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Professional Development as a Means to Increase Teacher Fidelity and Improve Teacher and Student Outcomes

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PROFESSIONAL DEVELOPMENT AS A MEANS TO INCREASE TEACHER
FIDELITY AND IMPROVE TEACHER AND STUDENT OUTCOMES

A Thesis
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Science
in
Special Education

by
Shari Lynn Booth
March 2017

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ABSTRACT

This study was conducted to examine professional development techniques for training special education teachers to implement discrete trial training within the classroom environment. The purpose of this study was to determine if professional development regarding discrete trial training increases the fidelity with which teachers implement discrete trial training when providing instruction to students with autism spectrum disorder. Specifically, the study noted if professional development that included coaching in the classroom increased the fidelity with which teachers were able to implement discrete trial training. Further, this study examined the correlation between an improvement in the fidelity with which teachers implemented discrete trial training and positive student outcomes. Six studies were included in the present study. These studies found that following an initial presentation of information regarding discrete trial training within the classroom coaching leads to an increase in teachers' ability to implement discrete trial training with fidelity. An increase in teacher fidelity was found to correlate positively to an increase in positive student outcomes such as increased student learning and decreased negative student behaviors. The impact these improvements in teacher and student outcomes stand to have on issues such as teacher burnout, attrition, and self-efficacy are also discussed.

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CHAPTER ONE

INTRODUCTION

There are a number of interrelated factors which impact both teacher and student outcomes in the field of special education. Such issues include teacher ability, teacher burnout and attrition, teacher self-efficacy, student learning, and both positive and negative student behavior. Evidence based practices (EBP), which are practices shown by research to effectively promote student learning, have the potential to greatly improve the special education environment by improving both teacher and student outcomes. Training teachers to implement EBP with fidelity has the potential to increase student learning and decrease negative student behavior. Increasing such positive student outcomes will potentially increase teacher self-efficacy and lower rates of teacher burnout and attrition. Providing teachers with effective professional development so that they have the ability to implement EBP with fidelity is a critical factor to improving both teacher and student outcomes in the field of special education.

Evidence Based Practices in Special Education

EBP, specifically those designed for students with autism spectrum disorder (ASD) are gaining prominence in the field of special education. EBP are heralded as techniques and strategies which, when implemented with fidelity, can greatly increase positive student outcomes. Increased student learning in the

areas of academics, communication, social skills, and daily living skills are each examples of such positive outcomes. Additional positive outcomes are a decrease in negative student behaviors such as noncompliance, aggression, and self-injury as appropriate behaviors increase.

The identification of EBP has taken great effort on the part of researchers and their identification holds much promise and potential. Researchers have provided the field of special education with an extensive list of EBP to be used with students with ASD (Wong et al., 2014). A growing understanding of techniques and strategies that will help students with ASD learn and thrive is emerging. However, the research centering on EBP cannot conclude with the mere identification of such practices. The task remains for researchers to identify effective means by which to train teachers and other school staff to implement EBP with the fidelity required to promote positive student outcomes.

Evidence Based Practices as Prevention for Negative Outcomes

Special education teachers currently teach students to the best of their ability and are yet often unable to truly increase student learning and decrease negative student behaviors. This inability to promote positive student outcomes often results in stress and burnout on the part of the teacher. If left unchecked, burnout can lead to teacher attrition and negative student outcomes (Brunsting, Sreckovic, & Lane, 2014; Wisniewski & Garguilo, 1997; Ruble, Usher, McGrew, 2015). Burnout negatively affects both teachers and students regardless of if the teacher experiencing burnout remains teaching or leaves the profession

(Brunsting et al., 2014). It is imperative to provide teachers with appropriate training so that they can effectively implement the EBP which have been currently identified. It is reasonable to postulate that both teachers and students will experience more success when teachers are trained to implement EBP with fidelity.

It is unrealistic to expect special education teachers to be able to implement EBP with the fidelity required to promote positive student outcomes as identified through research if they are not first trained to implement EBP with the same level of skill as the researchers which identified the practices. The skillful and effective use of EBP can only be developed through comprehensive professional development. Without such training, teachers will not be able to implement EBP correctly and teachers and students alike will not receive the full benefit of the identification of EBP (Cook & Odom, 2013). This study was conducted for the purpose of identifying modes of professional development which effectively train teachers to implement EBP with fidelity so that positive student outcomes increase and teacher stress, burnout, and attrition decrease.

Professional Development as Prevention for Negative Outcomes

A cyclical relationship can be seen between teachers' ability to provide effective instruction through the use of EBP, student learning, both positive and negative student behavior, and teacher stress and burnout. When teachers are unable to provide effective instruction, student learning is negatively impacted and positive student behaviors are not promoted. This void of effective instruction

creates an environment in which students are left to exhibit negative behaviors. When teachers lack the skills to successfully manage negative student behavior and teach students the skills needed for school success, teachers experience burnout ((Nistor & Chilin, 2013; Wisniewski & Gargiulo, 1997).

Teachers experiencing burnout do not provide effective instruction to their students and thus the cycle repeats itself. Effectively training teachers to skillfully implement EBP with fidelity is critical to interrupting this cycle and to promoting both teacher and student success. When teachers are trained to implement EBP with fidelity, student outcomes improve. Student learning and positive student behaviors increase while negative student behaviors decrease. As teachers are able to promote student learning confidently as well as appropriately manage negative student behaviors, teacher stress is alleviated. As teacher and student success increase, teacher burnout and attrition decrease. With effective professional development, a new cycle emerges; one in which teachers provide effective instruction, positive student outcomes increase, negative student behaviors decrease, and teacher stress and burnout lower. (Sarokoff & Sturmey, 2007; McKenney & Bristol, 2014; & Downs & Downs, 2012). In this cycle, teacher self-efficacy is likely to increase as teachers are more able to provide effective instruction. This, in turn, is likely to promote the continuation of this positive cycle.

Introduction of the Following Chapters

The standard chapters of literature review, method, results, and discussion follow this introduction.

Literature Review

The following literature review in this study begins with explaining teacher burnout and attrition in the field of special education. It explores the causes of teacher stress and the relationship teacher self-efficacy and administrator support play in the stress experienced by teachers. Professional development, including coaching and mentoring, are discussed as a means by which to help reduce teacher stress and thus contribute to the alleviation of teacher burnout and attrition. The area of ASD is discussed and student learning and behavioral challenges which are presented by this population are noted. Additionally, shortcomings of teacher credential programs for teachers of students with ASD are also discussed. The literature review concludes with a discussion of EBP, Discrete Trial Training (DTT), and how teachers are currently receiving training regarding DTT. This information is used to generate the research questions which guide the current study.

Method

The method section in this study begins with a synopsis of both the concepts of meta-analysis and of single subject research. It defines the parameters of the inclusionary and exclusionary criteria for the articles selected to be included in this study. The independent and dependent variable included in

this study are noted as well. The method section also contains information regarding the 32 different components which the studies were examined across in effort to determine the significance of their findings when combined as a whole.

Results and Discussion

The results section of this study reports the findings of the included studies. It offers no interpretation but rather strictly states the answers to the research questions. Similarities, differences, and patterns in the research data are presented. Tables are used to relate information regarding the specific percentages reported in the findings of each of the studies. It is in the discussion section of this study that the implications of the results are explored. The importance of the results to special education teachers, students with ASD, the field of special education as a whole, and the implications for future research are each explored within the discussion section.

CHAPTER TWO

LITERATURE REVIEW

The field of special education faces many factors which limit the success experienced by both teachers and students. These issues facing the field of special education do not exist in isolation from one another. The relationship between these issues is complicated and dynamic. A significant challenge to the success of students and teachers is that of teacher burnout and attrition. Teachers of students with ASD are at an increased risk of experiencing burnout and attrition. Not only do students with ASD present unique challenges to teachers but, preparation programs for such teachers do not adequately prepare teachers to effectively educate this population of students. When teachers are unable to promote positive outcomes for their students, the teachers themselves experience the negative outcome of burnout. Teacher burnout is also influenced by negative student behaviors, such as those displayed by students with ASD, and the teachers' inability to effectively manage said behaviors.

EBP have the potential to greatly increase the positive outcomes experienced by students with ASD in the special education environment. The rates of teacher burnout and attrition can be reduced when student learning increases and negative student behaviors decrease, as occurs when EBP are implemented with fidelity. However, teachers must be equipped through

professional development to implement EBP with fidelity as a means to improve both student and teacher outcomes.

As teacher skill increases, the quality of education which students receive also increases. When teachers are trained to engage students in learning and promote positive student behaviors, student learning increases and negative student behavior decreases. Professional development, when implemented effectively, has the potential to remedy the factors which are detrimental to both student and teacher success in the field of special education. Teacher burnout and attrition can be addressed through an investigation of professional development as a means to increase the fidelity with which EBP are implemented by teachers of students with ASD.

Teacher Burnout and Attrition: Negative Outcomes

Teacher burnout is a significant problem facing the field of special education as it influences both teacher attrition and negative student outcomes (Brunsting et al., 2014; Wisniewski & Gargiulo, 1997; Ruble et al., 2015) Special educators only remain teaching for approximately six years before leaving the classroom (Wisniewski & Gargiulo, 1997). An estimated 15% of special education teachers leave the profession after their first year of teaching and an additional 10%-15% leave after their second year (Whitaker, 2000). Burnout has been identified as a significant factor in teacher attrition (Brunsting et al., 2014; Wisniewski & Gargiulo, 1997; Ruble et al., 2015).

However, not all special education teachers experiencing burnout leave the classroom. Those remaining in the profession do so at the detriment of the student population. Special education teachers experiencing burnout have a negative impact on the academic development of students. Students of special education teachers experiencing burnout are disruptive, experience social and emotional difficulties, and achieve IEP goals with less frequency (Brunsting et al., 2014).

Teacher burnout occurs when teachers undergo stress for long periods of time while concurrently experiencing emotional exhaustion, depersonalization, and lack of personal accomplishment (Maslach, Schaufeli, & Leiter, 2001; Brunsting et al., 2014). Exhaustion is the core component of burnout. It is the most obvious symptom of burnout and the most widely experienced (Maslach et al., 2001). Emotional exhaustion occurs when a teacher feels empty and that they have nothing left to give psychologically of themselves to their students. Such feelings lead to depersonalization in which teachers withdraw from their students and develop negative, cynical, and indifferent attitudes and feelings towards them (Jennett, Harris, & Mesibov, 2003). Depersonalization is an attempt by the teacher to distance themselves emotionally and cognitively from their students as way to cope with work stress. As a result, teachers then perceive themselves as less effective with their students and experience a lack of personal accomplishment (Maslach et al., 2001).

