportunities for learners to receive feedback were less common. On average, educators who participated in classes with online learning components (taught completely online or blended) experienced better student learning outcomes than teachers in courses that solely used in-service (face-to-face) instructional training (United States Department of Education, 2010). The examination of these studies provides additional support for the uses of strategies that have proven effective and efficient in efforts to improve the implementation of school-based interventions like teaching mand training procedures to SWA.
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PD that includes OTV technology offers a shiny new vehicle for delivering training to teachers. OTV is based on adult learning theory, which suggests that adults learn best by relating new learning to past experiences, linking learning to specific needs, and practically applying learning (Ruiz et al., 2006). OTV has the potential to shift the traditional PD format from a passive, teacher-centered model to an active, learner-centered format (Ruiz et al., 2006) when used in conjunction with EBPs. OTV appears to be a viable and less resource intensive training modality worthy of future investigation.

Multicomponent training packages. Of late, researchers in the field of special education and ABA have placed an increased focus on exploring multicomponent training packages, or training programs that include more than one type of training method. These training packages allow the researcher to take advantage of the many different types of instructional methods and provide more comprehensive PD programs. Witt, Martens, and Elliott (1984) found that when evaluating the acceptability of school-based interventions, teachers preferred techniques that required less time to implement. Research on PD has demonstrated that time is an important commodity for teachers and staff (Parsons et al., 2012), and indicates that educators may be motivated to engage in behaviors that will save them time on the job (DiGennaro-Reed et al., 2005). Thus, it is important to determine which components of a training package have efficient timesaving components, and produce the best “bang for the buck.”

Iwata et al. (2000) evaluated the effectiveness of a two-hour training protocol, which included lecture (didactic), readings, and video instruction, with 11 undergraduate
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psychology students who were implementing functional analyses as coursework assignments. The training consisted of reading additional materials, watching a video model of a situation demonstrating correct implementation, passing a written quiz, and receiving verbal feedback on performance during sessions. The results indicated that these students with little clinical experience could learn the procedures in environments that simulated actual conditions with peers who were simulating the roles of "clients" who engaged in self-injurious and aggressive behaviors; however, the researchers did not record any measures of application outcomes or measures of fidelity with actual individuals whom engaged in these behaviors in-vivo.

Lavie and Sturmey (2002) trained assistant teachers to perform paired-stimulus preference assessments using a seven-step procedure (Reid & Parsons, 1995) including, brief instruction, a checklist, verbal description, a video model, and rehearsal with verbal feedback to mastery criterion. The study replicated and extending Iwata et al.’s (2000) research by demonstrating that staff could learn to conduct preference assessments in approximately 80 minutes with fidelity.

In a similar study, Moore et al. (2002) replicated and extended Iwata et al.’s (2000) work. Moore et al. utilized performance feedback, combined with written scripts, verbal performance feedback, rehearsal, and modeling, to train teachers to conduct functional analyses (FA). Three teachers with limited or modest prior experience with ABA procedures and three students participated in this study. The researchers examined the percentage of correct teacher responses the teachers offered after taking part in training on conducting FAs. The results suggested that with this type of training,
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teachers could learn to implement FA conditions accurately. These results extended
Iwata et al.’s findings by utilizing the classroom setting with three students and teachers.
Researchers like Lavie and Sturmey, as well as several others, have suggested that future
research should continue to evaluate rapid methods of staff instruction, to include
training teachers to implement procedures that can improve student achievement if
implemented with adequate levels of treatment fidelity.

LeBlanc et al. (2005) extended Lavie and Sturmey (2002) and utilized a
treatment package to teach discrete-trial teaching skills to three teachers. The
abbreviated training included a verbal review of a skills checklist and performance
feedback based on 10 skills related to discrete trial instruction after skill demonstration.
These researchers measured percentage of discrete trial skills implemented correctly.
This component combination resulted in quick skill acquisition and maintenance of
target skills with somewhat high fidelity during follow-up assessments for up to 11
weeks post-training.

Treatment Integrity

To make valid conclusions about the effectiveness of an educational or
behavioral intervention, it is essential to evaluate both outcomes and treatment integrity
(Hagermoser Sanetti et al., 2007). Treatment fidelity or integrity refers to the extent to
which teachers implement school-based interventions consistently and accurately
(Gresham et al., 2000; Noell et al., 2002).

Treatment integrity directly influences experimental validity of any study. The
goal of any research design is to control and measure the effects of independent
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variables on dependent variables. Failure to measure treatment integrity accuracy in implementation of the independent variable greatly jeopardizes experimental validity and poses threats to inferences made in treatment outcomes (Hagermoser Sanetti & DiGennaro Reed, 2012).

To obtain data on treatment integrity, researchers historically have observed teachers during their implementation of the intervention during instructional activities and measured the percentage of treatment steps implemented correctly (e.g., DiGennaro et al., 2005; DiGennaro-Reed, et al., 2007; DiGenarro-Reed, et al., 2010; DiGenarro-Reed et al., 2011; McIntyre, Gresham, DiGennaro & Reed, 2007; Wickstrom, Jones, LaFleur, & Witt, 1998).

DiGennaro et al. (2011), DiGenarro et al. (2007), DiGenarro et al. (2005) and DiGennaro-Reed et al. (2010), found a relationship between student outcome gains and treatment integrity levels. These studies are unique in that they examined the effects of both educator and student gains/outcomes for an intervention conducted on public school campuses. The results of these studies suggest that a functional relationship exists between treatment integrity and student outcomes in some studies (DiGenarro et al., 2011). "Only when effective practices are fully implemented should we expect positive outcomes. Implementation matters” (Blase & Fixsen, 2005, p. 10).

Social Validity and Maintenance in PD Training Programs

Outcome measures for both teachers who participate in PD, as well as the students that they teach, are not common practice in education. A design that addresses both student and teacher outcomes of PD contributes to the field in a plethora of ways.
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Social validity measures offer valuable information to help researchers validate the effectiveness and acceptability of an intervention from its constituents. These measures, when added to the dependent variable measures, provide quantifiable indications of efficacy establish functional relationships that assist in determining external validity of any treatment package (Hagermoser Sanetti & DiGennaro Reed, 2012).

Maintenance of skills may be the ultimate indicator of social validity for teacher PD, because maintenance of target skills indicates that the merits of the training persisted over time and likely resulted in improvements in students' target behavior. According to Kennedy (2002), the maintenance of behavior change is more an indicator of social validity than subjective perceptions of experimental outcomes usually obtained via social validity questionnaires.

Social validity. One important feature of social validity is the social importance of behavioral treatment effects (Wolf, 1978) or content assessment (Kennedy, 2002). Most program or intervention feedback evaluations consist of questionnaires, structured and unstructured interviews, and direct observations (Kennedy, 2002). Combining questionnaires and opened-ended interviews to determine social validity concerns is valuable to researchers, particularly those in education and PD fields (Kennedy, 2002). This type of social validity measure also contributes to learning whether the program was socially appropriate (in terms of ethics, cost, and functionality) and acceptable to the trainees or teachers (Schwartz & Baer, 1991; Wolf, 1978).
Maintenance. Maintenance of behavior change has served as an important focus of ABA for many decades (Kennedy, 2002). Kennedy defined maintenance of behavior change as the continuing durability in levels of behavior once the subject has achieved the operational goals, procedures, and outcomes of an experiment (p. 595). Evaluating the endurance effects of the intervention has become a standard process within applied interventions (Kennedy, 2002) and assists in establishing external validity.

When considering training effectiveness, researchers have also considered the trainees’ ability to demonstrate competence sometime long after the conclusion of training. Lack of maintenance is a concern that stems from ineffective training programs (Fleming & Sulzer-Arazoff, 1989). According to Fleming and Sulzer-Arazoff, supervisory feedback following staff training is an important variable in maintaining staff performance.

Design and Measurement

According to Cooper, Heron, and Heward (2007), Baer, et al. first described the multiple baseline design in 1968. The multiple baseline design is most functional when reversal or withdrawal of the treatment is impossible, unethical, inappropriate, or not indicated (Baer et al., 1968). The multiple baseline design (a single subject design) proved useful for the present study because it utilizes experimental control procedures among individuals, not groups, and is preferable when a thorough analysis of a procedure or several procedures is necessary. The main objective of this type of quantitative design is to control external variables so the researcher can assess the functional relationship between the independent and the dependent variables. As Cooper
et al. explained, a research design gains validity when it is replicable; and the multiple baseline addresses the issue of generalizability within single-subject design.

**Single-subject design.** Researchers have determined that well-conducted, single-subject research adequately addressed confounding issues of reliability, as well as internal and external validity (Barger-Anderson, Domaracki, Kearney-Vakulick, & Kubina, 2004; Cooper et al., 2007; Kazdin, 2010; Kennedy, 2002). A study demonstrates internal validity if the researcher can directly attribute changes in the dependent variable(s) to the manipulation of the independent variable(s) (Kazdin, 1982, 2010). If there are no significant student behavior changes and treatment integrity is not assessed, then the causal relationship may be compromised making it dangerous to draw conclusions whether the program was an ineffective program or it was just implemented with low levels of treatment integrity (Hagermoser Sanetti & DiGenarro Reed, 2012).

External validity refers to the extent to which the results of an investigation can be generalized or extended beyond the conditions within the experiment, such as with other students, teachers, and settings (Kazdin, 1982, 2010). This importance lies in the crux that poorly defined, described or implemented interventions make it nearly impossible to replicate, evaluate or generalize the results reported (Hagermoser Sanetti & DiGenarro Reed, 2012). Barger-Anderson et al. (2004) suggested that a researcher could demonstrate external validity in single subject research by (a) providing adequate details about the study, (b) documenting treatment integrity, and (c) recording intra-observer agreement on the variables. These criteria facilitate the replication of the study by other researchers in the future, which results in overall external validity.
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After reviewing the literature, it is clear that the field requires more research in many areas related to both autism and training opportunities for teachers of SWA. Single-subject design is the most commonly used model in the field of ABA, and it utilizes experimental control procedures within individuals, not groups. Researchers typically prefer to use single subject design with inquiries that require a thorough analysis of a procedure or several procedures. The researcher’s main goal when using this type of quantitative design is to control external factors to facilitate the accurate assessment of the functional relationship between the independent and the dependent variable. Additionally, as Cooper et al. (2007) noted, replicating the procedure across individuals adds much-needed strength to the study.

Component Analyses

Research has demonstrated the effectiveness of procedural checklists, verbal performance feedback, coaching, and modeling as interventions that improve fidelity when implementing teaching procedures (DiGennaro-Reed et al., 2007; Moore et al., 2002; Sturmey, 1998) for educators and staff. Further research is necessary, however, to identify which of these strategies is the most powerful and vigorous component in improving fidelity and impacting student outcomes.

A component analysis refers to a comparative assessment of two or more independent variables comprising a treatment package (Baer et al., 1968; Cooper et al., 2007; Ward-Horner & Sturmey, 2010). Cooper et al. (2007) defined component analysis as "any experiment designed to identify the active elements of a treatment condition, the relative contributions of different variables in a treatment package, and/or the necessary
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and sufficient components of an intervention” (p. 692). Researchers use component analyses to identify the most robust components of a treatment package that are responsible for behavior change and the results of component analyses may lead to improvements in the efficiency and social validity of the specific behavioral treatment by identifying ineffective, unnecessary, and effortful components (Ward-Horner & Sturmey, 2010). If parents, teachers, and staff can learn the key elements of an intervention, better generalization and maintenance may occur, and they may experience a time/cost savings benefit (Ward-Horner & Sturmey, 2010).

Kazdin (2010) suggested two designs for conducting a component analysis: dismantling and constructive. The dismantling strategy begins with the full packaged program. Once the researcher establishes and demonstrates the effectiveness of the intervention, he removes the components in subsequent intervention phases. The researcher then compares the phases to one another to evaluate each individual contribution of the intervention package components (Kazdin, 2010). The dismantling strategy also refers to a dropout design where a component is removed and the results no longer indicate an effective outcome (Ward-Horner & Sturmey, 2010).

The constructive strategy or additive strategy involves a comparison of the full program, or a reduced version of the program, to a version of the program that has an additional component(s) (Kazdin, 2010). The add-in approach allows for assessment of the individual effects of each component, prior to the combination of all components of the package (Ward-Horner & Sturmey, 2010). The benefit of this additive strategy is the researcher’s ability to examine both the efficacy of the components added to the core
intervention already in effect and the rates or levels of change for each element and avoid behavioral effects related to combining components in the drop-out or dismantling design (Ward-Horner & Sturmey, 2010). This design also allows the researcher to begin with the least intrusive variables or components, and add in additional components over time. The additive sequence also may appeal to researchers because it helps them pinpoint the interventions that require less effort and cost, while resulting in optimal and acceptable outcomes (Hanley, Iwata, Thompson, & Lindberg, 2000). Disadvantages include limitations on determining differences of the sequences of added components (Ward-Horner & Sturmey, 2010).

If the researcher adds a component to the base intervention (additive effect), will the component produce changes whether or not the previous component did so? Does each sum of the component added to the base intervention produce changes that are significant for the teacher and/or the student participants? For the purposes of this study, the researcher selected a constructive or additive strategy to analyze the benefits of adding elements to the base intervention of OTV. A dismantling strategy would not have been appropriate, as there would have been no way remove the acquisition of content knowledge and application experience from the base intervention of the OTV; thus the behavior would not be reversible in this situation (Ward-Horner & Sturmey, 2010). Another possible limitation is that the researcher cannot evaluate sequence effects unless he introduces components in a different order for some participants (Ward-Horner & Sturmey, 2010).
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Allen and Warzak (2000) described component analyses as a "stable of good clinical research" (p. 381), and suggested that they may be responsible elements in improving acquisition of new skills as well as treatment integrity.

Summary

Appropriate training in EBPs for early interventionists is not an optional activity for agency and school leaders to consider; it is a mandate of IDEIA. OTV is a viable component of PD for EI and special education organizations facing budget constraints and challenges with meeting IDEIA requirements for training their staff and teachers in EBP interventions for SWA. Educators and administrators must meet the challenge limited effective intervention options, and must seek to develop ways to train teachers and implement these types of interventions effectively in schools (Sugai et al., 2000), as efficacy and implementation are equal ingredients for a significant impact (Cook & Odom, 2013) in special education today.