The stress which can lead to teacher burnout is multifaceted. Frequent and prolonged stress leads to behavioral and psychological responses from teachers. As stress increases, so does the level of burnout which is experienced by the teacher (Wisniewski & Gargiulo, 1997). Stress can come in the form of a lack of administrative support, challenging student behavior, role overload, and expectation-reality mismatch (Brunsting et al., 2014). A lack of administrative support is felt by teachers when the administration does not provide teachers with the resources to be successful. Negative student behaviors provoke strong emotional responses from teachers and can lead to interpersonal conflict between the student and the teacher (Wisniewski & Gargiulo, 1997). Teachers experience role overload when they perceive their time and resources are not sufficient to meet the demands which are placed on them. Expectation-reality mismatch is experienced by teachers when the reality of their teaching experience is not in alignment with the expectations held during their pre-services preparation. Special education teachers are at a heightened risk for burnout as they experience each of these factors on a regular basis (Brunsting et al., 2014).

Burnout does not have a singular cause and the factors which contribute to the stresses special education teachers face do not occur in isolation. The stressors experienced by special education teachers co-occur on a regular basis. These stressors can be grouped into four domains. The first is organizational structure in which the role of the teacher is defined and a framework for teacher

support is identified. Professional interactions, including the relationships a teacher forms with other teachers, administrators, and parents, are the second domain of stressors. The third domain of stress a special education teacher experiences is their instructional assignment itself. Professional training is the fourth domain of stress (Wisniewski & Gargiulo, 1997).

Organizational structure provides the special education teacher with valuable information regarding responsibilities, goals, objectives, and support. The stress for special education teachers regarding organizational structure occurs when the organizational structure is too ambiguous or too imposing. Role ambiguity and role conflict are two specific organizational stressors (Wisniewski & Gargiulo, 1997). Role ambiguity occurs when a special education teacher is given insufficient information to do the job which is expected of them. The job description and the expectations of their roles are not made clear. Role conflict is experienced by special education teachers when their defined role conflicts with their actual responsibilities. In role conflict, the special education teachers' responsibilities may be in conflict with one another or may be impossible to complete given the reality of the teaching situation (Wisniewski & Gargiulo, 1997; Brunsting et al., 2014).

Professional interactions are valuable to special education teachers but they can also be stressful. In particular, the relationship a special education teacher has with their supervisor can be either a significant source of stress or a protective factor against stress. A negative relationship with a supervisor,

including limited interactions, poor quality of supervision, and insufficient feedback can cause special education teachers to doubt their own abilities and question their own professional judgment. Conversely, positive interactions with a supervisor can lead a special education teacher to develop competence, decrease teacher stress, and increase levels of teacher job commitment (Wisniewski & Gargiulo, 1997). Support from a principal leads to decreased levels of special education teacher burnout (Brunsting et al., 2014).

A special education teacher's instructional assignment, particularly the student population, is a significant factor influencing teacher stress levels (Wisniewski & Gargiulo, 1997). Teachers of students with challenging behaviors are at an increased risk for job stress, burnout, and attrition. Challenging behavior includes any behavior which threatens the health and safety of the student exhibiting the behavior or that of their peers. Challenging behavior also encompasses any behavior which limits the individual's participation in social activities or access to common facilities due to the intensity, duration, or frequency of the behavior (Nistor & Chilin, 2013). Any repeated pattern of behavior which impedes learning or prosocial interactions with peers or adults is considered challenging behavior (Gebbie, Ceglowski, Taylor, & Miels, 2011). Challenging behavior includes, but is not limited to, physical and verbal aggression, self-injury, destruction of property, defiance, noncompliance, disruption of classroom activities, illegal acts, social withdrawal, and socially inappropriate behavior (Nistor & Chilin, 2013).

Teachers may experience emotional reactions such as anger, sadness, powerlessness, fear, and apathy as a result of challenging student behaviors. Challenging behavior is a stressor which leads to increased teacher experiences of emotional exhaustion and depersonalization (Nistor & Chilin, 2013). Thus, teachers of students exhibiting challenging behaviors have an increased risk for stress, burnout, and attrition. Such teachers fear physical and verbal abuse, are troubled by loud students, are concerned about discipline and their relationships with their students, feel they lack influence on academic and social skills, and feel dissatisfaction with their accomplishments (Wisniewski & Gargiulo, 1997).

Professional training is viewed as a source of stress for special education teachers in that it often fails to provide teachers with the skills they need to meet the demands of their job and cope with the stress which such an endeavor entails. Relevant training is critical for teachers to be effective in their professional practices in the classroom. Ongoing training in relation to continually changing stressors and current best practices is requisite for teacher and student success. Requiring special education teachers to implement current best practices, without providing ongoing training and resources, results in teacher stress. Classroom success motivates teachers and lowers levels of teacher burnout. However, teachers need training to fully develop the necessary skills to bring about classrooms success (Wisniewski & Gargiulo, 1997).

Teacher self-efficacy, the belief teachers hold in regards to their own ability to bring about desired student outcomes, plays an important role in

teacher burnout and attrition (Ruble et al., 2015). Self-efficacy protects special education teachers from burnout and attrition. Self-efficacy leads to an increase in teacher motivation, application of effort, and perseverance in the face of difficulties such as challenging student behavior. Confident teachers have lower stress levels and remain teaching longer than do unconfident teachers (Ruble et al., 2015). Teachers with high self-efficacy use more positive teaching strategies as compared to teachers with low self-efficacy who use more authoritarian and restrictive strategies. Special education teachers are responsible for providing students with challenging behaviors appropriate behavior interventions. Effective intervention is partially based on teacher skill and comfort level which are influenced by teacher self-efficacy (Gebbie et al., 2011). Increasing teacher self-efficacy can decrease levels of special education teacher burnout and attrition (Brunsting et al., 2014; Ruble et al., 2015).

Special education teachers cannot entirely avoid stress caused by organizational structure, professional interactions, instructional assignments, and professional training. However, the stress teachers experience can be managed. Peer support, mentoring, and support from administrators and other supervisory personnel can all contribute to the mitigation of stress teachers experience. Administrative support can help with stress related to each domain as administrators have influence in each area of stress (Wisniewski & Gargiulo, 1997).

Administrators can actively provide support to special education teachers by sharing goals and values, providing opportunities for professional development, and fostering an environment of collegial learning. Administrators also play a critical role in developing reasonable teaching assignments and providing adequate feedback and personal support. In doing so, administrators assist teachers in the development of skills and commitment which are necessary for effective teaching. Increasing teachers' job satisfaction by providing emotional and instrumental support is a significant manner in which administrators can reduce teacher stress and increase teachers' job satisfaction, thereby reducing attrition. Administrators can contribute to a reduction in special education teacher attrition through the influence they have on role design, stress, job satisfaction, commitment, and professional development (Billingsley, 2004).

Professional Development

Improved professional development can minimize teacher stress, burnout, and attrition which is beneficial to both special education teachers and students (Wisniewski & Gargiulo, 1997). Intensive professional development is both long-term and should include follow-up. A series of focused workshops over time, interspersed with opportunities for teachers to dialog with trainers after attempting to implement new strategies and techniques in their classrooms is effective model of intensive professional development. Experts can be used as a catalyst for a change but sustained improvements in teaching methods are only

achieved when teachers take ownership of the new methods. Peer coaching can help provide support to teachers to sustain and further develop their use of new teaching methods which were learned during workshop style trainings (Swartz, 2014). Additionally, mentoring is a method of professional development which can increase a teacher's skill level and job satisfaction (Whitaker, 2000; Schwille, 2008).

Mentoring

Mentoring is similar to coaching in that both provide a framework of feedback, collaboration, and support. Mentoring also includes a specific emphasis on emotional support. Whitaker (2000) states the following:

The Council for Exceptional Children (1998) identified five purposes of a mentorship program for special educators: (1) to facilitate the application of knowledge and skills, (2) to convey advanced knowledge and skills, (3) to assist timely acculturation to the school climate, (4) to reduce stress and enhance job satisfaction, and (5) to support professional induction. (p. 547)

When mentors effectively accomplish these tasks, teacher job satisfaction increases which leads to a decrease in teacher attrition.

Effective mentoring begins with the characteristics of the mentor. Professionally, mentors of special education teachers must be knowledgeable regarding effective special education teaching practices, special education procedures, and be competent at completing special education paperwork.

Effective mentors must also exhibit personal characteristics such as being approachable, trustworthy, supportive, patient, sensitive, confident, and enthusiastic. It is also important for effective mentors to have strong communication skills, work well with others, and be knowledgeable of behavior management.

Frequency and content of the mentoring also contribute to its effectiveness. To be effective, mentoring should take place at least weekly. This can be in the form of observations, scheduled meetings, or unscheduled/informal meetings. Mentoring can focus on providing information about the school, the district, or special education. The mentor can also choose to highlight interactions with others, resources and materials, curriculum and instruction, discipline, or classroom management. To be most effective, the mentor must focus on the needs of the teacher and concentrate on emotional support (Whitaker, 2000).

Mentoring can serve many different functions, depending on the needs of the teacher. Mentoring can provide emotional support, occupational socialization, and pedagogical guidance. It can also help teachers better learn the art of teaching. Mentors can play a critical role in developing a teacher's skills and self-efficacy. In educative mentoring, the mentor creates learning opportunities for the teacher which lead to a better understanding of teaching, learning, and learning to teach. The mentor must understand the teachers' zone of proximal development and provide scaffolding to facilitate the acquisition of new skills by

the teacher. The teacher must actively participate in the process. As the teacher becomes more skillful and independent, the mentor must be mindful of fading support as appropriate to ensure the teacher can become autonomous.

Through the process of educative mentoring, the teacher learns by watching the more experienced mentor, practicing the techniques themselves, and reflecting on their practice. This is accomplished by mentoring which is conducted both 'inside the action' and 'outside the action.' Mentoring which is conducted 'inside the action' takes place during the actual interactive practice of providing instruction to students. Coaching, stepping in, co-teaching, and demonstration are each forms of 'inside the action' mentoring. Mentoring which takes place before or after student instruction is identified as 'outside the action.' Mentoring 'outside the action' includes informal conversations, mentoring sessions, debriefing sessions, co-planning sessions, videotape analysis, and writing. Mentors and teachers are each active participants in all forms of educative mentoring.

During mentoring 'inside the action,' mentors do not simply observe and provide supervision. Mentors take an active role in helping the teacher as situations naturally arise throughout the course of teaching. Mentors help teachers learn to think through situations and adjust as needed. The effectiveness of this style of mentoring is dependent on the teachers' receptiveness. As mentors work with teachers 'outside the action' they help teachers learn to plan, connect themes, reflect, and self-assess. Educative

mentoring is a complex professional practice which requires mentors to be skilled at all aspects of the mentoring process. Additionally, mentors must have an understanding of the skills and needs of the teacher and use professional judgement to determine which form of mentoring to use in a wide variety of teaching situations. Effective mentoring maintains both short and long term goals in which the mentor helps develop not only the teachers' skills, but also their perspectives, beliefs, and knowledge about teaching and learning (Schwille, 2008).

Coaching

Coaching is one aspect of mentoring which has a broad research base of its own. Peer coaching, in particular, is noteworthy. Peer coaching is a technique which can improve teachers' skills so that positive student outcomes increase. Peer coaching is the process by which the coaching teacher (CT) observes another teacher in class and then provides feedback to the observed teacher based on the observation. The CT's feedback aims to help the teacher improve instructional skills, strategies, and techniques (Hasbrouck & Christen, 1997). In addition to feedback, CT's also provide teachers with support and assistance in effort to help teachers refine present skills, learn new skills, and address any classroom problems (Galbraith & Anstrom, 1995). The collaboration which occurs in peer coaching leads to improved teaching practices which in turn increase student learning (Vidmar, 2006).

Peer coaching allows teachers to coordinate knowledge and skills. Teachers can learn about a skill and how to implement it from a more skilled CT. Successful peer coaching includes companionship, feedback, analysis, adaptation, and support. Peer coaching can begin with participating teachers attending a workshop to learn about a new technique. The CT then observes the teacher's class to note if the strategies taught in the workshop are being implemented. A coaching conference is held wherein the CT provides feedback relating to the observation and the two teachers collaborate together for improvement. Even willing teachers will encounter barriers to successfully implementing a strategy they learned at a workshop. Peer coaching can overcome these obstacles by providing ongoing assessment, in class training, follow up, and professional dialog.

There are four models of peer coaching. The first is technical coaching in which the focus is to transfer information learned in inservice training to actual classroom practice. The second model is collegial coaching. Collegial coaching focuses on the teacher's area of desired growth and helps teachers become more analytical of themselves. Challenge coaching is the third model of coaching. It is used to resolve persistent instructional problems. Lastly, in team coaching, the CT and the teacher plan, teach, and evaluate lessons together (Galbraith & Anstrom, 1995).

Peer coaching is an effective means to reinforce positive teaching practices, remediate less effective practices, and provide teachers with

knowledge of and the skills to use evidence based practices (EBP). Peer coaching must be based on an agreed upon definition of effective instruction which a CT compares a teacher to. The CT observes the teacher for the purpose of identifying the teacher's strengths and weaknesses. Then, the CT provides feedback and suggestions to help the teacher align teaching practice with the definition of effective instruction. When this occurs, both teacher and student performance improve (Hasbrouck & Christen, 1997)

Peer coaching is a trend that should continue and grow in prevalence within the field of special education. When compared to workshops, peer coaching is a superior method of staff development as it provides ongoing assessment, in class training, follow up, and professional dialog (Galbraith & Anstrom, 1995.) Using peer coaching to increase and improve upon a teacher's skillset leads to increased student achievement (Galbraith & Anstrom, 1995; Hasbrouck & Christen, 1997; Vidmar, 2006.)

Challenges of Autism Spectrum Disorder

Teachers of students with ASD are at a heightened risk of experiencing job stress which leads to burnout due to the specific challenging behaviors displayed by students with ASD (Lecavalier, Leone, & Wiltz, 2006; Jennett et al., 2003). ASD is a developmental disability which significantly impacts one's verbal and nonverbal communication and social interactions. Individuals with ASD have difficulty regulating their emotions, difficulty with peer relationships and trouble

understanding social situations (Ryan, Hughes, Katsiyannis, McDaniel, & Sprinkle, 2014). “Other characteristics commonly associated with autism include: (a) engagement in repetitive activities and stereotyped movements, (b) poor eye contact, (c) difficulty socializing with others, (d) resistance to changes in routine, and (e) unusual responses to sensory experiences” (Ryan et al., 2014, p. 94).

Many students with ASD lack the basic functional and learning skills which are necessary for school success. Students with ASD can present as being unmotivated to interact with others and the environment. Additionally, students with ASD often demonstrate challenging behaviors such as aggression, self-abuse, and noncompliance (Scheuermann, Webber, Boutot, & Goodwin, 2003). As a result, teaching students with ASD is especially challenging as the core impairments of ASD affect all areas of learning. The responsibility for teachers of students with ASD to instruct students as they exhibit challenging behavior leads to job stress, burnout, and ultimately, attrition (Ruble et al., 2015).

The presence of challenging behavior combined with a teacher’s perceived inability to manage the challenging behavior and promote positive student outcomes contributes to teacher burnout (Brunsting et al., 2014). A key stressor for teachers of students with ASD is what occurs in the classroom. Burnout is closely associated not only with challenging student behaviors but also with the special education teacher’s belief in their capability to successfully handle the behavior. Teacher self-efficacy plays an important role in teacher burnout and attrition for teachers of students with ASD (Ruble, et. al., (2015).

Improvements in teacher training will increase teacher self-efficacy and decrease burnout and attrition for teachers of students with ASD. By providing teachers with the appropriate instructional techniques and behavioral strategies to use with students with ASD, the risk for teacher burnout will decrease (Jennet et al 2003). Additionally, the use of appropriate teaching strategies will facilitate and maintain the success of students with challenging behaviors. Effective instruction is the foundation of student success. In order for students with ASD to be successful, effective instruction must be provided by their teachers as a regular and routine part of the classroom experience (Scott, Hirn, & Alter, 2014). Training in interventions specifically for students with ASD increases teacher self-efficacy and lowers teacher burnout (Jennet et al 2003) as well as increases positive student outcomes for students with ASD (Cook & Odom, 2013; Sarokoff & Sturmey, 2008; & Downs & Downs, 2012)

Requests for training in the area of managing challenging student behaviors are common among special education teachers. Challenging student behaviors are viewed as more difficult than any single disability, in and of itself (Gebbie et al., 2011). Conduct problems and lack of prosocial behaviors have been identified as the most significant challenging behaviors exhibited by children with ASD. Teacher training is the key to enhancing teacher practice but it must be sustained, intensive, and focused (Lecavalier et al., 2006). Many special education teachers of students with ASD are entering the field certified but not qualified. As a result, the responsibility of training teachers to the skill

level required to effectively instruct students with ASD falls on the school systems (Scheuermann et al., 2003).

Shortcomings of Teacher Preparation for Teachers of Students with Autism Spectrum Disorder

Many special education teachers receive their credentials through noncategorical certification programs. Such programs lack intensive instruction regarding specific skills teachers will need to work successfully with students with ASD. Noncategorical certification programs also lack supervised hours working with students with ASD. As a result, a fully certified special education teacher for students with ASD may not actually have the skills necessary to manage challenging student behaviors and promote positive student outcomes among students with ASD. The extent and quality of preservice training a teacher for students with ASD receives correlates with teaching success. Poor preparation for teachers of students with ASD results in poor quality of teaching (Scheuermann et al., 2003).

The core deficits experienced by individuals with ASD as well as the challenging behaviors they exhibit necessitate the very best teachers. Students with ASD may develop challenging behaviors due to poor teaching. Unfortunately, the training teachers receive while on the job is typically in response to a need or problem. It is reactive rather than proactive. This approach allows time for students to develop challenging behaviors which could have been minimized or prevented entirely by high quality teaching.

Additionally, the content of teacher training can be problematic as well. ASD is a heterogeneous in nature. While children with ASD may have difficulties in the same areas, ASD is a spectrum disorder and children have unique manifestations of difficulties and strengths. Training teachers in a single theory approach will greatly limit their effectiveness at meeting the needs of each individual student with ASD. Classroom instruction should be based on student need, not on the limited methods a teacher has been trained in. Teachers need to be trained in multiple methods to best meet the needs of a variety of children.

Another significant shortcoming of teacher training is that it is limited in scope and depth. Teacher trainings are often in the form of one or two day lectures or workshops. Such training formats can provide information and motivation but lack the hands on practice which is necessary to acquire mastery of a skill. Achieving mastery of the teaching skills necessary for working effectively with students with ASD requires comprehensive ongoing training with coaching and feedback (Scheuermann et al., 2003).

Information learned in classes and seminars does not translate to increased teacher skills in the classroom or to sustained improvement in classroom practices. Extensive follow up coaching and training are required in addition to workshop style seminars in order for teachers to develop sustained, skillful use strategies for students with ASD. In-service style teacher trainings are insufficient on their own to provide teachers with the training they need to

implement strategies for students with autism with the fidelity required to improve positive student outcomes (Mueller & Brewer 2013; Stahmer et al., 2014).

Improving Outcomes with Evidence Based Practices

It is important to base all professional development on research based strategies and techniques. A heightened focus on the quality of a teacher's instruction came with the passage of the No Child Left Behind Act (NCLB) of 2001. NCLB called for teachers to be highly qualified and to use scientifically based research in their instruction (Yell, Katsiyannas, & Shiner, 2006). The reauthorization of the Individuals with Disabilities Education Improvement Act (IDEA) of 2004 reiterated this emphasis on highly qualified teachers in the realm of special education. IDEA 2004 required special education teachers to meet the NCLB definition of a highly qualified teacher (Smith, 2005). The National Professional Development Center on Autism Spectrum Disorders (2014) has identified several evidence based practices (EBP) for working with students with (ASD).