The current study expanded knowledge of training early interventionists to deliver mand training to SWA. This inquiry utilized a constructive or additive component analysis to examine multi-component PD training program that included OTV, VPF, and CM components. The researcher examined teacher competence or fidelity in mand training procedures across components, outcomes of PD as evidenced by mand frequency for SWA across components, and teacher and parent satisfaction regarding this PD package to assist in offering social validity.
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CHAPTER 3: METHODS

McCulloch (2011) first investigated the use of OTV and a checklist to evaluate the self-monitoring of mand steps (treatment integrity) by paraprofessionals supporting SWA. McCulloch utilized a multiple baseline across participants to evaluate the impact of OTV on paraprofessionals working in a public school special education setting. These researchers found that after receiving only OTV, the percentage of correct implementation of mand steps increased for all paraprofessionals, and they observed and recorded a maintenance effect over time. The researchers also identified a relationship between increases in paraprofessional fidelity and increases in rates of spontaneous manding by the students, demonstrating functional control and demonstrating experimental validity. The present study extends McCulloch's work by employing the multiple baseline design and adding components of feedback and coaching to the base OTV intervention. In addition, this present study investigated the use of OTV with EI teachers and toddlers, while assessing for treatment integrity of mand step implementation, across additional components of PD (feedback and coaching/modeling) and assessing the relationship of outcome of PD for teachers on the students they support as measured by changes in student manding behaviors.

This inquiry investigated a multi-component training package designed to teach EI staff to use mand training with SWA. I addressed the following questions:

1. Will a multi-component training package that includes OTV, verbal feedback, and coaching/modeling be effective in instructing teachers about how to implement mand training procedures to SWA?
2. Which components of the training package are most effective in producing skill acquisition among the teachers and SWA?

3. What effect do the OTV videos alone have on the SWA whom the teachers support?

This chapter details the research methods utilized in this study, and is organized into three sections: (a) participants; (b) settings; (c) research design; (d) materials; (e) data collection; (f) and procedures, including a full description of independent and dependent variables; and (g) data analysis.

**Participants**

The teacher participants in this study worked at an EI agency where the student participants received services mandated under Part C of IDEIA. The program manager of the agency distributed consent forms to each teacher participant and returned them to me (see Appendix A). Parents signed consent forms on behalf of their minor children (see Appendix B). Teachers delivered the students’ signed consent forms by hand to the investigator.

**Teacher participants.** The agency’s program manager selected three teachers to participate in this study (see Appendix C for demographics). All teacher participants were females of Asian-American ancestry: Haunani was 35 years old, Chieko was 37 years old, and Sara was 55 years old. Chieko and Sara held master's degrees in special education, while Haunani possessed a master's degree in speech pathology. These three educators averaged of 11 hours of previous training specifically aimed at teaching SWA
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communication skills. The three educators also averaged of eight years of experience teaching SWA between them.

The teachers each completed self-reported ratings (see Appendix D) about their experience in the teaching profession prior to receiving PD in this research study. The ratings ranged from 1-5, and each rating held the following categorizations:

- Rating 1: "Novice, I need to learn a lot."
- Rating 2: "I have had some training, but could always learn more."
- Rating 3: "Intermediate learner, I feel I am doing well."
- Rating 4: "I have pretty much seen it all, and I don't think I can learn that much more."
- Rating 5: "Expert therapist, not much more to learn."

The investigator explained to the teachers that the study would investigate ways to help them implement IFSP goals more effectively with their students. All data collection involving the Baseline, OTV, feedback, and CM occurred in either the EI setting or the student-participant's home.

**Student participants.** All student participants had received a clinical ASD diagnosis or a psychologist suspected the disorder based on behavioral observations of the child participant. The agency’s EI psychologist evaluated the children suspected of having ASD, but had not given them a formal diagnosis at the time of the study. Additional criteria for the participant selection process for students included the following:
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

1. the student needed to be enrolled in an EI program under Part C of IDEIA (aged 0-3 years old);
2. the student needed to possess a vocal echoic repertoire, as reported by the program manager; and
3. the student needed to possess IFSP goals related to manding/requesting within the communication domain.

The program director chose these participant dyads (teacher and student pairs) based upon these criteria. Appendix E lists the demographic information for all student participants. Two student participants were male, and one was female. Buddy was the youngest participant at 1 year 11 months old. Braddah and KayCee were both 2 years 5 months at the start of Baseline conditions. All of the students lived in homes where English was the primary language. The students’ IQs ranged from 81-94, as measured by the Battelle Developmental Inventory, 2nd Edition (BDI-2). Appendix E also includes BDI-2 test results for the student participants.

**Braddah.** Braddah received a standard score of 94 on the BDI-2, and demonstrated emerging language skills. His interventionists noted that his tact repertoire was stronger than his mand repertoire, which was developing slowly. They also stated that Braddah separated easily from his mother, followed routines at day care, enjoyed the company of other children, and imitated the play of peers. The interventionists also reported that Braddah seemed to be developing appropriate adaptive/self-help behavior for his age.
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

**Buddy.** Buddy earned a standard score of 70 on the BDI-2, and demonstrated emerging echoic skills and imitation of simple words. According to interventionists, although Buddy had demonstrated emotions and was beginning to show affection, he was unable to respond to back-and-forth play with others. Interventionists categorized Buddy's eating skills as delayed because he continued to drink from a bottle and eat mostly mashed food using his tongue instead of chewing it.

**KayCee.** KayCee received a standard score of 81 on the BDI-2. Interventionists noted that she could point to family members when named, follow instructions as a listener, use signs to request, and tact objects in the environment. They also reported that she responded positively to praise and enjoyed story time. KayCee's parent noted that she needed help with dressing routines.

**Dyad assignments.** I established teacher-student dyads based upon the current agency case assignments as determined by the program manager. Each teacher participant had a caseload assigned by the EI agency, and I only included student participants in the caseloads of the teachers willing to participate in the study. Assigned dyads were as follows, with teacher name followed by student name: Dyad 1 – Sara and Braddah; Dyad 2 – Chieko and KayCee; Dyad 3 – Haunani and Buddy.

**Settings**

The study took place at an EI agency on the island of Oahu that provided services to SWA between the ages of 0 and 3 years old as mandated by Part C of the IDEIA. OTV training for teachers occurred at the EI agency site, and each teacher completed the training at self-selected times on personally-assigned computers with Internet access.
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

Teacher participants completed training independently of each other, within their individual workspaces at the agency. They used headphones when necessary. Remaining interventions took place in each SWA’s home, at the EI agency, or at a community park. I chose this agency because they reported an interest in obtaining training for their interventionists. I chose these natural settings based on report by interventionists as recommended environments for the student participants.

Research Design

I utilized a multiple baseline design to examine the effects of this OTV mand-training package for early interventionists across three teacher-student dyads with the conditions of A - B - (B+C) - (B+C+D). The conditions were as follows:

1. Baseline
2. OTV
3. OTV + feedback
4. OTV + feedback + CM.
5. Follow-Up

Materials

Materials for this study included OTV, a data collection sheet (see Figure 1) for teacher mand step fidelity and both spontaneous and prompted student mands. A social validity questionnaire was created for teacher participants (see Appendix D) and parents of student participants (see Appendix F). A set of evaluation tools in addition to the four-step mand procedure to assist in determining appropriate feedback for delivery to interventionists in Feedback and CM phases (see Appendix G) were also developed.
**Treatment Integrity Data: Mand Training Procedures**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Paraprofessional</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sanitize Environment (SE)</td>
<td>+ -</td>
<td></td>
</tr>
<tr>
<td>2. Verify MO (ensure learner has MO by assessing for EC, reach, or point)</td>
<td>+ - na</td>
<td></td>
</tr>
<tr>
<td>3. Prompt Mand (P) (effectively prompted and child responded to prompt)</td>
<td>+ - na</td>
<td>S P</td>
</tr>
<tr>
<td>4. Reinforce Mand by Delivering SR+ or SR- within 3 seconds of child response</td>
<td>+ -</td>
<td>Vocal Mand = Sign mand =</td>
</tr>
</tbody>
</table>

**Mand Trial # ____**

<table>
<thead>
<tr>
<th>Procedure</th>
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<th>Student</th>
</tr>
</thead>
<tbody>
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<td></td>
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<tr>
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</tr>
</tbody>
</table>

**Figure 1.** This trial-by-trial data sheet illustrates the format used to record collected on teacher fidelity of mand steps, as well as subsequent student responses in the form of a prompted or spontaneous mand.
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

**OTV.** The teachers utilized computers at their workplace to access and view *The Autism Training Solutions (ATS)* OTV program. Each video began with an 18-19 item pre-test to assess their baseline knowledge of the content and concepts (see Appendices H and I). Each OTV included content divided into modules of five to six minutes in length, and presented the information using voice-over descriptions of all learning objectives, text-overs, and video modeling of the key concepts. The modules presented textual information with vocal narration on the manding procedures that included modeling to illustrate the concepts and some examples and non-examples of the procedures (see Appendix J for OTV screen shots).

Each lesson module contained intermittent competency checks on mand training procedures and verbal behavior concepts discussed in each module. The *Introduction to Verbal Behavior* video lasted one hour in duration, and contained 24 modules and competency checks, with 1-to-2-item multiple-choice questions within each competency check. The *Teaching to Request/Mand* video lasted two hours in duration, and contained 18 modules and competency checks, with 1-2 multiple-choice questions within each competency check. The *Teaching to Request/Mand* OTV provided modeling of each part of the four-step manding procedure. Participants had to achieve 100% accuracy on each competency check, or they had to repeat the OTV module and another subsequent competency check. At the end of each video (24 or 18 modules respectively), the participants completed an 18-19 item post-test. The competency checks and pre/post-tests contained a combination of multiple-choice questions about the factual knowledge conveyed during the OTV and the application of that knowledge (see Appendices A and
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

B). The post-test for both the Introduction to Verbal Behavior OTV, and the Teaching to Request/Mand OTV contained the same questions as the respective pre-tests. The teachers had to achieve a score of 88% to complete each OTV; otherwise, they received a prompt to review the material again and complete the post-tests until they met the criterion. The teachers had three weeks to complete the two videos.

Objectives of the introduction to Verbal Behavior OTV were as follows (ATS, 2013):

1. understand the short history and background of Skinner’s Analysis of Verbal Behavior (1957);
2. understand the importance of teaching language based on its function versus form or grammatical structure;
3. identify the different verbal operants—the echoic, the mand, the tact, and the intraverbal—when presented with video illustrations; and
4. identify skills that support the acquisition of verbal behavior, such as listener responding, match to sample (MTS), and mimetic behavior (imitation).

Objectives of the Mand Training OTV were as follows (ATS, 2013):

1. define and identify the mand and understand the importance of increasing functional communication through mand training;
2. identify different types of mands;
3. identify ways to contrive and capture an MO to evoke additional mand training opportunities;
4. identify steps in teaching novel mands through mand training;
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

5. identify ways of recognizing motivating items and activities through preference assessments;
6. identify how to use prompting and prompt fading; and
7. understand how to reinforce and shape mands; and identify different topographies of verbal behavior in mand training, such as iconic communication or sign language.

**Social validity questionnaire.** Each of the teachers and parents received a social validity questionnaire about treatment acceptability (see Appendices F and G). The respondents completed the survey during the follow-up phase. The survey questions helped me determine the perceived value of the mand training for teachers, generalization of training received to other SWA they teach, and perceived outcomes for SWA. In addition, the teacher survey revealed data on the degree to which the respondents (a) valued the instruction each training component offered on teaching specific SWA how to request items, and (b) felt that each specific step was adequate or necessary to teach their SWA to mand.

The survey for parents provided information about whether parents perceived increases in participating students’ requesting and echoing behaviors. The survey also collected information about whether the parents felt they were able to learn techniques from the teacher that enabled them to help their child request or mand more at home.

**Data collection sheets.** I used data collection sheets to compile data on the teacher participants’ fidelity of implementation of mand steps. These sheets were used to
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

record spontaneous or prompted mands by student participants, and whether vocal or sign was observed during each trial for one participant (KayCee).

**Evaluation tools for feedback.** Initially, I used the standard data sheet to collect data on correct implementation of mand steps by teacher participants. However, I later developed a more tool with more specificity in response to preliminary student spontaneous mand data. This subsequent evaluation tool measured more precisely the behaviors which would be helpful in evaluating mand training behavior of teachers.

**Dependent Measures**

The dependent measures for this study included (a) the percent of fidelity of implementation of mand steps by the teacher, (b) the number of prompted mands demonstrated by the student, and (c) the number of spontaneous mands demonstrated by the student. These dependent measures addressed the OTV’s effectiveness in increasing student manding, as well as the integrity with which teachers implemented the mand training. I observed teacher and student dyads during Baseline and Intervention conditions. As teacher-participants conducted mand training in individual sessions with their students, I recorded the number of observed mand training steps, as well as the spontaneous and prompted mands exhibited by each student-participant. I used an audible timer to measure each 15-min observation period, and recorded the manding procedure steps simultaneously with student mand data, with the exception of reliability sessions where data were scored post session via video review by both myself and the intra observer reliability scorer. Recorded data included four pivotal mand steps for the teacher participants:
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

1. *Sanitize environment:* The teachers controlled the reinforcers in a neat and clean working environment;

2. *Contrive and capture student MO:* The teachers showed items of interest that the student might want, and waited for the student to look, reach, or grab for the items to verify an MO;

3. *Prompt the mand:* The teacher effectively used a vocal verbal prompt (e.g., an echoic prompt); and

4. *Reinforce the mand:* The teacher delivered a student’s reinforcer within three seconds of the mand.

I circled “correct” (plus) on the scoring sheet if the teacher correctly demonstrated the requisite behaviors (mand training steps), and circled “incorrect” (minus) on the scoring sheet if the teacher did not demonstrate the required behavior or demonstrated it incorrectly (see Figure 1).

I also recorded the frequency of mands for each student participant by noting whether he or she emitted a prompted or a spontaneous mand in each trial (See Figure 1). I recorded a spontaneous mand if the student emitted a mand for an object or action without receiving an echoic prompt. The item could be present, and an intraverbal question could multiply control the mand (e.g., “What do you want?”). I recorded a prompted mand if the student manded for an object or action after receiving an echoic prompt (a model). The item could be present to score either for a prompted or spontaneous mand.
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

Procedures

The data collection procedures for this investigation took place during five primary phases: Baseline, OTV, feedback, CM, and finally Follow-Up. Data collection began with baseline, prior to completion of OTV training; and then once teachers completed the OTV, OTV data collection commenced. Feedback, CM, and Follow-Up began once data were stable for each prior phase.