EBP are practices and programs shown by high quality research to have meaningful effects on student outcomes. EBP must meet prescribed rigorous standards in regards to research design, research quality, and quantity of research. EBP must be supported by multiple, high-quality, experimental and quasi-experimental research studies which demonstrate the EBP have a meaningful impact on student outcomes. Identifying and using the most effective

practices will increase positive student outcomes (Cook & Odom, 2013). It is important that EBP address the practical needs of the interventionist (The Council for Exceptional Children's Interdivisional Research Group, 2014).

Unfortunately, implementing EBP with the fidelity required to improve student outcomes has proven problematic. There is a significant gap between the identification of EBP and their implementation in the classroom. It is not possible for teachers to automatically or easily implement EBP into real classroom practice. Assuming EBP will be implemented simply on the basis of their identification will not bring about broad and sustained use of EBP.

Effectively implementing and sustaining use of EBP is a significant undertaking. For this to occur the EBP must be relevant to the student population and it must be practical for the teacher to implement. The teacher must trust the research of the EBP, be knowledgeable of the EBP, have the skills to implement the EBP with fidelity, and have the time to accommodate their own acquisition and use of the EBP. The school system must provide structure, culture, support, and resources which are conducive to the implementation of the EBP. Additionally, teachers must receive appropriate training and coaching to effectively implement EBP (Cook & Odom, 2013).

The combined result of the passage of the No Child Left Behind Act of 2001, which necessitates the use of EBP in special education, and the continued increase in the prevalence rate of ASD has led special educators to need knowledge and understanding of EBP specifically for students with ASD (Ryan et

al., 2011). It is critical for special education teachers to be able to implement EBP for students with ASD with fidelity to ensure that positive student outcomes are achieved. With extensive training, teachers can successfully implement EBP for students with autism with fidelity in classroom environments. (Stahmer et al., 2015).

The fidelity with which EBP are implemented has an effect on student outcomes. Higher fidelity results in better student outcomes. Fidelity refers to the degree to which a practice is implemented as intended as well as the degree to which the provider uses the procedures required as intended. Teachers often do not implement EBP with fidelity because they lack the training to do so. Training on EBP is often limited to a workshop or an instruction manual. However, ongoing coaching and feedback are critical for teachers to implement EBP with fidelity.

Highly structured EBP such as discrete trial training (DTT) are more likely to be implemented with fidelity than less structured EBP. Teachers can learn to implement EBP with fidelity. However, significant training and coaching are needed to reach and maintain levels of fidelity. Even teachers who achieve high levels of fidelity for a particular EBP can lose skills or the motivation to use the skills over time (Stahmer et al., 2014.) Thus, ongoing training, coaching, and mentoring is needed well past the initial training session (Stahmer et al., 2014; Sarokoff & Sturmey, 2008; McKenney & Bristol, 2014; & Downs & Downs, 2012).

Improving Outcomes with Discrete Trial Training

DTT has been identified as an EPB for students with ASD by the National Professional Development Center on Autism Spectrum Disorders (2014). DTT is a form of applied behavior analysis (ABA). ABA was defined by behaviorist B.F. Skinner in 1957. ABA seeks to modify an individual's behavior by controlling the antecedents and consequences to said behavior. In 1987 clinical psychologist Ivar Lovaas used DTT in the instruction of children with ASD. DTT is a technique in which specific, individual tasks are identified and taught through repeated presentation until the student achieves mastery of the skills. (Ryan et al., 2011).

DTT has been found to effectively teach students with ASD cognitive, language, adaptive, and compliance skills (Lovaas, 1987; Ryan et al., 2011). These results have been achieved in both center-based and home-based settings (Howard, Sparkman, Cohen, Green, & Stanislaw, 2005.) DTT is a nuanced instructional technique which requires all components to be implemented with fidelity in order to achieve such positive student outcomes. DTT is only effective when implemented correctly. The research indicates a variety of methods for training educators to implement DTT with fidelity; the majority of which are based on established general principles for conducting effective staff development. An increase in teacher knowledge of DDT can be gained during an inservice style training. However, teacher skill at implementing DTT does not occur without coaching and feedback provided in the classroom

(Sarokoff & Sturmey, 2007; McKenney & Bristol, 2014; & Downs & Downs, 2012).

One effective method for training teachers to implement DTT with fidelity is to provide teachers with four, full day workshops followed by several weekly coaching sessions in the classroom. The first day of workshop training should include information regarding the principals of operant reinforcement, antecedent intervention, and designing DTT procedures based on student need. The following three days of workshops should consist of a structured approach to the actual implementation of DTT strategies. The workshops should include practice opportunities for teachers which allow them to use a variety of materials and receive feedback regarding their use of DTT procedures.

In the follow up coaching sessions, coaches should use performance feedback to increase the fidelity with which teachers implement DTT in the classroom. Performance feedback includes praise for correct implementation of DTT, constructive feedback and review of any missed or incorrectly conducted aspects of DTT, rehearsal of missed steps with corrective feedback provided immediately, and a review of graphs depicting the teachers' level of fidelity over time. Providing performance feedback to teachers increases the fidelity with which they are able to implement DTT (McKenney & Bristol, 2014).

Another option for effectively training teachers to use DTT with fidelity is to begin with an eight-hour inservice training about DTT. The training should include information regarding the technical aspects of DTT procedures as well as

supporting skills such as managing challenging student behaviors, adhering to an efficient schedule, and managing curricular materials and programs. The training should be comprised of didactics and live modeling of correct and incorrect procedures. Practice sessions in which teacher participants practice DTT skills and receive corrective feedback should also be included in the training. Teachers should be assessed before and after the training in regards to their knowledge of DTT procedures and support skills.

Following the training, coaches are to observe teachers conducting DTT and provide corrective feedback on the first day the teachers return to the classroom. Similar coaching sessions must be provided on a weekly basis for the following six weeks. Using a tool such as the *DTT Competency Checklist for Instructors (DCCI)* can provide structure for coaching sessions. The DCCI focus on teacher skills in the areas of work session preparation/conclusion, technical skills, and student engagement/management. This tool provides a comprehensive approach which includes multiple aspects of effective DTT. Using this tool allows coaches to reinforce satisfactory teacher skills and provide corrective feedback regarding unsatisfactory teacher skills in both written and oral format. Providing training to teachers in such a way increases the fidelity with which DTT is implemented which in turn can increase positive student outcomes (Downs & Downs, 2012).

It is also possible to effectively train staff to use DTT using behavioral skills training, which lacks a formal workshop or inservice regarding DTT.

Teachers trained using behavioral skills training should have some prior knowledge and experience using DTT. In this style of staff development, teachers receive training and coaching in the classroom which includes instruction, rehearsal with feedback, and modeling. Prior to any training, the teacher is observed by the coach. The coach collects and graphs data regarding the teacher's implementation of DTT. Three sessions of behavior skills training lasting approximately 20 minutes each have been shown to increase a teacher's ability to use DTT with fidelity.

The instruction phase of behavioral skills training is conducted without students present. The coach provides the teacher with a written list of 10 components of DTT and states the operational definition of each. The coach then shares the teacher's graph of their prior implementation of DTT and reviews the teacher's accuracy with them on each of the components of DTT. Next, the rehearsal phase is conducted in the classroom by the teacher with a student under the observation of the coach. The teacher performs three discrete trials and is then provided descriptive spoken feedback by the coach. Such feedback includes positive comments in regards to correct implementation of DTT components as well as informative feedback on components which were executed incorrectly.

Then, the coach conducts the modeling phase in which they model three discrete trials. Before each modeled trial, the coach will identify one or more of the components the teacher previously implemented incorrectly and direct the

teacher to focus on that aspect of DTT during the coach's demonstration. The rehearsal and modeling phases are repeated for a total of 10 minutes. Lastly, the teacher conducts 10 uninterrupted trials of DTT which are video recorded by the coach. Behavior skills training quickly increases a teacher's ability to implement DTT with fidelity. When DTT is implemented with fidelity student learning increases and student behaviors improve (Sarokoff & Strumey, 2008).

Summary

In summary, teacher burnout and attrition are a significant problem facing the field of special education today (Brunsting et al., 2014; Wisniewski & Gargiulo, 1997; Ruble et al., 2015). Teachers of students with ASD are at particular risk for burnout and attrition as a result of the specific challenges presented by their students (Lecavalier et al., 2006; Jennett et al., 2003). Challenging student behavior, along with a teacher's inability to promote positive student outcomes are two factors which contribute to the stress which teachers experience which can ultimately lead to burnout (Nistor & Chilin, 2013; Wisniewski & Gargiulo, 1997; Ruble et al., 2015). Additional factors leading to teacher burnout can be grouped into four domains including the organizational structure, professional interactions, the instructional assignment, and professional training (Wisniewski & Gargiulo, 1997).

Improvements to professional development can remediate the stress which teachers face in all areas. Traditional workshop style or seminar trainings

have been found to be ineffective at promoting an increase in teacher skills which can increase positive student outcomes, diminish challenging student behavior, and lower rates of teacher burnout and attrition (Wisniewski & Gargiulo, 1997; Swartz, 2014; Whitaker, 2000; & Schwille, 2008). Professional development in the form of repeated coaching and mentoring sessions which focuses on EBP, utilizes both positive feedback and corrective feedback, and incorporates emotional support has been found to be productive in the field of special education.

Such professional development has been found to increase both teacher self-efficacy and teacher ability to implement EBP. These improvements in teacher outcomes lead to an increase in positive student outcomes, a decrease in challenging student behavior, and ultimately have the potential to decrease levels of teacher burnout and attrition (Sarokoff & Sturmey, 2008; McKenney & Bristol, 2014; & Downs & Downs, 2012). Professional development which focuses on training teachers to implement DTT with fidelity can improve student outcomes such as increased student learning and decreased negative student behavior while simultaneously increasing positive teacher outcomes by increasing teacher self-efficacy and lowering levels of teacher burnout and attrition.

Effectively conducting professional development stands to greatly improve the field of special education by improving both teacher and student outcomes. The current study was conducted for the purpose of determining if professional

development regarding DTT increases the fidelity with which teachers implement DTT when providing instruction to students with ASD. Research shows coaching is an effective component of professional development. Determining the effect providing in the classroom coaching has on the fidelity of DTT implementation by teachers of students with ASD is the second purpose of this study. Additionally, this study was conducted for the purpose of determining if a broader research base exists which demonstrates that student learning increases and negative student behavior decreases when teachers implement DTT with increased fidelity when instructing students with ASD. The impact these improvements in teacher and student outcomes stand to have on issues such as teacher burnout, attrition, and self-efficacy are also explored in the current study.

Research Questions

This study will answer three research questions. The first is: Does professional development regarding DTT increase the fidelity with which teachers implement DTT when providing instruction to students with ASD? The second is: What, if any, effect does in the classroom coaching have on the fidelity of DTT implementation by teachers of students with ASD? The third research question is: Does increasing the fidelity with which teachers implement DTT with students with ASD lead to an increase in student learning and a decrease in negative student behaviors?

CHAPTER THREE

METHOD

Meta-Analysis

Durlak and Lipsey (1991) provide a very thorough overview of the construct of meta-analysis. Meta-analysis is one of several techniques which can be used to review research literature. It has been commonly used since 1976 in both behavioral and social sciences. Meta-analysis is conducted to summarize the results of prior research relating to a particular research area or topic. It is used to investigate how findings may vary from study to study based on the characteristics of the reviewed studies. Meta-analysis offers both recommendations for future research as well as indicates implications for policy and practice.

Meta-analysis is unique from other types of reviews in two distinct manners. The first is that meta-analysis offers a quantitative representation of research findings. Secondly, meta-analysis provides statistical analysis of findings across studies as well as relationships of those findings to features of each study.

Additionally, Durlak and Lipsey (1991) detail the many advantages of including statistical analysis of research findings which are provided by meta-analysis. The outcome information from each study is thoroughly used. Both the direction and magnitude of effects as well as distribution of effects across studies

are examined in a meta-analysis. This allows for the statistical significance of the entire set of outcomes to be analyzed. Meta-analysis clearly indicates the studies which were selected, the specific portions of the studies which were used, and what exactly the outcomes and relationships of the data are based on. The statistical data which is generated through meta-analysis is both impressive and respected. Resultantly, many social policy implications can come from meta-analysis.

Although meta-analysis is both a widely used and well respected form of reviewing research literature, Durlak and Lipsey (1991) note that it has also faced controversy. Some researchers find fault with the conclusions and interpretations drawn from meta-analysis and emphasize the limitations of such a technique. Individuals unfamiliar with meta-analysis may find it difficult to understand as well as to conduct such a review. The methods of meta-analysis continue to change and improve which creates difficulty on the part individuals trying to remain apprised of the current best practices.

Additionally problematic is that meta-analysis can offer different findings and result in different conclusions than other types of reviews of the same research and even from other meta-analyses. Faulty meta-analysis can provide misleading information and even respectable meta-analysis can be misused. As a result, incorrect conclusions may be drawn which may lead to unjustified actions with wide spread, detrimental influence (Durlak & Lipsey, 1991).

The current study was initially intended to be a meta-analysis. The aim of this study to summarize the results of prior research, investigate how the findings of prior research differ based on the characteristics of the reviewed studies, and offer recommendations for future research as well as implications for current practice are consistent with the purposes of a meta-analysis as outlined by Durlak and Lipsey (1991). However, the manner in which the data was reported in the research included in this study prevented a true meta-analysis from being conducted. True statistical analysis of the reported data could not be conducted as the data was reported in aggregate rather than individual data points. Percentages from one study to another were compared but the information was not able to be combined into precise statistical analysis.

Single Subject Research

The principals of meta-analysis can also be applied to single subject research. Horner et al. (2005) provide a through explanation of the specifics of single subject research. Single subject research is a rigorous, scientific research methodology which was first operationalized in 1960. Multiple scholarly disciplines currently use this research method and over 45 professional journals report on the findings of single subject research. This methodology allows for systematic and detailed analysis of human behaviors at the individual level. Many effective interventions across disciplines such as medicine, social psychology, social work, and communication disorders have been studied using single

subject research. In the field of special education, single subject research has been implemented to examine strategies for academic achievement, improving positive student behavior and decreasing negative student behavior, and improving the skills of special education teachers.

Horner et al. (2005) explain single subject research is experimental in nature. It is not correlational or descriptive. The purpose of single subject research is to identify causal relationships between independent and dependent variables. In single subject research, each individual participant is the unit of analysis. Typically, single subject studies have a small group of three to eight participants. However, it is possible to conduct such research with no more than one participant. In single subject research, each participant serves as their own control. Each participant's behavior prior to the intervention is compared to their own behavior during and/or after the intervention.

As explained by Horner et al. (2005), the independent and dependent variables in single subject research must each be operationally defined. These definitions must be specific so that valid interpretations can be drawn from the research findings and so that the study can be accurately replicated in future research. The independent variable in single subject research is the intervention or practice which is being studied by the researcher. The researcher determines when and how the independent variable will change. This active rather than passive manipulation of the independent variable creates experimental control.

The dependent variable is one or more observable behaviors exhibited by the participants.

Dependent variables are repeatedly measured within and across controlled conditions so that behavioral patterns can be determined. Participant behavioral patterns before the independent variable is implemented are compared with behavioral patterns noted during and after the intervention. Each participant's behavior before the intervention is compared to their own behavior demonstrated during and after the intervention. This is referred to as baseline/comparison condition. A baseline measurement must be taken until a pattern is established. If the baseline data documents a trend in the direction which is expected to be caused by the intervention then the effect of the intervention is compromised.

As note by Horner et al. (2005), experimental control is necessary to confirm that the independent variable is the factor which causes change in the dependent variable. In single subject research, experimental control is established through reversal of the independent variable, multiple baseline design, or alternating treatment design. Typically, three instances of the experimental effect must be documented at three different points in time with a single participant or across different participants. Experimental effect is established when the manipulation of the independent variable results in covariation of the dependent variable.

The results of single subject research are interpreted through statistical analysis. A visual comparison of responses within and across phases is conducted. Assessment of all conditions of the study is required to document experimental control. A specific data pattern is needed to demonstrate that the change in the dependent variable is truly a function of only the independent variable. Visual analysis is used to interpret the level, trend, and variability at both baseline and intervention phases. The immediacy of effects, overlap of data points, magnitude of change, and consistency of data patterns are also studied in single subject research (Horner et al., 2005).

A central concern of single subject research shared by Horner et al. (2005) is the extent to which the findings of one study are applicable to other participants, locations, materials, and behaviors. The results of a single study may not be relevant outside the operational definitions of that studies own conditions. The external validity of a single subject study is increased by including multiple participants, settings, materials, and behaviors. The findings of single subject research are strengthened through systematic replication of such findings across multiple studies which are conducted in various locations by different researchers. Meta-analysis of single subject research is critical to making significant contributions to the field of special education.

Single subject research holds much significance for the field of special education. It provides a practical research methodology for examining educational and behavioral interventions and the experimental effects of each in

the actual classroom setting. Single subject research can be used to study theories of behavior and resultantly to predict which conditions behavior change and learning are likely or unlikely to occur. Single subject research can also be used to advance the field of special education through identification of educational and behavioral interventions which are worthy of large scale analysis. Such contributions can only be made if single subject research is replicated and the results are found meaningful through the process of single subject meta-analysis. Experimental control must be demonstrated across multiple studies, researchers, and participants so that researchers, practitioners, and policy makers can have confidence in the results (Horner et al., 2005).

Inclusionary Criteria

The research articles in this study were primarily found by conducting a key word search in CSUSB's Pflueger Library's search engine for scholarly, peer reviewed articles. Key words and phrases included multiple combinations of: staff development; professional development; teacher training; coaching; mentoring; autism; autism spectrum disorder; discrete trial training; fidelity; EBP; student outcomes; and negative student behavior. Inclusionary criteria were applied to the resulting articles so that six articles were found acceptable for this meta-analysis. To be included in this study, articles had to be: (a) published in between 2000-2016; (b) conducted in the United States; (c) conducted in special education classrooms settings; (d) focus on students with autism spectrum

disorder and the teachers and instructional staff of such students; and (e) focus on the EBP of DTT.

Articles which did not meet these criteria were excluded.

Numerous articles which focused on the effects of training teachers to implement DTT with fidelity in the home setting were excluded because of the great disparity of the setting in which the study was conducted. The home environment is vastly different than the special education classroom environment. Research results from one setting are not necessarily applicable to the other. Although research exists which demonstrates the effectiveness of coaching teachers to improve their use of DTT in the home setting, they were excluded from the present meta-analysis which focused on school based implementation of DTT.

Variables and Other Factors

The six single subject research articles included this study (Leblanc, Ricciardi, & Luiselli, 2005; Dib & Sturmey, 2007; Sarokoff & Sturmey, 2008; Fetherston & Sturmey, 2014; McKenney & Bristol, 2015; & Stahmer et al., 2015) each study similar independent and dependent variables. These variables pertain to the effects professional development has on the fidelity with which teachers implement DTT and the effects implementing DTT with higher fidelity has on student outcomes. These studies were examined across 32 different components

in effort to determine the significance of their findings as a combined whole. See table 1.

The number and characteristics of both adult and student participants were noted. Information regarding adult participant characteristics included the profession of the adult participants, if the adult participants had training in DTT prior to their current position, if the adult participants had prior experience with DTT in their current position, how long the adult participants had been in their current position, and how the adult participants were selected. Information pertaining to student participants included how the student participants were identified, the age and/or grade of the student participants, the education setting of the student participants, and the disability category of student participants. Data from the baseline, intervention, and follow up phase or absence of data from any phase of each study was recorded for each variable as reported in each study.

The independent and dependent variables of each study were carefully examined. The independent variable was the professional development which the adult participants received to be trained in the EBP of DTT. The location, length, techniques, and presenter of the professional development practices were all documented. Whether or not coaching in the classroom was included as part of the professional development was also specifically noted. Each study indicated the fidelity of adult implementation of DTT as one dependent variable.

Additional dependent variables included student performance in DTT responses and student displays of disruptive behavior.

The majority of the six articles included in this study had three to four adult participants. One study had 9 adult participants. The largest study was conducted across two years. During the first year, 57 adults participated. 38 of the original 57 adults participated in the second year of the study. The adult participants in each study were primarily special education teachers or instructional assistants. The adult participants all worked in special education classrooms for students with autism. The majority of the articles did not report how long adult participants had been in their current professional position. Of those that did report this information, the length of time adult participants had been in their current professional position ranged from less than six months to just over six and a half years.