Data collection. Following the completion of the OTV training, I collected data on the teachers’ implementation of the mand training and their student’s mand behaviors on a trial-by-trial recording sheet (see Figure 1). A timer with an audio cue aided me in recording up to four 15-min sessions per day. I also collected data in-vivo (in-situ) during each mand training session. A master's-level behavior analyst recorded interobserver reliability data by viewing video recordings of each session selected for reliability on the same data sheet I used for recording primary data. I obtained video for reliability by physically holding the camera or using a tripod focused on the teacher-student dyad activities. During Baseline and intervention phases, I recorded the number of each child participant’s prompted and spontaneous mands, along with the percent of mand step fidelity that the teacher delivered correctly.

Baseline. During Baseline, teachers received instruction to “do your best,” and "do what you normally do during your sessions with your student." When Baseline data were stable for teachers’ performance of mand training and student manding (prompted and spontaneous), the OTV intervention phase began. I staggered interventions across participants to demonstrate functional control of the variables.
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

**OTV.** I provided each participant with an opportunity to establish an individual profile account at the OTV website (www.AutismTrainingSolutions.com), and subsequently view and complete two OTVs (*Mand Training* and *Introduction to Verbal Behavior*). As described above in the Materials section, these videos contained visual models of target behaviors, text, narrative explanations, examples of concepts and principles used in mand training, and competency tests.

Each participant received a login account and instructions for completing the two OTVs. Teachers initially had three weeks to complete the two OTV modules. However, a time extension was necessary, as all teachers were unable to complete the training in the given three-week period. The director of the early intervention agency allowed the teachers to watch the instructional videos during the course of their normal workday. The teachers completed the three hours of OTVs within 13 weeks, and not within the three weeks initially instructed.

**Post OTV.** Upon completion of OTVs, I observed the teachers during 15-minute sessions with their SWA. The data collection process during these teacher-student dyads was the same as in Baseline for the remainder of the study.

**Feedback.** After the completion of each 15-min session, the Feedback condition commenced and lasted for five minutes. During the Feedback sessions, I followed a feedback protocol to assist in consistent delivery of feedback (Parsons & Reid, 1995) based on an evaluation of teacher competency in the delivery of mand training (see Appendix G). This protocol included the following components: (a) begin with a positive or empathetic statement, (b) identify skills performed correctly, (c) identify
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

skills performed incorrectly, (d) specify how to change/improve incorrect performance, (e) solicit questions, (f) describe next actions, and (f) end with a positive or empathetic statement. Feedback included this evaluation tool in addition to the four-step mand integrity data as follows:

1. teacher verifies child's MO before prompting (I observed the teacher acknowledging the child looking, reaching, grabbing for item of motivation);
2. teacher fades prompts to transfer stimulus control from prompted to independent response (I observed teacher using a time delay, as evidenced by not reinforcing first mand (extinction), and waiting up to 3-sec for a spontaneous mand response to occur, and then reinforcing that mand trial);
3. teacher uses word or phrase as prompt (I observed teacher offering the student one-word echoic prompt of the name of the item, and/or initial consonant sound of item followed by one-word echoic prompt of the item);
4. teacher utilizes procedures across a variety of motivational categories (I observed teacher contriving mands by using stimuli of interest across motivational categories (e.g., food, toys, books, physical activity); and
5. teacher targets specific mands (I observed teacher contriving and prompting mands that are directly specific to the reinforcer).

I delivered feedback to the teachers by providing constructive feedback and praise on the fidelity procedures on the datasheet (see Appendix G) that they demonstrated (e.g., "O.K., remember to verify that there is an MO before you prompt
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

him”; “Make sure to not ask questions that would result in him nodding his head, ‘yes’”; “Just wait for him to want it, then prompt if you need to.”).

Initially, during the first sessions of abbreviated feedback with Sara, I delivered feedback after the session and employed the four-step integrity results; however, the researcher observed that this form of feedback was not adequate to change the teacher participant behavior to result in increased spontaneous mands for student participants. As a result, I developed and implemented a performance evaluation (Appendix G) for feedback and CM phases that better met the teachers’ needs, and used the new tool to evaluate teacher mand integrity and determine the type of verbal feedback that was necessary. This tool was used as an evaluation of the observed behavior of the teacher. A + or - was scored and feedback about performance was written during the session. The feedback delivered to each teacher was based on this evaluative tool.

**CM.** Once data during the Feedback phase were stable for each of the participants, the CM phase commenced. I delivered CM feedback in-vivo during the session with the SWA, based on evaluations of teacher performance based on the same evaluation tool used in Feedback (see Appendix G) and using the same seven-step format for delivery of feedback for that 15-minute session. The verbal feedback delivered in vivo was identical to that given in the Feedback phase and consisted of praise for correct mand steps (e.g., "Very good, you made sure that he was looking at the car before you prompted him to say 'car.'"). When a teacher failed to implement a skill correctly, the feedback contained clarification and verbal direction about the observed
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

error (e.g., "Remember to wait for the child to look, reach, or grab for an item so you know he is motivated for it *BEFORE* you prompt him.").

During CM, I answered the teacher’s questions, and also provided coaching but did not model the correct implementation of skills during or after the sessions. Each CM implementation of modeling, which took place after the session ended, consisted of no more than five minutes of modeling and narrative feedback regarding the correct implementation of the specific constructive feedback delivered during the session. CM entailed the provision of feedback during each session that included modeling after each session as well as feedback delivered verbally based on an evaluation tool which provided additional feedback based on behaviors not accounted for on the four-step mand integrity datasheet (see Appendix G). The subsequent modeling component targeted mand teaching procedures to correct errors demonstrated by the teacher on this same evaluation tool.

Modeling in CM lasted for less than five minutes before each session, and I based the modeling on the teacher’s errors in the previous session. Teachers had the opportunity to observe several trials in which I was demonstrating, modeling, and narrating the mand fidelity steps of implementation.

**Follow-up.** Five weeks after termination of CM, I conducted three to four 15-min follow-up observations using procedures identical to Baseline conditions. The teachers did not receive feedback or CM during these probes.
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

Social Validity

I distributed social validity questionnaires to the participating teachers and the parents at the completion of the CM or during follow up (see Appendices F and G). These questionnaires provided information to assist in determining the extent to which training components were perceived as highly effective and valuable by the teacher, as well as determining the extent to which the parents perceived the mand training to be effective with their child.
CHAPTER 4: RESULTS

The results yielded mixed results in terms of frequency of student manding in relation to the fidelity of teacher mand steps. In addition, variable agreement between primary and secondary data collectors was obtained due to limitations listed in the discussion section of this paper.

**Inter-observer Agreement and Treatment Fidelity**

Inter-observer agreement (IOA) or inter-observer reliability refers to the extent to which observers agree in their scoring of the dependent variables (Kazdin, 1982). IOA is important to assess for in that it (a) ensures consistency of responding by the learner, (b) minimizes biases, (c) suggests whether or not the target behaviors are well defined (Kazdin, 1982). For teacher fidelity, I calculated the treatment integrity of mand step implementation by dividing the number of steps implemented correctly by the number of steps implemented incorrectly per observation session. I then converted the resulting number to a percentage and assessed the student mands for IOA. Spontaneous mands and prompted mands were calculated by determining if a match occurred between the primary observer and the secondary observers classification of the mand trial.

Two trained observers, both with master's degrees in education and board certification in behavior analysis (BCBA), collected IOA data on the participants’ accuracy for 33% of the sessions and on the number of (a) spontaneous mands or prompted mands by student participant (mand classification accuracy), (b) the teacher participant fidelity the four step procedure and (c) overall agreement (mand classification and teacher fidelity combined). I was the primary observer and collected...
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

data through direct observation. The reliability observer watched 33% of the total
sessions on videotape and collected data on student mands and teacher fidelity in the
same manner as the primary observer (see Table 4). Overall, IOA was 81.30% (range =
46%-100%) for Dyad 1 (Sara and Braddah), 88.58% (range = 62%-99%) for Dyad 2
(Chieko and KayCee), and 82.41% (range = 0%-100%) for Dyad 3 (Haunani and
Buddy). For mand step implementation, reliability was 84.84% (range = 52%-100%) for
Dyad 1 (Sara and Braddah), 86.08% (range = 65%-96%) for Dyad 2 (Chieko and
KayCee), and 83% (range = 0%-100%) for Dyad 3 (Haunani and Buddy). For mand
classification accuracy (S vs. P) reliability was 81.76% (range = 50%-100%) for Dyad 1
(Sara and Braddah), 85.58% (range = 49%-100%) for Dyad 2 (Chieko and KayCee), and
78.16% (range = 0%-100%) for Dyad 3 (Haunani and Buddy). A wide range of
reliability agreement was calculated. Reasons for this range may include the difficulty in
matching up the trials by the observers due to trial-by-trial data collection rather than
interval recording.

Effectiveness of the Training Procedures

The study yielded mixed results for participants (see Figure 2 and Table 5). Dyad
1, Sara and Braddah, had slight to moderate positive outcomes associated with the
package. Results indicated that the most robust outcomes for the training package
components occurred with Dyad 2, Chieko and KayCee. The training package did not
prove effective for Dyad 3, Haunani and Buddy, and no functional relationship can be
suggested between the independent variables and the dependent variables.
Table 4

Inter-Rater Agreement

<table>
<thead>
<tr>
<th>Dyad 1: Sarah and Braddah</th>
<th>Baseline</th>
<th>Post OTV</th>
<th>Feedback</th>
<th>CM</th>
<th>Follow-up</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTF mean %</td>
<td>MTF SD</td>
<td>MTF range</td>
<td>Mands mean</td>
<td>Mands SD</td>
<td>Mands range</td>
<td>Total mean</td>
</tr>
<tr>
<td>Baseline</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Post OTV</td>
<td>73.25</td>
<td>19.56</td>
<td>52-97</td>
<td>64.5</td>
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<td>50-100</td>
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<tr>
<td>Feedback</td>
<td>x</td>
<td>x</td>
<td>X</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>CM</td>
<td>87.14</td>
<td>10.63</td>
<td>64-97</td>
<td>86.43</td>
<td>9.48</td>
<td>67-96</td>
</tr>
<tr>
<td>Follow-up</td>
<td>x</td>
<td>x</td>
<td>X</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Total</td>
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<td>52-100</td>
<td>81.76</td>
<td>50-100</td>
<td>81.30</td>
<td>46-100</td>
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</table>

<table>
<thead>
<tr>
<th>Dyad 2: Chieko and KayCee</th>
<th>Baseline</th>
<th>Post OTV</th>
<th>Feedback</th>
<th>CM</th>
<th>Follow-up</th>
<th>Total</th>
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<tbody>
<tr>
<td>MTF mean %</td>
<td>MTF SD</td>
<td>MTF range</td>
<td>Mands mean</td>
<td>Mands SD</td>
<td>Mands range</td>
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<tr>
<th>Dyad 3: Haunani and Buddy</th>
<th>Baseline</th>
<th>Post OTV</th>
<th>Feedback</th>
<th>CM</th>
<th>Follow-up</th>
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</tr>
</thead>
<tbody>
<tr>
<td>MTF mean %</td>
<td>MTF SD</td>
<td>MTF range</td>
<td>Mands mean</td>
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<td>Mands range</td>
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<tr>
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<td>0</td>
<td>0</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Post OTV</td>
<td>49.08</td>
<td>42.5</td>
<td>0-100</td>
<td>73</td>
<td>42.28</td>
<td>0-100</td>
</tr>
<tr>
<td>Feedback</td>
<td>81.5</td>
<td>6.5</td>
<td>75-88</td>
<td>58.5</td>
<td>8.5</td>
<td>50-67</td>
</tr>
<tr>
<td>CM</td>
<td>79.66</td>
<td>10.4</td>
<td>65-88</td>
<td>76.33</td>
<td>15.1</td>
<td>55-88</td>
</tr>
<tr>
<td>Follow-up</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Total</td>
<td>83</td>
<td>0-100</td>
<td>78.16</td>
<td>0-100</td>
<td>82.41</td>
<td>0-100</td>
</tr>
</tbody>
</table>

Note. MTF = Mand Training Fidelity, SD = Standard Deviation
Figure 2. This graph provides a visual display of the data collected across all phases of the study and across all three teacher-student dyads.
TABLE 5

**Manding Means and Standard Deviations Across Subjects and Phases**

<table>
<thead>
<tr>
<th></th>
<th>Mean MTF</th>
<th>Mean SM</th>
<th>Range</th>
<th>Mean MTF</th>
<th>Mean SM</th>
<th>Range</th>
<th>Mean MTF</th>
<th>Mean SM</th>
<th>Range</th>
<th>Mean/Standard deviation (SD) across subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>93.0</td>
<td>0.5</td>
<td>0-3</td>
<td>86.13</td>
<td>0</td>
<td>0-2</td>
<td>97.0</td>
<td>0.38</td>
<td>0</td>
<td>92.04 0.49</td>
</tr>
<tr>
<td>Post OTV</td>
<td>100.0</td>
<td>7.67</td>
<td>1-21</td>
<td>98.7</td>
<td>2.4</td>
<td>0</td>
<td>100.0</td>
<td>0</td>
<td>0-3</td>
<td>99.56 0.61</td>
</tr>
<tr>
<td>Feedback</td>
<td>AF 100</td>
<td>AF 18.33</td>
<td>12-29</td>
<td>1-13</td>
<td>SSP 100</td>
<td>SSP 6</td>
<td>0-20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedback</td>
<td>99.5</td>
<td>7.7</td>
<td>1-25</td>
<td>99.1</td>
<td>8</td>
<td>0-4</td>
<td>100.0</td>
<td>2</td>
<td></td>
<td>99.53 0.37</td>
</tr>
<tr>
<td>Coach/Model</td>
<td>99.33</td>
<td>11.66</td>
<td>9-13</td>
<td>99.69</td>
<td>81.25</td>
<td>0-2</td>
<td>99</td>
<td>1</td>
<td>57-109 99.34 0.28</td>
<td></td>
</tr>
<tr>
<td>Mean MTF across phases</td>
<td>98.47</td>
<td>96.72</td>
<td></td>
<td>99.24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean SM across phases</td>
<td>10.69</td>
<td>27.17</td>
<td></td>
<td>1.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SD</td>
<td>6.11</td>
<td>6.30</td>
<td>5.32</td>
<td>31.41</td>
<td>1.07</td>
<td>2.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Key:**

SM = Spontaneous Mand
SD = Standard Deviation
MTF = Mand Training Fidelity
Dyad 1: Sara and Braddah. During Baseline, Braddah’s levels of spontaneous mands ranged from 0-3, and demonstrated low variability and a flat trend (M= .5; SD=1.12). Spontaneous and prompted mands were at 0 for the last three sessions of Baseline for Braddah. Sara’s fidelity of the mand training ranged from 84% to 100% in accuracy (M=93%; SD= 7.14; see Figure 3).