Adult participants were selected to participate in the studies in a variety of manners. In three studies, adult participants were selected based on their poor implementation of DTT. In one study, the adult participants volunteered to be part of the study. The remaining two studies did not report how adult participants were identified. The amount of training and experience adult participants had with DTT, prior to participating in their respective studies, varied by study. Two studies indicate that participants had no prior training in DTT but did have prior experience implementing DTT. The adult participants in three additional studies received previous training in basic ABA techniques but not DTT specifically and

did not indicate any previous experience implementing DTT. One study did not report if participants had any prior training or experience with DTT.

Although only three of the six studies report student outcomes, each of the six studies involve student participants. All of the student participants had a diagnosis of ASD and attended special education classrooms specifically for students with ASD. These classrooms were either on public school campuses or at private schools for students with developmental disabilities. Student participants ranged from 3-12 years of age. Two studies did not report how student participants were selected. In two other studies, students were selected to participate as a result of attending classrooms in which adult participants of the study were working. Student participants were randomly selected in one study and nominated by their teachers in another. Student participants had a range of academic, language, and social skills as well as different levels of disruptive behaviors.

In effort to answer the research questions regarding the impact of professional development on teachers' fidelity at implementing DTT and the effect of improved fidelity on student outcomes, this study explored one independent variable and three dependent variables. The independent variable selected for this study was the professional development used to improve teachers' ability to implement DTT with fidelity. The topic, location, length of time, training strategies, and coaching component of the professional development

were each taken into account. The conditions at the baseline, training, and post training phases were each analyzed as well.

The first dependent variable was the fidelity measurement used in each study. Each study examined the adult participants' integrity to DTT procedures and if adult participants were able to correctly implement specific components of DTT. The second dependent variable was student learning, specifically students' correct responses during DTT drills. Two studies reported data on dependent variable two. The third dependent variable, which was recorded in two of the studies, was student disruptive behavior such as inappropriate vocalizations, repetitive body movements, and refusal to work. Each of the dependent variables was examined during baseline, training, and follow up conditions when such data was reported in the studies.

Information was collected regarding a variety of additional components of each study as well. The methodology of each study was documented. This included how data was collected on adult participants, how data was collected on student participants, interobserver agreement, and the length of time between the training and follow up conditions. The perceptions of adult participants in regards to whether or not the professional development was effective were also examined. Overall findings, possible explanations of the results, and the limitations of the studies, each as reported by the authors, were also investigated during the course of the current study.

Table 1. 32 Components Included in this Study

	Improving discrete trial instruction by para-professional staff through an abbreviated performance feedback intervention 2005 Leblanc, Ricciardi, and Luiselli	Reducing student stereotypy by improving teachers' implementation of discrete-trial teaching 2007 Dib and Sturmey	The effects of instructions, rehearsal, modeling, and feedback on acquisition and generalization of staff use of discrete trial teaching and student correct responses 2008 Sarokoff and Sturmey	The effects of behavioral skills training on instructor and learner behavior across responses and skill sets 2014 Featherston and Sturmey	Supporting intensive interventions for students with autism spectrum disorder: Performance feedback and discrete trail teaching 2015 McKenney and Bristol	Training teacher to use evidence-based practices for autism: examining procedural implementation fidelity 2015 Stahmer, Rieth, Lee, Reisinger, Mandell, and Connell
Number of adult participants	X	X	X	X	X	X
Number of student participants	X	X	X	X		
Adult participant characteristics	X	X	X	X	X	X
Student participant characteristics	X	X	X	X	X	X
Independent variables	X	X	X	X	X	X
Dependent variable 1, fidelity	X	X	X	X	X	X
Dependent variable1, baseline %	X	X	X	X	X	X
Dependent variable 1, training %	X		X	X	X	X
Dependent variable 1, follow up %	X	X	X	X	X	X
When follow up was conducted	X					
Dependent variable 2, student scores and DTT drill			X	X		
Dependent variable 2,			X	X		

student baseline %						
Dependent variable 2, student training %				X		
Dependent variable 2, student follow up %			X	X		
Dependent variable 3, negative student bx		X		X		
Dependent variable 3, baseline %		X		X		
Dependent variable 3, training %				X		
Dependent variable 3, follow up %		X		X		
Methods	X	X	X	X	X	X
Data collection on adults	X	X	X	X	X	X
Data collection on students		X	X	X		
IO agreement collection	X	X	X	X	X	X
IO agreement: adult baseline	X	X	X			
IO agreement: adult training						
IO agreement: adult follow up			X			
IO agreement: student baseline		X	X			
IO agreement: student training						
IO agreement: student follow up			X			
Adult perceptions of PD	X		X	X	X	
Significant findings	X	X	X	X	X	X

Possible explanations of results (as reported by authors)			X	X		
Limitations of study (as reported by authors)	X	X	X	X	X	X

CHAPTER FOUR

RESULTS

When the independent variables of professional development are compared across the six studies included in this study, (Leblanc et al., 2005; Dib & Sturme y, 2007; Sarokoff & Sturme y, 2008; Fetherston & Sturme y, 2014; McKenney & Bristol, 2015; & Stahmer et al., 2015), three basic modalities emerge in regards to the manner in which professional development for DTT is conducted. The first is a small scale approach based on a technique called behavior skills training (BST). The second is to conduct professional development in a large scale manner, using the training information and format of the Strategies for Teaching Based on Autism Research program (STAR). STAR includes instruction on DTT, pivotal response training (PRT), and functional routines (FR). STAR begins with providing workshops and seminars and then moves to follow up coaching in the classroom. Providing professional development through a combination of STAR and BST techniques is the third modality seen in this study. See Table 2.

Behavior Skills Training Professional Development

Peter Sturme y has been part of conducting multiple research studies determining the effects of BST on teachers' ability to implement DTT with fidelity. Three such studies are included in this study (Dib & Sturme y, 2007; Sarokoff &

Sturme y, 2008; & Fetherston & Sturme y, 2014). Other Sturme y articles were excluded on the basis of being conducted in home, rather than school, settings. Fetherston and Sturme y (2014) explain BST as a model of professional development which is comprised of written instructions, verbal feedback, modeling, and skill rehearsal. Each of the Sturme y studies included here contains these four steps and follows the same basic format in design. The topic of Sturme y's professional development is always DTT. It is considered to be a small scale format because it is conducted in individual classrooms with individual teachers and instructional assistants. The elements of the BST model of professional development; instruction, observation, feedback, and modeling provided to staff one on one within the classroom setting; are the core components of coaching.

Two different styles of conducting the baseline phase are seen in the Sturme y studies. Dibs and Sturme y (2007) require staff to conduct student programs as usual in the baseline phase. Sarokoff and Sturme y (2008) provided staff members a list of 10 DTT components before having staff members conduct 10 DTT sessions. Similarly, Fetherston and Sturme y (2014) provide staff with a task analysis of the teaching components of DTT and the operational definitions of each which were read aloud to the participants. In the 2014 study, the experimenters also answered any questions the adult participants asked prior to their implementation of DTT in the baseline phase.

The training phase also differed slightly in each of the Sturme y studies. Dibs and Sturme y (2007), provided staff members with a copy of a checklist for task presentation, prompting for task presentation and problem behavior, and reinforcement which were used to score their performance. Staff members then conducted DTT with a student and the trainer provided spoken descriptive feedback for correct and incorrect teaching behavior. The trainer also showed staff their data from previous session and described the staff members' performance. Lastly, the trainer described the steps on the behavior checklist of presentation, prompting and reinforcement while modeling each. The feedback and modeling continued until the staff member was able to complete the checklist without errors two consecutive times.

Sarokoff and Sturme y (2008), conducted a portion of the training phase in the classroom teacher's office and a portion in the classroom during a DTT session. During the training which took place in the office, staff members were given list of 10 components of DTT. The experimenter stated the operational definition of each component and provided staff members with a graph of their baseline and previous session data sheet. The experimenter stated the scores and described staff members' accuracy. The portion of the training phase which was conducted in the classroom while staff members implemented DTT with students consisted of rehearsal, feedback, and modeling, followed by 10 DTT trials. This sequence was repeated for 10 minutes.

The training phase in the Fetherston and Sturmey (2014) study was also conducted during a 10 minute DTT session in the classroom with a student. The experimenter provided the staff member with the same task analysis which they had been given during the baseline phase. The experimenter provided feedback, rehearsal, and modeling to the staff members for one response. The training phase was considered complete when the staff member reached 90% accuracy of DTT implementation for three consecutive sessions.

Leblanc et al. (2005) conducted research similar to that done by Sturmey in that the profession development focused on DTT, was conducted one on one with staff members in the classroom setting, and included coaching components of instruction, observation and feedback. The Luisslli et al. (2005) study differs in that it examines the effect an abbreviated performance feedback process had on staff members' ability to implement DTT with fidelity. The abbreviated performance feedback lacks modeling, role play, and practice implementation of DTT. Staff members received no training on DTT prior to the baseline phase. During the baseline phase, staff members are told to instruct the students according to the designed learning programs. No performance feedback is given in this phase.

Abbreviated performance feedback was conducted during the training phase. During this phase, the trainer reviewed a DTT instructional checklist with the staff member. The staff member then conducted DTT with a student. Immediately following the DTT session, the trainer gave performance feedback

for each of the skills on the DTT instructional checklist. Performance feedback for skills performed correctly 100% of the time was praise and approval.

Performance feedback for skills performed correctly less than 100% of the time was clarification and verbal direction. The trainer also answered staff members' questions during the training phase without any modeling, role play, or practice of DTT. Each performance feedback session lasted eight to ten minutes. Staff members concluded the training phase when they demonstrated DTT correctly 90% of the time or greater for two consecutive sessions.

Combination of Strategies in Teaching Based on Autism Research and Behavior Skills Training Professional Development

McKenny and Bristol (2015) conducted a research study focused on professional development which combined the coaching components of BST with the seminar format for dissemination of information to a large group. Prior to the baseline phase, staff members attended a seminar style workshop which provided information regarding DTT. This portion of the professional development included one day of training about operant reinforcement, antecedent based intervention, and designing DTT procedures according to student need. Participants had opportunity for hands on practice with materials and received feedback from the trainers. This workshop was followed by three days of seminars of STAR training in the provision of DTT.

Following these four days of training, McKenny and Bristol (2015) conducted the baseline phase of their study. This study entailed two baseline phases. During the first baseline phase, staff members conducted DTT and did not receive any feedback. During the second baseline phase, staff members implemented DTT and were later given general feedback. General feedback lacked specific examples and data. Additionally, no time for rehearsal was given during this phase.

During the training phase, staff members implemented DTT and were provided with performance feedback one time per week. The performance feedback included a review of a graph of their level of integrity to DTT. DTT steps which were implemented correctly were described and praised. Any steps of DTT which had been conducted incorrectly were reviewed and modeled. The researchers solicited questions from the staff members at this time. Rehearsal opportunities with corrective feedback were conducted until the staff member implemented the missed step correctly. Staff members moved to maintenance when their performance was consistently at or above 80% accuracy.

Strategies in Teaching Based on Autism Research Professional Development

Stahmer and Rieth (2015) conducted research on professional development using the STAR method to train and coach staff members to use implement DTT with fidelity. This research study lasted two years. During the first year, staff members attended workshops and received observation and coaching

from STAR program developers. During the second year of the study, staff members received observation and coaching from local coaches whom had been trained by STAR developers.

The first year workshops lasted a total of 28 hours to cover the STAR program. During these hours of professional development, staff members received training regarding curriculum assessment, classroom set up, DTT, PRT, and FR. This was done through lectures, video examples, and role play. Additionally, STAR developers visited each classroom to assist with classroom set up. Immediately following this component of professional development, five days of observation and coaching were provided to each classroom. Three additional days of coaching were provided in the classrooms throughout the first year of the study. Ongoing advising and coaching were conducted by email and phone during the first year of the study. Each classroom received an average of 26.5 hours of coaching during the first year.

During the second year, observation and coaching were provided on a monthly basis to each classroom. An average of 36.1 hours of coaching was provided to each classroom during the second year of the study. During each year of the study data was collected twice, for a total of two data collection periods. However, training was ongoing during each data collection period so a true baseline, intervention, and follow up phase cannot be noted.

Commonalities across Styles of Professional Development

Although there are some differences in the formatting of the scope and sequence for each of the six examples of professional development in this meta-analysis, they each have two components in common. The first is that staff members were provided with detailed information about DTT. This may be in the form of a large group workshop or one on one in the classroom. Regardless of the format, in each mode of professional development, all staff members were provided with a foundation of knowledge and understanding of DTT. This serves as the basis for the second commonality among the different examples of professional development which is purposeful, ongoing observation and coaching within the classroom setting. The initial information provided to staff regarding DTT serves as the framework to guide the classroom observations and coaching sessions. This framework is necessary to ensure that the observation and coaching sessions are purposefully conducted to reach the overarching goal of improving staff members' ability to implement DTT with fidelity.

Dependent Variable One: Fidelity Measurement

The first dependent variable examined in this study is the fidelity measurement. This measurement pertains to staff members' ability to implement DTT with integrity. Researchers in each study operationally defined DTT and the components on which data was being collected. See appendix A for a list of the DTT components included in each of the studies. The studies monitored if staff

members adhered to DTT protocol and displayed DTT skills indicated in each operational definition of DTT. The percentage of correct usage of DTT components and the percentage of opportunities in which staff members engaged in accurate DTT implementation were recorded to determine if staff members did or did not implement DTT with fidelity. Each study reported findings in a range of percentages per each phase of the study. Specific percentage information can be found in Table 3. Each study indicates an increase in staff members' ability to implement DTT with fidelity from the baseline to follow up phase.

Dependent Variable Two: Student Learning

The second dependent variable explored in this study is the effect implementing DTT with higher rates of fidelity has on student learning. Only two of the included studies collected data on this aspect. Sarokoff and Sturmey (2008) collected data of student responses during DTT drills which taught sight words, match to sample, and receptive skills. Fetherston and Sturmey (2014) recorded data of student responses during DTT drills for imitative responses, stimulus identification, and performance of an action. Both studies considered a response to be correct when the student emitted an independent correct response as defined by the particular DTT drill being conducted.

Both studies report an increase in student correct responses when staff members implemented DTT with increased fidelity. Sarokoff and Sturmey (2008)

report student scores in a percentage of correct responses given during DTT drills that staff members had been specifically trained on. These scores are shown in Table 4. Fetherston and Sturmey (2014) report student scores for DTT drills which staff members had been specifically trained on as well as DTT drills which were not part of the staff members' training. These scores are reported out in percentages of correct responses and are shown in Table 5.

Dependent Variable Three: Student Behavior

The third dependent variable examined in this study is the effect implementing DTT with improved fidelity had on negative student behavior. Only two of the included studies collected data on changes in negative student behavior. Dib and Sturmey (2007) operationally defined negative student behavior to be student stereotype including inappropriate vocalizations such as screaming, talking, singing, or laughing out of context and repetitive body movements such as arm flapping, finger wiggling, leg lifting and rocking. Fetherston and Sturmey (2014) operational defined negative student behavior as any sound or movement unrelated to the ongoing activity or that occurred in the absence of an instruction, any repetitive movements, any verbal or physical resistance to prompting, and any refusals. In both studies, negative behaviors were scored using a 10 second momentary time sampling procedure in which the occurrence or nonoccurrence of negative student behavior was scored at the end of each 10 second interval.

Both studies reported the percentage of intervals in which students engaged in negative behaviors. Dib and Sturmey (2007) included data from baseline and follow up phases of the study. This data can be seen in Table 6. Fetherston and Sturmey (2014) included data from baseline, training, and follow up phases for both trained and untrained responses. Their results are shown in Table 7. Both studies report a decrease in negative student behaviors when DTT was conducted with higher rates of fidelity.

Interobserver Agreement

Interobserver agreement (IOA) was collected in all six of the included studies (Leblanc et al., 2005; Dib & Sturmey, 2007; Sarokoff & Sturmey, 2008; Fetherston & Sturmey, 2014; McKenney & Bristol, 2015; & Stahmer et al., 2015). However, it was collected and reported differently in each study. When combined as a whole, the range of IOA for each study was 84%-100%, with the majority of the studies ranging from 90%-100%. Depending on the study, IOA was collected during 20%-75% of sessions. A portion of the studies reported IOA per session, per adult, and per student across all phases of the study. Other studies reported IOA per skill, per behavior, or per individual in a total percentage for the entire study. IOA was not indicated in any of the studies as a possible explanation of the findings.

Participants' Opinions

Four of the six studies included a measurement regarding whether or not the adult participants found the professional development to be effective or not (Leblanc et al., 2005; Sarokoff & Sturmey, 2008; Fetherston & Sturmey, 2014; & McKenney & Bristol, 2015). Each of these four studies administered their own acceptability survey using a Likert-like scale to determine the adult participants' opinions regarding the professional development. In each study the participants rated the professional development favorably. Participants viewed BST as acceptable and effective. Receiving training in DTT was found to be a useful and positive experience by the adult participants.

Overall Findings

All six of the articles share similar significant findings (Leblanc et al., 2005; Dib & Sturmey, 2007; Sarokoff & Sturmey, 2008; Fetherston & Sturmey, 2014; McKenney & Bristol, 2015; & Stahmer et al., 2015). Staff members' ability to implement DTT with fidelity was repeatedly found to increase after professional development which included educating staff members about DTT and coaching them to implement it correctly. Improvements in staff members' ability to implement DTT with fidelity were found to increase student learning on DTT skills and decrease negative student behaviors during DTT sessions. In particular, BST was found to quickly and efficiently improve instructor's use of DTT, was able to be conducted within existing school support structure, and instructors

were able to generalize DTT skills to novel DTT teaching situations after receiving BST.

Table 2. Types of Professional Development Conducted per Study

	BST	STAR	Combination of BST and STAR
Leblanc, Ricciardi, and Luiselli 2005	X		
Dib and Sturmey 2007	X		
Sarokoff and Sturmey 2008	X		
Featherston and Sturmey 2014	X		
McKenney and Bristol 2015			X
Stahmer, Rieth, Lee, Reisinger, Mandell, and Connell 2015		X	

Table 3. Percentage of Staff Members' Implementation of Discrete Trial Training with Fidelity

Authors	Baseline	Training	Follow Up	Calculation
Dib & Sturmey	0%-4%	Not Reported	100%	Mean
Sarokoff & Sturmey	22%-50%	95%-99%	91%-100%	Mean
Fetherston & Sturmey	18%-46%	90%-97%	89%-100%	Mean
Leblanc, Ricciardi, & Luiselli	32%-43%	86%-94%	95%-100%	Mean
McKenny & Bristol	62%-92%	82%-100%	89%-100%	Medium
Stahmer et al	79%	71%-74%	80%	Mean
Average of Each Study	35.5%-52.3%	84.8%-92.8%	90.7%-96.7	Mean

Table 4. Sarokoff and Sturmey (2008) Student Percentage of Correct Responses during Discrete Trial Training

Student	Baseline	Follow Up
Student A	20%-40%	50%-100%
Student B	30%-60%	80%-90%
Student C	0%-30%	30%-60%
Average of each Student	16.7%-43.3%	53.3%-83.3%

Table 5. Fetherston and Sturmey (2014) Student Percentage of Correct Responses during Discrete Trial Training

Student	Baseline Trained Responses	Baseline Untrained Responses	Training	Follow Up Trained Responses	Follow Up Untrained Responses
Dennis	0%-24%	0%-44%	25%-50%	31%-58%	12%-71%
Donald	0%-20%	0%-44%	0-42%	44%-58%	0%-44%
Craig	8%-36%	0%-47%	20%-33%	50%-55%	0%-44%
Chad	0%-10%	0%-33%	0%-15%	8%	0%-25%
Average of each Student	2%-22.5%	0-42%	11.3%-35%	33.3%-44.8%	3%-46%

Table 6. Dib and Sturmey (2007) Percentage of Intervals of Negative Student Behaviors

Student	Baseline	Follow Up
Mike	55%	7%
Dave	20%	5%
Juan	65%	10%
Average of each Student	46.7%	7.3%

Table 7. Fetherston and Sturmey (2014) Percentage of Intervals of Negative Student Behaviors

Student	Baseline Trained Responses	Baseline Untrained Responses	Training	Follow Up Trained Responses	Follow Up Untrained Responses
Dennis	45%-76%	45%-86%	19%-60%	6%-16%	0%-28%
Donald	38%-52%	31%-87%	12%-16%	0%-20%	4%-23%
Craig	46%-65%	24%-70%	4%-8%	4%-12%	4%-17%
Chad	45%-100%	35%-88%	7%-42%	12%	6%-17%
Average of each Student	43.5%-73.3%	33.8%-82.8%	10.5%-31.5%	5.5%-15	3.3%-21.3%

CHAPTER FIVE

DISCUSSION

The field of special education is continually advancing. The identification of EBP is currently at the forefront of the progress being made to improve special education. This is particularly true in regards to special education practices for students with ASD. EBP have the potential to greatly improve outcomes for students with ASD. However, the identification alone of EBP is not enough to significantly impact the learning and behavior of students with ASD. EBP must be implemented with fidelity in order to bring about the student results which were identified through research. Teachers must implement EBP with fidelity in order for the use of such practices to be impactful to student learning. It is for this reason that the identification of effective manners in which to conduct professional development regarding the implementation of EBP with fidelity is of significant interest.