Dyad 1, Sara and Braddah, had slight to moderate positive outcomes associated with the package. Results indicated that the most robust outcomes for the training package components occurred with Dyad 2, Chieko and KayCee. The training package did not prove effective for Dyad 3, Haunani and Buddy, and no functional relationship can be suggested between the independent variables and the dependent variables.

Immediately following the completion of OTV intervention, Braddah’s spontaneous mands ranged from1-21, and initially increased to 21, but quickly fell to 6 immediately after increasing to 21(M=7.67; SD= 6.34). By session 12, his spontaneous mands had decreased to 1. Concurrently, prompted mands slowly increased from 2 to 12. A brief crossover occurred between sessions 10 and 11. As his spontaneous mands decreased, his frequency of prompted mands increased. Compared to baseline range of 0-3 spontaneous mands, Braddah’s spontaneous and prompted mands increased in frequency overall during this phase. During the OTV phase, Sara's fidelity of mand training remained stable at 100% (M=100%).
Figure 3. Dyad 1- Sara and Braddah. This figure illustrates the mand frequency (spontaneous and prompted) for Braddah and fidelity of mand training for Sara across phases.
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Following the OTV phase, and before the Feedback phase, I conducted an abbreviated Feedback phase ("Wait 3 seconds after verifying MO") for Dyad 1, because the teacher, Sara, was not waiting to see if there was an MO before prompting the mand.

During this phase (M=18.33; SD=7.82), there was an increase in the trend and level of Braddah’s spontaneous mands, from near to or at 0 in Baseline to 12, 14, and 29 across sessions 13, 14, and 15 in the abbreviated Feedback phase. When compared to data from the OTV phase, results indicated that prompted mands decreased as spontaneous mands increased in frequency with moderate variability. The magnitude and level of this change were modest but significant, compared to a range of 0-21 spontaneous mands during the OTV phase, and a range of 0-3 during Baseline. Prompted mands remained at a range of 2-8 in this abbreviated Feedback phase, slightly variable, with only a mild increase in level and a slight downward trend. Braddah’s prompted mands did increase slightly in this phase from the Baseline and OTV phases. Sara’s fidelity of mand training remained stable and flat at 100% accuracy.

During the Feedback phase for Sara and Braddah, spontaneous mands for Braddah initially decreased to near Baseline levels (sessions 16-18), with low variability, and his prompted mands were also near Baseline levels (M=7.70; SD=7.82; range=1-25 spontaneous mands). During sessions 16-18, his spontaneous mands decreased in mean and range from his performance during the abbreviated Feedback phase; however, his mands were still above Baseline and OTV levels. By the fourth Feedback session, however, both spontaneous and prompted mands increased slightly in level and trend. Braddah’s spontaneous mand data were quite variable in this condition—initially
increasing above that of the Baseline and OTV phases, and then decreasing towards the end of the phase. Sara's fidelity of mand training remained stable at 99.5% accuracy.

During the fifth phase, CM, the frequency of Braddah’s sho spontaneous manding increased, averaging 18.25 (SD= 8.59; range=6-28). Initially, the level of spontaneous mands initially increased from a level of 1 in the Feedback phase to 9 in CM, again increasing significantly from the Baseline, OTV, and Feedback phases. Variability was moderate (slightly less than the previous phase), and the trend was unstable. Three crossovers occurred with spontaneous and prompted mands during session 27, and again during sessions 29 and 31. Levels for prompted mands increased, but the trend was flat and variable. Sara's fidelity of mand training remained stable at 99%.

A Follow-Up condition occurred seven weeks later across three sessions. During Follow-Up, the level of spontaneous mands decreased slightly, compared to the CM phase, and had a fairly stable and flat trend (M=11.66; SD=1.41; range=9-13 spontaneous mands). The levels of the spontaneous and prompted mands for follow-up remained higher than Baseline, OTV, and Feedback phases. Braddah’s average number of mands decreased from 18.25 in CM to 11.66 in follow-up. Sara's fidelity of mand training during follow-up remained stable at a mean of 100%.

**Dyad 2: Chieko and KayCee.** KayCee’s levels of spontaneous mands were stable at zero during a Baseline of 8 sessions. Her prompted mands were slightly variable throughout most of the Baseline (ranging from 0-5), with a trend that first increased, and then decreased to stabilize at zero by session 7. Chieko’s implementation of the mand training during Baseline ranged from 62% to 100% accuracy (M= 86%), with an
increasing trend from sessions 2 through 6, but concluded with a downward trend (see Figure 4).

Immediately following Chieko’s OTV intervention, KayCee’s level of spontaneous mands remained similar to Baseline in OTV. During session 11, she demonstrated a sharp increase in prompted mands (39). Only a slight increase in spontaneous mands was evident at session 13, and the number of mands subsequently decreased to near Baseline levels (M=1.3; SD=1.12; range=0-3 spontaneous vocal mands) towards the end of the phase. More notably, KayCee’s prompted mands increased from a range of 0-6 in Baseline to a range of 3-39 in Post-OTV. This increase demonstrated some immediate level and magnitude changes and an initial increasing trend during sessions 9, 10, and 11 for prompted mands. However, she demonstrated a sharp drop at session 12 to near Baseline levels. Aside from the initial increase of prompted mands, variability was slight, and the level was low for prompted mands. The trend remained stable and somewhat flat (just slightly above Baseline level) for spontaneous mands. Chieko's fidelity of mand training remained stable and flat at 95%-100% (M=98.70%) during Post-OTV.

I initiated a Feedback phase as the second intervention and third phase for this participant dyad. The trend for KayCee’s spontaneous mands remained stable and upward, with some variability (M=8; SD=6.57; range=0-20 spontaneous mands). The magnitude and level of these changes were modest and ranged from 0 to 20 spontaneous mands in Feedback, compared to a range of 0-15 spontaneous mands OTV and zero in Baseline. KayCee’s prompted mands showed the most significant level change, and ranged from 15-33, compared to 0-6 in Baseline, and 3-39 in OTV. Moderate variability
Figure 4. Dyad 2- Chieko and KayCee. This figure illustrates the mand frequency (spontaneous and prompted) for KayCee and fidelity of mand training for Chieko across phases.
occurred with prompted mands, with a slightly upward trend. Chieko's fidelity of mand training remained stable and flat at 97%-100% accuracy (M= 99%).

After the fourth phase, CM (M= 45.64; SD= 26.51; range=13-111 spontaneous mands), KayCee’s spontaneous mands increased considerably in both level and trend, and jumped significantly during sessions 38 and 39 (111 and 74 spontaneous mands respectively). Variability and the magnitude in change from Baseline were high, and magnitude was moderate, relative to the previous condition of Feedback, and even more significant when compared to OTV and Baseline. The level changes in KayCee’s prompted mands remained moderate, but prompted mands decreased as spontaneous mands increased. Data for prompted mands were moderately variable during CM; however, compared to Baseline, OTV, and Feedback phases, prompted mands decreased in frequency as spontaneous mands increased. Chieko's fidelity of mand training remained stable and flat at 100% accuracy during CM.

A Follow-Up condition occurred five weeks later across four sessions. During Follow-up (M=81.25; SD=23.92; range=57-109 spontaneous mands), the level again increased significantly from Baseline, OTV, Feedback and CM, and showed an upward trend (i.e., 57, 101, 58, 109). KayCee’s demonstration of spontaneous mands was highly variable in this phase. Prompted mands were also highly variable, with a downward trend and mild change in level and a range of 5-39. Compared to CM, spontaneous mands increased during Follow-up, while prompted mands decreased in frequency, with no crossovers occurring as they did in CM. Chieko's fidelity of mand training remained stable at 99.5%-100% accuracy (M=99.69%) during follow-up.
**Dyad 3: Haunani and Buddy.** Buddy’s levels of spontaneous mands ranged from 0-2 during Baseline, with almost no variability and a stable and flat trend at or near zero (M= .38; SD=.695). Prompted mands showed no variability, and demonstrated a flat trend at zero. Haunani’s fidelity ranged from 90% to 100% accuracy (M=97%) with an upward trend for only four sessions where mands occurred during session (see Figure 5). Immediately following Haunani’s OTV intervention, the trend of spontaneous mands did not increase. Variability was low, as was his level of spontaneous mands (just at baseline level; M=0; SD=0; range=0 spontaneous mands). Only one prompted mand occurred in the three OTV sessions. Upon visual inspection, the initial magnitude of change for his spontaneous mands was not significant between Baseline and OTV. Haunani’s fidelity remained at 100% OTV for the one session where a mand occurred.

I selected and initiated a echoic-to-mand training (change in protocol) phase as the second intervention phase for this participant dyad, because Buddy did not demonstrate the echoic skills reported by the program manager when the study began. Buddy demonstrated a slightly upward trend for spontaneous mands (i.e., 1, 13, 2, 10, 4). Spontaneous mand data were variable during this phase (M=6; SD=4.69; range=1-13 spontaneous mands). The magnitude and level of these changes were modest compared to the OTV intervention (0 spontaneous mands) and Baseline (4 spontaneous mands). The initial magnitude of change for his spontaneous mands was slightly significant upon visual inspection between Baseline, OTV and echoic-to-mand training. Prompted mands were fairly stable, with a slight downward trend; however, the level of prompted mands
Figure 5. Dyad 3- Haunani and Buddy. This figure illustrates the mand frequency (spontaneous and prompted) for Buddy and fidelity of mand training for Haunani across phases.
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was slightly higher than during Baseline and OTV. Haunani’s fidelity remained stable and flat at 100% accuracy during this phase.

During the third intervention phase for Haunani, Feedback, the data were slightly variable (low) in this condition and remained at or close to Baseline and OTV levels (M=2; SD= 1.53; range=0-4 spontaneous mands). The level dropped slightly between echoic-to-mand training and the Feedback phase, and Buddy's spontaneous mands decreased, varying from a range of 1-13 in the previous echoic-to-mand training phase to 0-4 during the Feedback phase, with spontaneous mands of 4, 1, 2, 0, 4, and 1 after feedback. Prompted mands remained stable and close to Baseline, with a near zero level change. Haunani’s fidelity remained stable at 100% accuracy.

I implemented researcher intervention between Feedback and the modified CM phases to determine if modifying the echoic training procedure by delaying the delivery of the reinforcer would elicit mands from Buddy. I did not collect data during this process, with the exception of recording 10 prompted mands in a 30 min session with Buddy. During this researcher intervention, the latency of the echoic response decreased from the beginning of the 30 min session from 17 prompts to between 2-3 prompts to echo the vocal model, or initial consonant/vowel sound of the mand target.

After the fourth intervention phase, modified CM, Buddy’s spontaneous mands did not increase in trend, and remained at or close to baseline levels (M= 1; SD= 7.56; range 0-2 spontaneous mands); however, his prompted mands increased significantly in trend and level when compared with the Baseline, OTV, echoic-to-mand training, Feedback, and researcher intervention phases.
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Variability was low for Buddy’s spontaneous mands, as was the level, and magnitude in change from Baseline remained low across all phases except echoic-to-mand. His prompted mands increased in frequency, ranging from 2-15, and demonstrated a modest but stable upward trend, moderate level change, and slight variability. Haunani’s fidelity of mand training remained stable and flat at 99.42% accuracy.

A Follow-up condition occurred almost six weeks later across four sessions. During follow up, Buddy’s spontaneous mands remained low in level and trend changes, compared with Baseline, OTV, and Feedback, and demonstrated with low variability (M=1; SD=1.0; range=0-2 spontaneous mands). His level of prompted mands decreased slightly, showing a slight downward trend (5, 7, 4, 2) over the four follow up sessions, and variability remained low and relatively stable. Haunani's fidelity of mand training remained stable at 98%-100% (M= 99%) accuracy.

**Overall results.** During this multiple-baseline investigation, the investigator observed variable changes in teacher and student behavior, but did not observe a co-variation between teacher fidelity of mand training and student mand behavior in all phases across all participants. In all dyads, Baseline began with low levels of spontaneous and prompted manding behavior in student participants, and relatively higher levels of fidelity in teacher behavior than expected across teacher participants. Across all phases of the study, fidelity of mand training did increase to averages near 100% for all participants, but did not seem to jump with levels of mands by student participants.

In two participant dyads, OTV alone by teacher participants resulted in somewhat notable increases in spontaneous and/or prompted mand behavior. With added
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components of feedback, these same two dyads (1 and 2) demonstrated moderate increases in mand behavior by the student participants, while teacher fidelity remained high. However, I identified limitations to the feedback that was planned based because it drew from the four-step mand procedure, and it was apparent that there were components of teacher mand behavior that I omitted from this feedback and fidelity data. During Post OTV collection of data on teacher fidelity of the four-step procedure, I identified the need for additional verbal feedback (based on other behaviors they were not doing) and developed a feedback form to evaluate the teacher behavior and determine feedback warranted. I delivered this feedback to teachers during ongoing sessions. Overall, the most significant and robust changes in student mand behavior occurred during the modeling/coaching phase. The discussion section of this study includes an overview and explanation of these student behavior changes. Interestingly, the teacher fidelity remained relatively high throughout the study, where as the student spontaneous manding behavior was not impacted as a result of this higher fidelity earlier on.

This study demonstrated, with mixed results, that the combination of components of an OTV-based intervention for teachers to teach SWA to mand for items they are motivated to obtain is a successful option for PD. The independent variable of OTV alone did not account for much change in student manding behavior; however, the additive component of modeling/coaching appears to be the most robust component of this OTV-based mand training package. Threats to internal validity may be that the teachers had higher levels of training and education in teaching SWA, which may be why their levels of fidelity began at relatively higher levels than expected.
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**Social validity.** During the Follow-Up phase, I asked participating teachers and parents to complete a social validity questionnaire (see Appendices F and G). The questionnaire included eight questions for teachers and five questions for parents, and asked participants the degree to which they agreed with given statements (1=strongly disagree, 2=disagree, 3=slightly disagree, 4=slightly agree, 5=agree, 6=strongly agree). Tables 4 and 5 display the results of the questionnaires.

Tables 6 and 7 illustrate the mostly positive social validity questionnaire results for parents and teachers respectively. All three parent participants reported that they agreed with the statements, and gave each questionnaire item a score of 4, 5, or 6. Only one parent participant, Buddy's mom, expressed a disagreement, noting "slightly disagree" on two questions: (1) By participating in this study, my child learned how to request the things he/she wants more, and (3) since participating in this study, my child makes spontaneous requests (mands) more often.

All but one of the teacher participants reported that they agreed with the statements in the questionnaire. Sara, who worked with Braddah, disagreed that two hours of video training was adequate to teach her how to help her student mand (without add-on components), by indicating a score of 2 "disagree" on question 6. The teachers reported that overall, adding the feedback and coaching/modeling components were both necessary to show them how to teach their student to mand.
Table 6

*Social Validity Questionnaire Results (Parents)*

<table>
<thead>
<tr>
<th></th>
<th>KayCee's mother</th>
<th>Braddah's mother</th>
<th>Buddy's mother</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>By participating in this study, my child learned how to request the things he/she wants more.</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>1.41</td>
</tr>
<tr>
<td>Since participating in this study, my child repeats (echoes) what I am saying more frequently.</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>5.33</td>
<td>.94</td>
</tr>
<tr>
<td>Since participating in this study, my child makes spontaneous requests (mands) more often.</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>1.41</td>
</tr>
<tr>
<td>As a result of this study, my child has learned more language that is important for him/her.</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>4.67</td>
<td>.47</td>
</tr>
<tr>
<td>By participating in this study, I was able to learn some of the same techniques to help my child at home.</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

Key: 1=strongly disagree; 2=disagree; 3=slightly disagree; 4=slightly agree; 5=agree; 6=strongly agree
**Table 7**

*Social Validity Questionnaire Results (Teachers)*

<table>
<thead>
<tr>
<th>Questionnaire statement</th>
<th>Haunani</th>
<th>Chieko</th>
<th>Sara</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>By participating in this study, I learned more about how to help students to make requests/ mands.</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>5.33</td>
<td>.47</td>
</tr>
<tr>
<td>Since participating in this study, my student repeats (echoes) what I am saying more frequently (prompted mands).</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Since participating in this study, my student makes spontaneous requests (mands) more often.</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>4.66</td>
<td>.47</td>
</tr>
<tr>
<td>As a result of this study, my student has learned more language that is important for him/her.</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4.66</td>
<td>.47</td>
</tr>
<tr>
<td>I see myself using the knowledge and skills that I acquired during this study to help other students I work with now and in the future.</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>5.33</td>
<td>.47</td>
</tr>
<tr>
<td>I think that the <strong>video training</strong> was adequate to teach me how to help my student to mand (without the add on components).</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>3.3</td>
<td>.94</td>
</tr>
<tr>
<td>I think that <strong>verbal feedback from the researcher</strong> add-on was necessary (when combined with the video training) to teach me how to help my student to mand.</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>5.66</td>
<td>.47</td>
</tr>
<tr>
<td>I think that <strong>coaching/modeling</strong> from the researcher add on was necessary (when combined with video, and verbal feedback) to teach me how to help my student to mand/request.</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>5.66</td>
<td>.47</td>
</tr>
</tbody>
</table>

Key. 1= strongly disagree; 2=disagree; 3=slightly disagree; 4=slightly agree; 5=agree; 6=strongly agree
In sum, the OTV was effective in teaching basic mand training skills to early interventionists; however, results indicated that the improvement in the number of mands made by the participating students was more pronounced after the addition of feedback and CM. Previous research on feedback and coaching has demonstrated that these two components are necessary for optimal outcomes of a training package. These findings demonstrate consistency with supporting literature on using OTV to train staff in many disciplines including health care, business, computer science, and even medicine (Ruiz et al., 2006; United States Department of Education, 2010).

Summary of Results

This provides a summary of this study’s results with respect to the three research questions. This summary includes interpretations of the results, as well as possible limitations to consider, implications for practice, and recommendations for future research.

Research question #1: Will a multi-component training package that includes on-line, self-directed training (OTV); verbal feedback; and coaching/modeling be effective in instructing teachers to implement mand training procedures to SWA? For teacher participants Sara and Chieko, the use of OTV alone resulted in some increases in students’ manding behavior for Braddah and KayCee respectively. With the added components of feedback and coaching/modeling, Sara and Chieko were successful in increasing spontaneous mands for Braddah and KayCee. For Buddy, manding remained low throughout phases, despite the cumulative
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effects of OTV and the addition of feedback, coaching, and modeling for Haunani.
Overall, the training package proved effective with two of three student-teacher
participant dyads (Sara and Buddy; Chieko and KayCee). For each student participant,
the package produced disparate outcomes of spontaneous manding behavior.

**Research question #2: Which components of the training package are most
effective in producing skill acquisition among the teachers and SWA?** The findings
here were consistent with findings from other research, and indicated that the coaching
and modeling had the greatest effect on manding by the students. For Dyads 1 (Sara and
Braddah) and Dyad 2 (Chieko and KayCee), coaching and modeling produced the most
significant results for the student spontaneous manding behavior. For Haunani and
Buddy, Coaching/Modeling resulted in increases in prompted mand behavior, which
should be highlighted given the barrier of a lack of an echoic repertoire which Buddy
presented with.

**Research question #3: What effect do the mand training (OTV) videos
alone have on the SWA whom the teachers support?** This study does not
overwhelmingly support the conclusion that OTV videos (as PD for teachers)
demonstrated a notable effect SWA spontaneous mands. Some slight increases in
manding behavior were evident for Dyad 1 (Sara and Braddah) and Dyad 2 (Chieko
and KayCee); however, OTVs alone did not impact Dyad 3 (Haunani and Buddy). The
results clearly indicate, however, that increased mands were a result of the combined
components of feedback, coaching, and modeling, indicating PD should contain these
valuable components.
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Interpretation of Results

The primary purpose of designing and implementing PD activities for teachers is to bring about changes in student behavior. To ensure the adequate application of mand implementation procedures, teachers may need to receive coaching/modeling and verbal feedback in addition to classroom training or OTV. Such feedback should aid them in understanding and improving their level of treatment fidelity. Without evaluating the fidelity with which the teachers implement the steps, it may be difficult to determine whether mand training is appropriate and effective for SWA. It also may prove challenging to ascertain whether the fidelity of implementation was a barrier in the acquisition of mands for SWA. Of course, mand step implementation integrity across all EI systems would be a challenge, but identifying the most practical, effective, and efficient delivery methods for mand training is one important way to address and improve the EBP implementation of mand training in EI settings.

Delivery of feedback may be a component of training worth additional evaluation in the future. In the first Feedback phase of this study, I provided comments and feedback after the session ended. This latency in delivering feedback appears to be a critical element for examination. Alternately, the coaching/modeling phase included ongoing feedback that addressed errors in implementation during the sessions. This phase produced the most significant effects for the teachers and is worthy of note.

**Dyad 1: Braddah and Sara.** During the six Baseline sessions, Braddah only demonstrated three spontaneous mands and ten prompted mands. While Braddah’s mand frequency remained low, the fidelity for Braddah’s teacher was variable but relatively
high. The utilization of the OTV did result in slight observable changes in the number of mands per session for Dyad 1; however, these results were not consistent in the OTV phase, and a crossover occurred between prompted mands and spontaneous mands. Initially, Braddah's spontaneous mands increased from 0 in Baseline to 21 in OTV. During the next several sessions, the number of spontaneous mands decreased, as the prompted mands increased (crossover). This phenomenon could represent a loss of functional control, as the OTV intervention did not reliably and consistently increase spontaneous mands for Braddah, and instead increased prompted mands. This outcome could have resulted from the fact that the teachers did not learn about transfer procedures in the OTV. Interestingly, the teacher fidelity during OTV remained at 100%, which one could interpret as an outcome of the OTV, resulting in increasing the mand implementation delivery for this dyad teacher. During the abbreviated Feedback phase of "wait" after verification of MO, the spontaneous mands increased significantly, and the prompted mands decreased, possibly because the teacher received feedback that encouraged her to wait until she could verify the MO when the student looked, reached for, or grabbed at an item of interest. However, once this abbreviated feedback was discontinued, the functional control was no longer observed.

During the Feedback phase, spontaneous mands for Braddah dropped to near baseline levels for two sessions, and then began to increase for the next three sessions, dropping again before increasing and then decreasing again near the end of this phase. During this session, the teacher commented to me that she was not used to or comfortable receiving feedback, and was observed to demonstrate behaviors associated
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with being nervous during sessions. This could have attributed to an aversive condition, which might have produced variable responses from the SWA; however, the fidelity remained close to 100% throughout this condition.

During Coaching/modeling, spontaneous mands increased overall, as did prompted mands, albeit three crossovers occurred throughout this phase. Throughout this stage, the teacher needed much feedback and coaching to remember to implement transfer trials after prompted mands. In addition, teaching this instructor to use transfer trials to transfer stimulus control from prompted mands to spontaneous mands using a time delay procedure did not appear to be effective until the end of the CM phase, when there was a notable crossover as spontaneous mands increased above prompted mands. I noted when transfer trials occurred on the data sheet, but did not examine these trials as a dependent measure of the study. Future researchers should consider these trials during investigations of mand training for teachers. On several occasions, I observed that Sara had a difficult time remembering to wait for the MO to see if the SWA would mand spontaneously, and seemed to want to prompt right away during every trial, before waiting for a spontaneous mand from Braddah. I provided repeated feedback and coaching to remind her to wait for the MO, and give the student an opportunity to mand spontaneously for the item.

At the Follow-Up session seven weeks later, Braddah’s spontaneous and prompted mands remained moderate at levels higher than Baseline, OTV, and Feedback; however, his rate of manding was lower than in the CM phase seven weeks prior. The
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levels of manding during Follow-Up suggest that the overall package was effective with this dyad, especially the coaching/modeling component.

**Dyad 2: KayCee and Chieko.** During eight Baseline sessions, the student participant, KayCee, did not demonstrate any spontaneous vocal mands and demonstrated few prompted vocal mands. The teacher fidelity for KayCee’s teacher, Chieko, was moderate but variable between 62% and 100%, albeit KayCee's vocal mand frequency remained low closer. During Baseline, KayCee manded using signs imitatively prompted by her teacher. She demonstrated echoic skills; however, the prompting of sign mands versus vocal mands was inconsistent and variable by the teacher. Chieko accepted and reinforced some mands when KayCee used a sign to request, but failed to reinforce others when she signed. Chieko also gave a vocal prompt after KayCee had signed spontaneously for the item, which likely increased the response requirement for KayCee. I recorded the sign mands but not include them in the data or graph, as the study called for vocal mands as a dependent measure.

The utilization of the OTV did result in slight observable changes in the number of prompted vocal mands per session for Dyad 1, but no notable change occurred in KayCee’s spontaneous vocal manding. Interestingly, the teacher fidelity during OTV remained variable, between 95% and 100%, which one could interpret as a result of the OTV that changed Chieko’s mand implementation delivery. During OTV phase, Chieko asked me whether she should require a vocal or sign mand, but I could not provide any feedback at that point in time. During the Feedback phase, spontaneous vocal mands increased, as did prompted vocal mands. I also responded to Chieko’s previous question
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at this point, and suggested that she require vocal mands, even if she had to provide a prompt to increase the response requirement. I also encouraged Chieko to transfer stimulus control from a prompted vocal mand to a spontaneous vocal mand by using a time delay; however, feedback only did not appear to produce changes in the Chieko’s behavior as she implemented transfer trials with KayCee.

During CM, spontaneous vocal mands increased overall, as did prompted vocal mands. Throughout this phase, I also noted that Chieko made frequent attempts to conduct transfer trials in response to the modeling and coaching that took place during the sessions. Feedback during the sessions appeared to lead to a significant increase in spontaneous vocal mands, likely due to Chieko’s success with implementing transfer trials with KayCee. I recorded these trials as prompted vocal mands, which led to successful spontaneous mands following the transfer trials on many occasions. Two crossovers occurred during this phase; and spontaneous vocal mands increased, while the prompted vocal mands decreased throughout the session. At Follow-Up, five weeks later, spontaneous and prompted mands remained at high levels compared to Baseline, OTV, and Feedback, and even higher than the CM phase five weeks prior. The levels of manding during Follow-Up suggest that the overall package was effective with this dyad, especially CM and transfer trials, and led to increases in KayCee’s spontaneous vocal mands.

Dyad 3: Buddy and Haunani. During eight Baseline sessions, Buddy only demonstrated three spontaneous mands, and he was observed to demonstrate no prompted mands at all. These spontaneous mands were audibly unclear to me; however,
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I scored them as spontaneous mands as the teacher reinforced them with observed excitement, as evidenced by praise, smiles and delivery of preferred item to Buddy. Although Buddy’s mand frequency remained low, at near zero levels during Baseline, the teacher fidelity for Haunani was variable but relatively high, which suggested that even with levels of 90-100% fidelity, other procedures might be necessary to increase mands.

The utilization of the OTV intervention alone did not result in any observable changes in the number of spontaneous or prompted mands per session for Dyad 3. After three sessions OTV, I decided to intervene due to his lack of echoic behavior to determine whether targeting an echoic-to-mand procedure with the delivery of a mand item would increase his echoic prompted responses. I added an echoic-to-mand training procedure that paired the initial sound of the item with the item, in an attempt to break the response requirement down into a simple consonant sound. Echoic behavior remains critical to the development of verbal behavior and frequently comprises many early learner treatment programs (Ward, Osnes, & Partington, 2007). In general echoic training, the teacher presents a vocal verbal stimulus and reinforces the parity or approximations of the student vocal imitation (Ward et al., 2007). During this phase of the study for this student, prompted mands increased slightly as a result of the echoic-to-mand training procedure. The spontaneous mands also increased, but this result was not a predicted outcome of echoic-to-mand procedure.

During the echoic-to-mand phase, Buddy's spontaneous mands were variable but higher than levels in Baseline, and prompted mands were lower than spontaneous
mands, albeit higher than Baseline levels. Interestingly, the fidelity for Haunani remained relatively high, near 100%, throughout this condition. During Feedback, the levels of spontaneous and prompted mands for Buddy dropped to near Baseline levels again, even though I continued the echoic-to-mand procedure. I did not collect any integrity data on the implementation of echoic-to-mand; however, Haunani did receive reminders to stay consistent with the procedure during Feedback after each session.

Because the echoic-to-mand procedure was somewhat effective for this dyad, and feedback resulted in decreases of spontaneous and prompted mands, I implemented an intervention where the teacher was not present (researcher intervention). I hypothesized that Buddy was "holding out" for the reinforcer, meaning that he was learning that the teacher would give the full word for the mand, then give three consonant prompts; and if he did not echo, she would deliver the reinforcer to him. During this researcher intervention, the parent was present. I explained the hypothesis to the parent, and she agreed to the use of edible reinforcers during subsequent sessions.

Over the course of this intervention session, I amended the echoic-to-mand procedure by keeping the echoic demand on Buddy, without "killing the MO," to elicit a vocal prompted mand. For example, I would say "bubbles, buh, buh, buh, buh, buh, buh," with 1-2 second pauses between each delivery of the consonant sound prompt. Once he echoed the prompt, I would deliver the reinforcer and repeat the adult form of the word simultaneously "bubbles." This session lasted for 30 minutes, and resulted in 14 prompted mands. Each trial presented the prompt between 2-10 times, decreasing each subsequent trial from 10 down to 2 presentations of the prompt nearing the end of
the 30-minute session. I then amended the procedure and discussed and modeled the changes with the teacher before started the CM phase.

During CM, spontaneous mands did not increase; however, prompted mands did increase consistently throughout this phase, because the Haunani sought to "keep the demand" on Buddy, instead of reinforcing a mand, until he echoed an approximation of the target word by producing a consonant sound for the item that he desired. During this phase, Haunani attempted the transfer trials to transmit stimulus control from a prompted mand to a spontaneous mand; however, her efforts were largely unsuccessful. I ultimately decided that prompted mands were acceptable because Buddy was just beginning to develop echoic stimulus control.

Overall, the increase in prompted mands for this dyad was significant, considering that Buddy did not demonstrate much echoic control, and the modified echoic-to-mand procedure used in manding appeared to be effective in eliciting prompted mands given vocal consonant prompts. At Follow-Up almost six weeks later, spontaneous and prompted mands remained above levels recorded during the Baseline, OTV, and Feedback phases; but they were lower than noted in the echoic-to-mand and CM phases. The levels of manding during Follow-Up suggest that the overall package was slightly effective with this dyad, most notably the modified SP procedure to elicit prompted mands and increase echoic control.

Vocal mand training can present a myriad of challenges to teachers in several ways: selection of mand targets (Sundberg & Partington, 1998), capturing and contriving MO's as well as competing reinforcers (Ward et al., 2007), the number of opportunities
daily, response forms selected, and finally responses accepted during shaping (Ward et al., 2007). For Buddy, a procedure based on an echoic-to-mand should be used to elicit vocal approximations for mands.

**Overall results.** Overall, this study was effective in teaching early intervention teachers more effective procedures for eliciting mands from their SWA. Results suggest that OTV alone was not sufficient to produce significant increases in manding behavior for SWA, and that additive components of feedback, and especially coaching/modeling are necessary components of PD for teachers to produce significant outcomes in manding frequency. It is evident from these results that three hours of OTV, without the addition of modeling/coaching from a mentor, coach, or behavior analyst, will not increase the frequency of spontaneous and/or prompted mands to levels necessary to impact the learner in a significant way.

Despite these findings, OTV can be a valuable and time-efficient addition to a training package that includes modeling/coaching components. Educators should not ignore the use of an OTV component to teach manding or other skills related to increasing language or other pro-social skills should in lieu of face-to-face or classroom instruction. The use of OTV- based training can effectively and efficiently replace this type of classroom training, save time and money in order to utilize the expertise of a consultant in the classroom. Utilizing an expert teacher or behavior analyst during sessions where feedback, modeling and coaching in vivo may be most productive in achieving outcomes associated with increased language for SWA. These recommendations also align with adult learning and support foundational knowledge.
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acquisition, yet highlight the need for practice of the skills learned in the classroom environment with coaching and feedback from an expert colleague.

In the current study, the additive component of feedback produced variable results, and brought to light additional questions for future researchers to examine. Such queries might include an examination of the difference between in-vivo and delayed feedback during mand training. In addition, an investigation of the use and effect of transfer trials is worthy of consideration, in that this study provided preliminary evidence that the use of transfer trials by teachers with some integrity may produce even more significant increases in spontaneous mands for SWA. Modeling and coaching proved to impact the student participants the greatest; however, it is unclear whether the modeling (prior to the session, but based on previous session errors), coaching (delivered during the session and based on a revised evaluation scored during sessions), or the combination of both provided more robust results.

Social validity. Social validity questionnaires yielded positive results from parents and teacher participants alike. Parents reported that they agreed that their child learned how to request the things he or she wanted more frequently, echo a vocal prompt for a mand more frequently, request more often, and utilize more language. The parents also responded that they were able to learn some of the same techniques to help their children request or mand at home.

Social validity questionnaires also revealed that teacher participants agreed that OTV alone was not sufficient to help them learn to teach manding skills. The teachers agreed that verbal feedback and coaching/modeling were necessary to equip them to
teach their students to mand for the items to which they wanted to gain access. They also agreed that by participating in the study, they learned more about how to help their students increase the number of mands they make, echo a vocal prompt more frequently, mand spontaneously more often, and learn important language skills. The teachers indicated that they could apply the skills acquired during the study to their other students.

**Extension of the research.** This study contributed to the line of research investigating component packages for delivering PD to teachers. First, it served as one of the first component analyses of teaching mand training procedures to teachers of SWA, by investigating OTV alone, as well as the additions of verbal feedback on performance and coaching/modeling. This component analysis contributed to the research by providing additional evidence that modeling and coaching are indeed beneficial for achieving significant outcomes with PD, particularly when training teacher to foster increased manding behavior by SWA. The results of this inquiry provided evidence that OTV alone is not adequate to teach mand training procedures to teachers of SWA; however, OTV can be in efforts to reduce the time and effort required by consultants and behavior analysts who typically teach the basic-level classroom training on content knowledge required to teach mands to SWA.

Secondly, this study extended the research conducted by McCulloch (2011), which determined that OTV was effective in teaching public school paraprofessionals mand training steps. The current study replicated McCulloch's work by using the same OTV component for teaching basic mand training procedures; however, in the present
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inquiry, I added other evidence-based PD components to the package. McCulloch used OTV as a base component, and added a self-checklist for paraprofessionals to increase the fidelity with which they implemented the mand steps with SWA in a public school setting. The researchers reported an overall correlation between increased implementation integrity and increased rates of spontaneous mands by SWA (McCulloch, 2011). Authors reported functional control over paraprofessional's implementation of mand steps with use of OTV and combined checklist.

The present study differed from McCulloch (2011) work in that it utilized early intervention teachers as participants, as opposed to paraprofessionals. In addition this current study did not use a checklist component, because the participant teachers in already demonstrated higher (adequate) percentages of implementation integrity with the mand steps at Baseline, posing a potential confounding variable. These higher percentages likely occurred with the teacher participants at Baseline due to their advanced degrees and training acquired over the tenure of their careers as educators in early intervention. In contrast, the paraprofessionals in McCulloch's study did not have college degrees or training in ASD, and demonstrated lower levels of implementation fidelity at Baseline. Researchers in both studies utilized the steps of implementation; however, McCulloch utilized a three-step evaluation of implementation integrity (sanitize environment, prompt/require mand, and reinforce mand), while I employed a four-step evaluation (sanitize environment, verify MO, prompt, and deliver reinforcer within three seconds). The current study examined the effects of additive components of PD adding feedback, modeling, and coaching to an OTV-based PD package.
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Limitations

This study had several limitations worthy of consideration and note for future research investigations.

Highly-trained teachers. First, I evaluated the effects of this training package with three highly-trained early interventionists in one agency. It is possible that this higher trained participant pool obscured initial OTV intervention effects. With other teachers or interventions, with lesser-developed skill sets, this type of package would prove more effective. For example, a teacher with less training and education in teaching language to SWA may begin with lower baseline levels of mand step implementation integrity, and as a result of OTV alone, may produce more significant changes in their fidelity. Finally, PD delivered to teachers with a base OTV component that focusing on the acquisition other skills like FBA or teaching other verbal operants, or the addition of similar components may yield different or more effective results.

Student sample. Additionally, I assessed the effects of this training package on the outcomes of three disparate toddlers with ASD. It is possible that with other SWA who possessed echoic repertoires with more developed stimulus control, the outcomes would be even more significant. It is also possible that SWA who possess stronger echoic repertoires may demonstrate functional control more quickly and with less effort. Additionally, a measure to determine participation was not used in this study. A tool such as the Echoic Assessment (Esch, 2007) would be helpful to provide information to researchers who need to ensure that the participants possess an adequate echoic repertoire. Lastly, Buddy was the youngest of the three participants at 1 year 11 months,
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whereas Braddah and KayCee were 2 years 5 months, a whole 6 months older at the start of the study which could have presented a limitation of age of participant.

**Verbal feedback.** I followed a *sandwich approach* (Parsons & Reid, 1995; Reid & Parsons, 1995) when delivering feedback to teachers during the Modeling/Coaching phase. A *sandwich approach* is an method of delivering feedback that (a) begins with positive or empathetic statement; (b) identifies skills performed correctly; (c) identifies skills performed incorrectly; (d) specifies how to change/improve the incorrect performance; (e) solicits questions from the performer; (f) describes next actions to the performer; and (g) ends with a positive statement. It is possible that combining verbal feedback with the graphic display of student outcomes (mand data), as well as fidelity percentages, would yield more efficient results, as there is evidence that better treatment integrity was produced by combining graph and verbal performance feedback (Hagermoser Sanetti et al., 2007). Graphic display of treatment integrity data can be effective (Codding et al., 2005); however, it is unknown whether displaying student outcome data (number of spontaneous and prompted mands per session) would be effective. Ultimately, performance feedback is more effective when its presentation includes a graphic component and is provided frequently (Balcazar, Hopkins, & Suarez, 1985).

**Feedback and coaching as aversive variables.** Future research could also facilitate an examination of whether the teachers perceived feedback as aversive, and meeting competency criteria functioned as negative reinforcement or not. Application of
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a negative reinforcement contingency, in combination with performance feedback, may increase treatment integrity and impact student outcomes of manding more efficiently.

During the feedback phase, Sara commented that she was uncomfortable receiving feedback, and felt nervous. It may be possible that this feedback for Sara functioned as a punisher and influenced her implementation or lack of implementation of the feedback being delivered. Teacher or trainee behavior is subject to contingencies of reinforcement (DiGenarro et al., 2005) and likely to punishment. Researchers have documented much success with use of feedback, however, it is possible that these positive outcomes are associated with and confounded by reactivity to being observed (Gresham et al., 2000).

Training schedule. The time frame allotted to complete the OTV training also may have proved to be a limitation because the teachers initially had some difficulty completing the training during the workday, and I did not establish a deadline for when the teachers had to complete each video. As a result, the teachers took longer than expected to finish the OTV packages. If the program manager had mandated that teachers schedule time into their daily schedules across one or two weeks, they may have completed the three hours of OTV more quickly and efficiently. Another possible reason for the latency in completion of the training materials could be 'teacher buy-in'.

Experimental control. Another limitation to consider is that I did not attain consistent experimental control of the independent variables with one participant, Buddy. During Baseline and OTV, Buddy’s demonstration of poor echoic stimulus control indicated that he did not possess an echoic repertoire, therefore resulting in a lack of
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functional control for OTV. It would have been helpful to use a measure other than staff recommendations to determine participant inclusion, as their reports that student participants demonstrated emerging echoic skills were not completely accurate. A quick assessment of students’ echoic skills would have proved useful during the selection process. One such assessment worthy of consideration for future researchers may be the Echoic Assessment component of the VB MAPP (Esch, 2008).

During the echoic-to-mand procedure for Buddy, some functional control was attained, however inconsistent and variable. During Feedback, no observable changes in Buddy's spontaneous manding were observed as a result of the feedback delivered that I delivered, and indicating a lack of experimental control in this phase. The researcher initiated intervention resulted in a modification of the CM procedure for Buddy, and resulted in some experimental control for prompted mands, however not for spontaneous mands. Finally, during Follow-Up, some control was maintained for prompted mands, however for spontaneous mands, no control was maintained.

Transfer trials. An additional limitation of the study may have been the teachers’ ability to deliver transfer trials, which may have impacted the frequency of manding by SWA. Teachers were given feedback on how to complete a transfer trial (transfer of stimulus control from prompted to spontaneous). For example, a transfer trial occurs when the teacher prompts a mand, and then does not deliver the reinforcer immediately. Instead, she waits for a spontaneous mand to occur within a few seconds and only delivers the reinforcer upon this response. Successful transfer of stimulus control results in increased numbers of spontaneous mands. One teacher (Chieko), in particular, learned
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more quickly to identify when to transfer stimulus control in response to the feedback she received during coaching. As a result, she began to make independent determinations of when to implement a transfer trial, and her student subsequently demonstrated a significantly higher numbers of spontaneous mands than the students of other teachers. The resulting number of spontaneous mands demonstrated a co-variance to the decrease in prompted mands for KayCee.

Sara appeared to have difficulty learning to transfer stimulus control from a prompted mand to a spontaneous mand in order to increase the number of spontaneous mands for Braddah, and as a result, was inconsistent in increasing spontaneous mands in earlier phases. It was not until CM that Sara began to demonstrate understanding of the feedback and modeling to implement a transfer trial that Braddah's spontaneous mands began to increase. For Haunani, transfer of stimulus control was not indicated as a acquisition target, as Buddy demonstrated little echoic control, and the determination was made to prioritize and focus on eliciting prompted mands in order to increase his echoic control.

**Data collection system.** Another limitation of note is the data collection system used for the study. I collected mand data on a trial-by-trial basis, which made it difficult to record the five scores for each mand trial once the frequency of mands increased significantly. This increased frequency could have caused the experimenter to miss a step or even a mand while recording data for a previous mand. The reliability observer coded video of the sessions and could pause the video while she entered data on the recording sheet. This likely contributed to the reduced interobserver agreement; however, IOA
scores were still at acceptable levels that suggested the impact of this limitation might have been minimal.

Researchers should consider designing future studies with interval recording during in-vivo data collection to make recording less effortful. They might also consider using video to record each session to control for this limitation and ensure that each IOR recorder can pause and rewind the video to score each mand more accurately.

**Prompt mand.** Lastly, the four-step procedure used to determine fidelity of implementation included "prompt mand" (effectively prompted mand and child responded to prompt), which was difficult to assess. When the teacher was unsuccessful in prompting the mand, there was no way to record how many times it took for the SWA to respond with a vocal echo to the prompt provided. This step also failed to account for errors related to prompt delivery by the teacher (e.g., not waiting for student to mand spontaneously after verification of MO and prompting right away), and did not address the process of transferring stimulus control from a prompted mand to a spontaneous mand.

**Implications for Practice**

The findings of this study reveal several valuable implications for the use of training packages for teaching mand training steps using OTV to early interventionists and other educators or service providers. First, OTV alone did not appear to produce notable increases in the number of mands for SWA. The teachers did not acquire skills to significantly impact student outcomes with OTV alone. They required feedback and coaching to impact student outcomes with increasing the number of mands emitted by the
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student, and this finding was also validated by the questionnaires given to teachers as part of the social validity assessment. Improvements in student behavior were associated with implementation accuracy for most students, however the teachers already possessed higher degrees than in previous studies mentioned, and demonstrated somewhat higher fidelity of implementation of the mand step procedures, so the improvement in fidelity, if any, was not highly correlated to the student mand outcomes.

The ultimate survival of a PD program weighs heavily on acceptability by the staff (Parsons et al., 2012). Possible reasons for acceptability may include the following:

- **A performance-based competency requirement**: Staff may find training more acceptable if they are able to use skills immediately to benefit their clients.

- **The use of supportive feedback or descriptive praise**: Staff prefers positive reinforcement comments during on the job training.

- **Active participation and engagement during training**: as opposed to traditional in-service type trainings which many times include long periods of sitting and lecture (Parsons et al., 2012).

This training program involved the use of all three suggestions for increasing acceptability, which may increase the likelihood for adoption and implementation of such blended training programs for other teachers and practitioners.

**Future Research**

The findings of this study reveal several valuable limitations and implications to explore for the use of training packages for teaching mand training steps using OTV to
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early interventionists and other educators or service providers. First, OTV alone did not appear to produce notable increases in the number of mands for SWA. The teachers did not acquire skills to significantly impact student outcomes with OTV alone. They required feedback and coaching to impact student outcomes with increasing the number of mands emitted by the student, and this finding was also validated by the questionnaires given to teachers as part of the social validity assessment. Improvements in student behavior were associated with implementation accuracy for most students; however the teachers already possessed higher degrees than in previous studies mentioned. Future studies could address this with teacher or paraprofessional participants without degrees. These teachers demonstrated somewhat higher fidelity of implementation of the mand step procedures, so the improvement in fidelity, if any, was not highly correlated to the student mand outcomes. Other research topics include latency of feedback, usefulness of OTV to train teachers on other EBP procedures, as well as comparisons of combinations of graphic and verbal feedback.

Summary

Given the limitations discussed, the present results are nevertheless encouraging in light of recent challenges in PD for schools and early intervention agencies. Epistemic issues remain systematically related filling the research-to-practice gap with EBPs; however, OTV remains a valuable vehicle of delivery for initial training in knowledge and concepts, allocating the time and expertise of behavior analysts and lead teachers to fulfill the necessary components of coaching and feedback during on-the-job and in-vivo applied settings. The procedures and mixed results presented here suggest that teachers
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can be relatively well trained to deliver mand training with some fidelity when their learners have already developed a relatively strong echoic repertoire. The benefit of adopting and implementing OTV as a PD vehicle to replace in-service type trainings, is unrealized, and with some time, hopefully will become a standard in the field of education and behavior analysis.
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Appendix A: Informed Consent Package for Teacher Participation in Research

September 2012

My name is Amy Wiech, and I am a graduate student at the University of Hawai‘i (UH) in the Department of Special Education. One requirement of my doctoral degree program is to conduct a research project. The purpose of my project is to teach a procedure called "manding" to the paraprofessionals/teachers whom support children with autism. This will likely increase your child's ability to request the things he/she wants using approximations of words or vocalizations of words. I am asking for your permission (consent), to participate in this project. If you participate in this project, you will receive free training for participating in this project.

**Activities & Time Commitment:** If you participate in this project, here is what I will do and how long it will take:

- First, I will observe you working with your assigned student for a total of 15 minute sessions, for 3-5 sessions, that is 15 minutes per day at Easter Seals or home. During these observations, I will collect data on communication between you and your student.

- Next, you will complete a pre-test for each of 2 videos required for the study (see Appendices A and B). The two videos are called Introduction to Verbal Behavior, and Mand Training. Each video will take you about 1 hour to view and complete the post test for. The training videos will show you an evidence based intervention to teach manding or requesting to your student.
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- Last you will complete a post test to help me see how much you learned from the video. You will be able to view these videos at work since your program manager has approved this. Please let your program manager know when you have completed both pre-tests and both videos so we can begin the next phase.

- After you complete the 2 hours of video training, I will again observe you working with your student for 15 min sessions for 3-5 sessions.

- Next, you will be instructed to use a checklist, to help you in the procedures being taught. This is the second step of this study.

- Next, I will observe you working with your assigned student for 15 minute sessions, for 3-5 sessions, that is 15 minutes per day at Easter Seals or home.
  During these observations, I will collect data on communication between you and your student.

- Next you will be given a session of verbal feedback based on the checklist during your sessions with your student. This is the third step. I will then observe you working with your assigned student for 15 minute sessions, for 3-5 sessions, that is 15 minutes per day at Easter Seals or home. During these observations, I will collect data on communication between you and your student.

- Last, you will be given coaching and modeling session pertaining to the checklist. This is the fourth step. I will observe you working with your assigned student for 15 minutes, for 3-5 sessions, that is 15-30 minutes per day at Easter Seals or in the home. During these observations, I will collect data on communication between you and your student.
Finally, I will ask you to fill out a 6 item written survey which will take you 5 minutes to complete.

**Risks and Benefits:** I believe there is little risk to you participating in this project. However, if you become stressed or uncomfortable, please let me know and you can take a break, stop, or discontinue your participation in this project.

I believe that participating in this project may directly benefit you by having you learn about and use techniques that help your student(s) improve how they make requests, to you, and perhaps other people, for objects and activities that they want. I also hope that the results of this study will contribute to research findings and help other paraprofessionals, therapists, teachers and students, in the future.

**Voluntary Participation:** Your participation in this project in voluntary. Moreover, at any time, you can stop participating in this project, and you can withdraw your consent without any loss of benefits or rights.

**Confidentiality and Privacy:** When I report findings from this project (e.g., in a paper, published article, or at a professional conference), I will take steps to ensure your privacy and confidentiality. I will not use your real name or other personally identifiable information in any report. Instead I will use a pseudonym/fake name. During this project, I will keep data that I collect in a secure location. Only my advisor and I will have access to research records, although legally authorized agencies, including the University of Hawai'i Human Studies Program, have the right to review research records.
Questions: You can contact me at 808-637-7736 if you have any questions about this study. You can also contact my UH advisor, Dr. Mary Jo Noonan at 956-5599. If you like, please contact me and I will provide you a project report/summary after the project is finished.

If you have any questions about your or your child’s rights as research participants, you can contact the UH Human Studies Program, by phone at (808) 956-5007 or by e-mail at uhirb@hawaii.edu.

Please keep the prior portion of this consent form for your records.

If you agree to participate in this project, please sign the following signature portion of this consent form and return it to Amy Wiech.
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

CONSENT FOR TEACHER PARTICIPATION

I have read the above information regarding this study, and I agree to participate in the research project entitled, **A Comparison of Video Based Training Components as Professional Development for Paraprofessionals working with Children with Autism.** I understand that, in order to participate in this project, I understand that I can change my mind about participating, at any time, by notifying the researcher to end participation in this project.

Name of Teacher (Print): ________________________________

Signature: ___________________________________________

Date: ________________________________
Appendix B: Informed Consent Package for Child Participation in Research

September 2012

Dear Parents/Guardians,

My name is Amy Wiech and I am a doctoral candidate in Special Education/Exceptionalities at the University of Hawaii, Manoa. A requirement of completing my course of study is to conduct a research project under the supervision of my faculty advisers Drs. Mary Jo Noonan and Dennis McDougall, professors in the College of Education, Department of Special Education. This letter is being provided to you to explain my research and ask for your permission to include your son/daughter in my project. The following is a description of the study I plan to conduct and an explanation of your rights.

My study will examine the effects of online training for early interventionists who support students with autism. I will be investigating the effects of the use of online training by the early interventionists who support students with autism. Due to reactivity, we will explain what behaviors we are measuring after the completion of the study. The behaviors being measured will be related to implementation of mand training or requesting.

At the conclusion of the study, I am willing to provide free access to Autism Training Solutions (ATS) to each family as well as the early intervention agency you are working with. This would directly benefit your child's teachers, related service personnel as well as you as parents, who can also utilize this valuable training resource online.
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

Your child will be involved in several sessions, which would be conducted during your scheduled early intervention sessions. Sessions would occur at your child's school during naturally occurring opportunities where requesting would occur, (i.e. center time). You are in no way obligated to grant permission for your child to participate in this study, and your child will not be penalized in any way for not participating. If your child does participate, you have the right to withdraw him/her from the study at any time without prejudice to you or your child. During any session, if your child asks to stop, or shows signs of wanting to stop (beyond what might be expected in any routine teaching situation), the session will be terminated. Please be assured that your child's name will not be revealed in any publication, document, recording, computer storage, or any other form of report or presentation developed from this research.

Attached are two copies of the research consent form. By signing this consent form, you are granting permission for your child to participate in this research project. You should return a signed copy of the form and keep the second for your records. Please return forms by ________________.

If you have any questions regarding this research or your rights related to participating in this research, please feel free to call me at 808-637-7736 or Dr. Mary Jo Noonan at 808-956-5599.

Thank you for your cooperation.

Amy Wiech, M.Ed., BCBA
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

I give consent for my child ___________________________ to participate in research entitled ___________________________ being conducted by Amy Wiech, M.Ed., BCBA Primary Investigator in collaboration with Mary Jo Noonan, PhD. The intention of this study is to fulfill course requirements of a Doctoral Degree program at the University of Hawaii.

In this study, we are attempting to provide the teachers and teachers who are in your child's classroom with some training used to increase functional communication skills.

Here's what we will do:

1. I will observe your child in his/her during 1:1 instruction during scheduled early intervention sessions, as well as observe the teaching behaviors of the early interventionist assigned to your child. The total duration of the study could last up to 10 months. During these observations we will be collecting data. The data we are collecting pertain to your child's functional communication.

2. After Baseline when we are observing, your child's teacher will watch some training videos. The training that your child's teacher will receive is called "Mand Training". Mand training is an instructional procedure used to increase functional communication with students with disabilities.

3. Once the teacher has watched the videos, and passed a comprehensive test with at least 80% accuracy, intervention data will be collected.
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

4. During the intervention phase, we will continue to collect data on the 1:1 sessions. We will add a component called "Feedback/Coaching" to help the teachers get better results.

Possible Risks and Benefits:

The risks and discomforts associated with participating in this research investigation are minimal. There are no financial or physical risks associated with this study. During sessions, your child's teacher will continue to provide special education services as outlined in your child's IFEP. No guarantees will be made with respect to the outcomes of the intervention. Although it is not possible to assure that your child's language skills will increase, there are potential benefits associated with participating in this research study. You and your child's teachers will be provided with free access to Autism Training Solutions online training platform and may learn new procedures that could help your child's functional communication improve. It is also hoped that this study will contribute to the field of special education, by providing evidence and support for online training of special education staff.

As stated in the letter you received, your child's name will not be used. The data will be kept in a locked file cabinet in a locked room. If you would like a summary of the study after its completion, please contact me and I will gladly send you one.

For the purposes of the study, the procedures to be followed, and expected duration of my child's participation have been described to me. Possible benefits of the study have been described above, as have alternative procedures, if such procedures are
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

applicable and available. I acknowledge that I have had the opportunity to obtain additional information regarding the study and any questions that I have raised have been answered to my full satisfaction. Furthermore, I understand that my child is free to withdraw consent at any time and to discontinue participation in the study without any prejudice to my child.

Finally, I acknowledge that I have read and fully understand this consent form. I sign it freely and voluntarily. A copy has been given to me. If any further questions arise, I may contact the primary researcher Amy Wiech at 808-637-7736 to gain additional information or Dr. Mary Jo Noonan, at 956-5599. If I have questions about my rights as a participant, I can call the Committee on Human Studies at UH at 956-5007 or email them at uhirb@hawaii.edu.

__________________________________
Person Authorized to Consent for Participant Child

__________________________________                      _____________
Name/Signature                      Date

_______________________________  __________________
Principle Investigator or Representative

_______________________________  __________________
Name/Signature                      Date
Appendix C: Teacher Demographics Results

Table C1

Teacher Demographics

<table>
<thead>
<tr>
<th>Demographic Categories</th>
<th>“Sara” (SB)</th>
<th>“Chieko” (SM)</th>
<th>“Haunani” (HK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Female</td>
<td>Female</td>
<td>Female</td>
</tr>
<tr>
<td>Age</td>
<td>55 years old</td>
<td>37 years old</td>
<td>35 years old</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Filipino/Japanese</td>
<td>Japanese American</td>
<td>Chinese/Caucasian</td>
</tr>
<tr>
<td>Years teaching SWA</td>
<td>7</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Hours of training to teach SWA how to talk</td>
<td>0</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Self-rated therapist level 1-5</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Self-rated opinion of previous professional development opportunities impacting students</td>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Years of College</td>
<td>6+</td>
<td>6+</td>
<td>6+</td>
</tr>
<tr>
<td>Degree Awarded</td>
<td>B.S. in Home Economics</td>
<td>BS Speech-Language Pathology</td>
<td>M.S. Speech Language Pathology</td>
</tr>
<tr>
<td></td>
<td>M.Ed. Special Education</td>
<td></td>
<td>M.Ed. Special Education</td>
</tr>
<tr>
<td>Position in early intervention</td>
<td>Special Education Teacher</td>
<td>Special Education Teacher</td>
<td>Speech-Language Pathologist</td>
</tr>
</tbody>
</table>

Note: Self Rating Rubric for Self Rated Therapist Level 1-5: 1= novice, I need to learn a lot; 2= have had some training, but could always learn more; 3= intermediate learner, I feel I am doing well; 4=I have pretty much seen it all, and don't think I can learn much more; 5= expert therapist/teacher; not much more to learn.

Note: Self Rating Rubric for Opinion of previous professional development opportunities impacting; students: 1= strongly disagree; 2=disagree, 3= slightly disagree; 4= slightly agree; 5= agree; 6= strongly agree.
Appendix D: Social Validity Questionnaire for Teachers
A Comparison of Video Based Training Components as Teacher Development for Early Interventionists working with Children with Autism

Name: __________________________ Pseudonym: ____________________________

1- strongly disagree  2-disagree  3-slightly disagree  4-slightly agree  5-agree  6-strongly agree

1. By participating in this study, I learned more about how to help students to make requests/mands.
   1  2  3  4  5  6

2. Since participating in this study, my student repeats (echoes) what I am saying more frequently (prompted mands).
   1  2  3  4  5  6

3. Since participating in this study, my student makes spontaneous requests (mands) more often.
   1  2  3  4  5  6

4. As a result of this study, my student has learned more language that is important for him/her.
   1  2  3  4  5  6

5. I see myself using the knowledge and skills that I acquired during this study to help other students I work with now and in the future.
   1  2  3  4  5  6

6. I think that the 2 hours of video training was adequate to teach me how to help my student to mand (without the add on components).
   1  2  3  4  5  6

7. I think that verbal feedback from the researcher add-on was necessary (when combined with the video training) to teach me how to help my student to mand.
   1  2  3  4  5  6

8. I think that coaching/modeling from the researcher add on was necessary (when combined with video, and verbal feedback) to teach me how to help my student to mand/request.
   1  2  3  4  5  6

Comments on study:
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

Appendix E: Student Demographics Results

Table E1

*Battelle Developmental Inventory Second Edition Standard Scores and Descriptions of Participants*

<table>
<thead>
<tr>
<th></th>
<th>Braddah: 29 months old</th>
<th>Buddy: 23 months old</th>
<th>KayCee: 29 months old</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IQ 94 (SS)</td>
<td>IQ 70 (SS)</td>
<td>IQ 81 (SS)</td>
</tr>
<tr>
<td></td>
<td>Cognitive 93 (SS)</td>
<td>Cognitive 74 (SS)</td>
<td>Cognitive 84 (SS)</td>
</tr>
<tr>
<td></td>
<td>Motor 113 (SS)</td>
<td>Motor 77 (SS)</td>
<td>Motor 113 (SS)</td>
</tr>
<tr>
<td>Adaptive Score</td>
<td>104 (SS)</td>
<td>75 (SS)</td>
<td>84 (SS)</td>
</tr>
<tr>
<td></td>
<td>• Able to undress.</td>
<td>• Starting to chew foods, rather than mashing with tongue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Feeds self with utensil.</td>
<td>• Emerging with using utensil</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Toileting is emerging.</td>
<td>• Emerging use of sippy cup rather than bottle</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Awakes 1-2 times a night for a bottle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Personal-Social Score</td>
<td>92 (SS)</td>
<td>95 (SS)</td>
</tr>
<tr>
<td></td>
<td>• Separates easily from caregivers.</td>
<td>• Displays emotions when frustrated (e.g., throwing toys)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Takes pride in achievements and expresses enthusiasm for his play.</td>
<td>• Beginning to show affection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Follows routines at day care.</td>
<td>• Showing interest in colorful objects and pictures, beginning to recognize self in mirror. Not yet engaging in back and forth play with others.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Imitates peers. Indicates that he hurt himself.</td>
<td></td>
<td>• vocalizes when imitated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Allows others to participate in her activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Response positively when praised</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Enjoys being read to</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Aware of other children around her</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Waves &quot;bye&quot; but does not yet spontaneously greet others</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Assists with dressing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• asks for food by using signs or pulling mother to fridge</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Assists with cleaning up toys</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Not potty trained</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Unable to undress independently</td>
<td></td>
</tr>
</tbody>
</table>

175
### VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

<table>
<thead>
<tr>
<th>Braddah: 29 months old</th>
<th>Buddy: 23 months old</th>
<th>KayCee: 29 months old</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication: 75 (SS)</td>
<td>Communication: 55 (SS)</td>
<td>Communication: 69 (SS)</td>
</tr>
</tbody>
</table>

- Continues to demonstrate appropriate understanding of language.
- He identifies your and my and follows verbal commands.
- Expressive language skills are developing slowly.
- He is beginning to use a few words spontaneously.
- He says:  bye, hi, no, ball, mom, "ena"/Kalena (dog's name, eyes, head, blue, and combines "mom come," and let's go .
- Speech imitation skills are improving but is still dependent on willingness.
- Possible developmental verbal apraxia.

- Responds to tone of voice, responds to sound outside of his field of vision. Beginning to attend to someone speaking to him.
- Understanding of spoken words is still inconsistent even with gestural cues
- Expressive words heard spontaneously are go, goggle (bubble), dee (doggie), yay, book.
- Continues to vocalize more
- Starting to imitate simple words

- Inconsistently responds to name
- Able to identify family members when named, responding to simultaneous verbal and gestural commands.
- Follows familiar verbal commands to pick up___, sit down, etc. Understands prepositions out and on.
- Expressive: demonstrates communication intent using a few words and signs.
- She is spontaneously initiating sounds, words, or signs associated with objects in the environment. She is using more signs to communicate such as more, please, dirty, dog, ball, baby and eat. Words heard include "buh"/ball to label or request, says "tut/out,. Starting to produce more animal sounds spontaneously.
- Continues to struggle to initiate speech sounds. May have a motor planning problem.

Note: Scores reported from the Battelle Developmental Inventory Second Edition. All scores reported in Standard Scores (SS) as reported at Baseline.
### Appendix F: Social Validity Questionnaire for Parents

A Comparison of Video Based Training Components as Teacher Professional Development for Early Interventionists working with Children with Autism

Name of Child: ___________________ Parent Name: ________________________________

<table>
<thead>
<tr>
<th>1- strongly disagree</th>
<th>2-disagree</th>
<th>3-slightly disagree</th>
<th>4-slightly agree</th>
<th>5-agree</th>
<th>6-strongly agree</th>
</tr>
</thead>
</table>

1. By participating in this study, my child learned how to request the things he/she wants more.  

2. Since participating in this study, my child repeats (echoes) what I am saying more frequently.  

3. Since participating in this study, my child makes spontaneous requests (mands) more often.  

4. As a result of this study, my child has learned more language that is important for him/her.  

5. By participating in this study, I was able to learn some of the same techniques to help my child at home.  

Comments:
# Appendix G: Feedback Evaluation Tool

## Manding Evaluation Tool and Feedback Script

<table>
<thead>
<tr>
<th>Staff:</th>
<th>Child:</th>
<th>Observer:</th>
<th>Date:</th>
</tr>
</thead>
</table>

Feedback Protocol (Reid)

**Steps**

1. Begin with positive or empathetic statement
2. Identify skills performed correctly
3. Identify skills performed incorrectly
4. Specify how to change/improve incorrect performance
5. Solicit questions
6. Describe next actions
7. End with positive or empathetic statement
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

<table>
<thead>
<tr>
<th>Checklist evaluation</th>
<th>Score + or --</th>
<th>Feedback script (Step 4)</th>
<th>Feedback required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher sanitizes area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher verifies child's MO for item before prompting</td>
<td></td>
<td>Present an item or activity and observe the child to look, grab, or reach for item to verify if he/she really wants it and has an Mo for it before prompting him/her.</td>
<td></td>
</tr>
<tr>
<td>Teacher fades prompts effectively</td>
<td></td>
<td>Immediately after giving an echoic/vocal prompt and child mands for item successfully, quickly provide opportunity for a transfer trial to a spontaneous mand. You can do this by waiting up to 3 seconds after the exaggerated presentation of the item, or by gesturing with mouth, or by giving a phonemic prompt (mouth with sound). You should be trying for lesser intrusive forms of the echoic prompt as you are working towards more spontaneity.</td>
<td></td>
</tr>
<tr>
<td>Teacher does not use questions as prompts, such as &quot;What do you want?&quot;</td>
<td></td>
<td>Just present the name of the item or activity as a prompt once you have verified the MO. Do not ask a question such as &quot;Do you want...?&quot; or &quot;What do you want?&quot;</td>
<td></td>
</tr>
<tr>
<td>Teacher utilizes procedures across a variety of motivational categories (eg. food, toy, activity)</td>
<td></td>
<td>Make sure you are offering a variety of items/activities from a variety of categories (food, toys, activities).</td>
<td></td>
</tr>
<tr>
<td>Teacher does not target general mands (ie, &quot;more&quot;), or do not require politeness (eg. &quot;please&quot;)</td>
<td></td>
<td>Be specific about naming the items your student is manding for when prompting him/her. Do not require &quot;please&quot; or use &quot;object + please in manding&quot;. These are general mands and if you teach them, eventually you will have to unteach them.</td>
<td></td>
</tr>
</tbody>
</table>

Total + = _____  Total -- = _____  _____ %
Appendix H: Introduction to Verbal Behavior Pre-Post Test

1. Who wrote Verbal Behavior and broke down language into verbal operants?
   a) Pavlov  
   b) Lovaas  
   c) Watson  
   d) Skinner

2. An airplane flies overhead and a girl says "airplane". This is an example of which verbal operant?
   a) Imitation (mimetic)  
   b) Tact  
   c) Mand  
   d) Echoic

3. A man approaches a pizza counter and says, “May I have a slice of cheese?” This is an example of which verbal operant?
   a) Mand  
   b) Intraverbal  
   c) Listener response  
   d) Tact

4. As a dog walks in front of a boy, he says, "look a dog." This is an example of which verbal operant?
   a) Tact  
   b) Listener response  
   c) Echoic  
   d) Intraverbal

5. Billy saying, “my name is Ricky” after Ricky said, “my name is Ricky” is an example of which verbal operant?
   a) Intraverbal  
   b) Listener response  
   c) Mand  
   d) Echoic

6. Skinner's analysis of verbal behavior emphasizes _________ in addition to the form of language.
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

a) function
b) topography
c) order
d) classification

7. Vocal Imitation is synonymous with

a) mimetic behavior
b) gross motor behavior
c) echoic behavior
d) fine motor imitation

8. ___________ are usually the first form of communication to develop in typically developing children.

a) Mands
b) Tacts
c) Intraverbals
d) Following Directions

9. When people say "MO", they are referring to

a) mimetic operant
b) motivating operation
c) motor operants
d) manding operant

10. Which operant directly benefits the speaker?

a) the intraverbal
b) the tact
c) the mand
d) the echoic

11. Mands can result in getting all of the following EXCEPT?

a) tangibles
b) actions
c) information
d) MOs

12. Non-specific reinforcement includes all of the following EXCEPT?
a) the object that was named  
b) praise  
c) nodding yes with your head  
d) social attention  

13. Skinner believed that learning a word in one operant

a) would readily transfer to all other operants  
b) was sufficient for language acquisition  
c) may not transfer to other operants  
d) would always have to be taught in every single operant

14. Responses from this operant occur when someone names an item that is contacted through one of their five senses. These responses are maintained by non-specific reinforcement.

a) mand  
b) tact  
c) intraverbal  
d) listener response

15. Clapping upon seeing another individual clapping is an example of what behavior?

a) mand  
b) listener response  
c) imitation (mimetic behavior)  
d) tact

16. Another term for listener responding is?

a) expressive language  
b) mimetic language  
c) imitative language  
d) receptive language

17. A woman saying, “Cynthia” after being asked, “What’s your name?” is an example of which verbal operant?

a) intraverbal  
b) mand  
c) listener response  
d) echoic
VIDEO-BASED TRAINING FOR EARLY INTERVENTIONISTS

18. Behavior that is evoked by another’s verbal behavior, such as conversation can be best described as

a) manding  
b) tacting  
c) intraverbal  
d) echoic
Appendix I. Teaching to Request/Mand Pre-Post Test

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

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

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

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

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

b) Antecedent: Jose sees a bird and doesn’t want it. Behavior: Jose says, "bird". Consequence: Jose’s friend looks at the bird  
d) 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?

a) 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.  
b) Antecedent: Kari’s mom says, “Put your doll away” Behavior: Kari puts her doll away. Consequence: Kari’s mom says, “Thank you”  
c) Antecedent: Kari’s mom says, “where is your doll?” Behavior: Kari says, “I don’t know.” Consequence: Kari’s mom says, “ok”  
d) 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…

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

6. A mand is controlled by…

a) motivation  
b) Discriminative Stimuli  
c) prompts  
d) reinforcers

7. Motivating Operations are…

a) antecedents for all language.  
b) changes in the environment that temporarily increases the value of a particular object or event.  
c) reinforcers that motivate people to increase the rate of mands.  
d) 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.

a) True  
b) False

9. When you alter the environment to create motivation for something, you are…

a) using the principles of DISC  
b) setting up for your session.  
c) disrupting others in the class.  
d) contriving and capturing motivating operations.

10. What does it mean to “sanitize the environment?”

a) Use disinfectant to clean all surfaces and materials.  
b) Clear the area of all clutter and distracting items.  
c) Prevent free access to items the students wants so they can mand for it.  
d) Clear the area of flashy colors and too many hangings on the walls.

11. All of the below are examples of sanitizing the environment EXCEPT

a) putting toys they want out of reach.  
b) putting items in hard to open containers.  
c) spraying the materials with anti-bacterial soap everyday.  
d) purposefully leaving out an essential item from an activity.
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12. There a number of modes of communication you can teach in mand training. All of the following are good options to teach in mand training EXCEPT

   a) pulling person towards desired item.
   b) Picture Exchange Communication System
   c) keyboarding
   d) sign language

13. When deciding what mands to teach you should...

   a) choose what mands YOU want them to learn first.
   b) always teach them to say “please” after each mand.
   c) do a preference assessment to determine what motivates your learner.
   d) not choose food items since it’s distracting to other children around them.

14. When a learner is first learning to mand avoid teaching...

   a) generalized words like “more” or “eat”.
   b) carrier phrases such as “I want..” or “Can I have”.
   c) mands for yes and no.
   d) all of the above.

15. You can verify that there is motivation when

   a) the individual is looking intently at the item.
   b) the individual is reaching for the item.
   c) the individual is moving toward the item.
   d) all of the above

16. James is reaching for a gummy worm you have in your hand, he isn’t saying “gummy” what is the most intrusive prompt you can give?

   a) model the word “gummy”/ echoic prompt.
   b) model a part of the word “guh”/ partial echoic
   c) wait a little longer for him to respond/ time delay
   d) point at the gummy/ gesture

17. You can transfer the control of the mand to the motivation operation alone by...

   a) systematically fading your prompts.
   b) prompting least to most.
   c) requiring your learner to mand 100 times a day.
   d) always prompting with the most intrusive prompt so they are always successful.
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18. You can track your learners progress in mands by...

   b) taking frequency data and graphing the results to be analyzed over time.
   c) track frequency of problematic behaviors.
   d) ask the parent how many times they mand at home.
   e) make an educated guess on how often your learner is manding per hour because it's not realistic to take frequency data.

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

   a) True
   b) False
Appendix J: Screen Shots of OTV Modules

Figure J1. This screenshot illustrates the OTV example for Introduction to Verbal Behavior Module viewed by the participant teachers. The video player is present on the left side of the screen, and a visual checklist system is visible on the right side. Both items instructed teachers about which sections they had completed and how many more sections they needed to complete to finish the entire video. A notes section is visible on the bottom, where teachers could type in notes while they were watching the video.
Figure J2. This screenshot illustrates the OTV example Teaching to Request/Mand Module viewed by the participant teachers. The video player is present on the left side of the screen, and a visual checklist system is visible on the right side. Both items instructed teachers about which sections they had completed and how many more sections they needed to complete to finish the entire video. A notes section is visible on the bottom, where teachers could type in notes while they were watching the video.