Professional Development

Identifying professional development strategies which can reliably improve teachers' ability to implement EPB with fidelity stands to improve the field of special education on many levels. As indicated in this study, student learning increases and negative student behavior decreases when teachers implement EPB with fidelity. Limiting professional development to workshops, lectures, and

seminars does not equip teachers with the skillset which is required to implement EBP with fidelity. As the results of this study demonstrate, providing teachers with information regarding EBP in this manner is an appropriate starting place for professional development. However, according to this study, an initial presentation of information regarding EBP must be followed by conducting coaching in the classroom in order to increase teacher fidelity at implementing EBP.

Without the opportunity to participate in effective professional development that includes in the classroom coaching, special education teachers may be unable to bring about the desired student outcomes of increased academic learning and positive student behavior. The inability to effectively implement EBP and resultantly bring about desired student outcomes is a significant contributing factor to the stress, burnout and attrition which pervade the field of special education.

DTT is one of the oldest and most widely accepted EBP for students with ASD. DTT is a nuanced technique which requires the instructor to skillfully and cohesively implement multiple components. As evidenced by the degree of fidelity in implementation related to the increase in positive student outcomes demonstrated in this study, instructors must receive training to implement DTT with fidelity. When DTT is not implemented with fidelity it ceases to be an EBP in the true sense of the practice. When EBP are not implemented as indicated by

research they will not bring about the desired results in student learning or student behavior.

The results from this study indicate that professional development for DTT must begin with educating instructional staff members regarding the principals and practices of DTT. It must then move beyond the initial informational component and take the form of ongoing coaching in the classroom. Effective coaching sessions, as detailed in this study, are comprised of observation, feedback, and modeling based on the principals of DTT which were presented in the initial information session.

DTT is one of many EBP which have been identified through research as a strategy that is effective in the education of students with autism. As demonstrated in this study, when EBP are implemented with fidelity, student learning increases and negative student behaviors decrease. The shortcoming of EBP, including DTT, is that their mere identification is not enough to translate to improvement in the education of students with ASD. Identification of EBP is the first step in improving the quality of education which is provided to students with ASD. The second step is to fully train classroom staff members to effectively implement EBP so that student learning truly increases.

It is not enough to inform teachers of EBP. Teachers should not be expected to hear about an EBP once and then be able to implement it with fidelity in their classrooms. This expectation is an unrealistic one which does a disservice to both teachers and students. As shown in this study, staff members'

ability to implement EBP with fidelity increases after professional development which includes both an informational component followed by an extended coaching component. Additionally, the results of this study indicate that an increase in teachers' use of EBP with fidelity is followed by an increase in positive student outcomes.

Weaknesses in teacher preparation for students with ASD are prevalent at both the preservice and in-service levels of teacher development. In California as in many states across the U.S., teachers receive their credentials through non-categorical certification programs. This type of credential program allows for a fully credentialed teacher to lack the skills which are necessary for bringing about positive outcomes for students with ASD. Here again is a disservice to both teachers and students. Teachers are providing instruction at the highest level which they were trained to do so and are yet unqualified to manage challenging student behaviors and promote positive student outcomes for students with ASD.

It is as unrealistic of an expectation to believe teachers new to the field of ASD are able to provide high quality instruction without extensive training as it is to expect a teacher to be able to implement EBP with fidelity after simply learning of its existence. Again, as demonstrated by this study, the solution lies in improving professional development through coaching in the classroom which is focused on EBP. Such staff training results in an increase in teacher skills which correlates to an increase in positive student outcomes such as an increase in student learning and a decrease in negative student behaviors.

Suggestions for Future Research

Teacher Self-Efficacy

The relationship between effective professional development, teacher skill level, teacher self-efficacy, student outcomes, teacher burnout, and teacher attrition can be seen in a linear pattern. When professional development is conducted as suggested by the results of this study, then teacher skills improve and student learning increases. It is logical to then conclude that when teacher skills improve, teacher self-efficacy increases. It can also be reasoned that an increase in teacher self-efficacy further results in improved student outcomes such as increased learning and decreased challenging behavior which in turn lowers the instance of teacher burnout and attrition. Future research must be conducted to solidify the causal relationship between each of these dynamics. This is essential in effort to link improvements in professional development to a decrease in teacher burnout and attrition.

This chain of positive changes in the education for students with ASD is precipitated by the initial improvement in professional development. Teachers do not leave their credential programs as experts in their field. Teachers of students with ASD cannot implement EBP with fidelity after simply being informed of them. However, as indicated in this study, when professional development includes an in depth coaching component, teachers gain the skills necessary for improving student outcomes. It is likely that an improved skill set which results in improved student outcomes will contribute to improving teacher self-efficacy. Further

research must be conducted to determine a connection between improved teacher self-efficacy and improved student outcomes and whether or not this combination serves as a protective factor against teacher burnout and attrition which compromises the field of special education.

Teachers of students with ASD are at a heightened level of need for professional development delivered at the level of intensity of ongoing support and training in the classroom as identified in this study. The core deficits experienced by individuals with ASD impact their learning in all areas. Students with ASD often lack the basic functional and learning skills which are necessary for school success. This lack of essential skills is often manifested in challenging student behavior such as noncompliance, aggression, and self-injurious behaviors.

Teachers of students with ASD can experience job stress and burnout if they are unequipped to promote positive student outcomes for their students demonstrating such challenging behavior. Burnout is linked not only to challenging student behavior but also to a teachers' perceived inability to manage said behavior. Future research exploring the connection between improving teachers' self-efficacy as a means to alleviating the burnout which can ultimately lead to attrition is critical to the field of special education.

Teachers themselves often ask for training in the area of challenging student behaviors. The field of special education must answer this request with sustained and comprehensive staff development. It is imperative that such

professional development focus on equipping teachers to use EBP such as DTT through professional development which includes both an informational and practical application component as indicated by the results of this study. It can be reasonably assumed that effectively training teachers to use EBP for students with ASD with fidelity will increase teacher self-efficacy and thus contribute to a decrease in levels of teacher burnout and attrition. Future research must be conducted in effort to identify a causal relationship between providing professional development in the manner indicated in this study and an increase in teacher self-efficacy.

Coaching and Mentoring

This study focused significant attention on the coaching components of instruction, observation, feedback, modeling, and skill rehearsal found in BST. In the field of special education, coaching can be conducted by an expert in a particular topic or by an experienced peer coach. Additionally, coaching and mentoring are two professional development practices which often co-occur in the field of special education. The principals of BST and the concept of coaching in general, which have been found effective in this study, can be infused into both peer coaching and mentoring relationships. Such coaching and mentoring experiences can be effective at promoting both positive teacher and student outcomes.

Through participation in coaching and mentoring opportunities, teachers become more skillful at implementing EBP with fidelity. Research must be

conducted to determine if this results in an increase in their self-efficacy. As demonstrated in this study, student learning increases when EBP are implemented with fidelity. Research also needs to be conducted to determine if an increase in student learning contributes to an increase in teacher self-efficacy. Increasing a teacher's self-efficacy is a significant factor in decreasing teacher burnout and attrition. Resultantly, future research in this area is very important.

Teacher Stress Factors

Teacher burnout and attrition are of significant concern for teachers of students with ASD and in the field of special education in general. Future research must focus on identifying if increasing teacher self-efficacy is one manner in which improving staff development can help remedy the occurrence of teacher burnout and attrition. Research should also be conducted to determine if improving staff development can also help mitigate the negative effects of additional stressors faced by special education teachers on a regular basis. Special education teachers experience stress as a result of a lack of administrative support, challenging student behavior, role overload, and expectation-reality mismatch. Stressors can be grouped into the four domains of organizational structure, professional interactions, instructional assignment, and professional development itself.

The organizational structure provides the framework for teacher support from both the administration and other resources. Administrators can provide support to teachers and decrease teacher stress by facilitating appropriate

professional development. Research needs to be conducted to determine if professional interactions with administrators, service providers, coaches, and mentors are made more meaningful and more effectively reduce stress when conducted within the parameters of effective professional development as indicated by the results of this study.

Professional development which provides dissemination of information in tandem with ongoing coaching can mitigate the stress which comes with an instructional assignment for students with challenging behaviors such as those exhibited by students with ASD. When conducted effectively, professional development serves to reduce stress instead of create it. Future research which focuses on the ability of effective professional development to ease role overload and compensate for the expectation-reality mismatch which many teachers experience will be valuable to the field of special education. .

When implemented according to the parameters delineated in this study, professional development has the potential to help counteract and even prevent the stress special education teachers routinely face. Research must establish whether or not improved professional development can reduce teacher stress and thus serve to decrease teacher burnout which occurs when teachers encounter stress for extended periods of time while concurrently experiencing emotional exhaustion, depersonalization, and lack of personal accomplishment. Decreasing teacher burnout is of significant importance in the endeavor to

improve the field of special education. Teacher burnout contributes negatively to student education regardless of if the teacher remains teaching or not.

Teacher burnout is a significant factor in the high rates of teacher attrition which occur within special education. A continual turnover of teaching staff negatively impacts the quality of education which students in special education receive. However, student education is also negatively impacted when a teacher experiencing burnout remains teaching. Providing improved professional development, as indicated in this study, can contribute to remedying the negative effects of teacher burnout. Research must be conducted to determine if doing so will increase the skillset of teachers so that they will remain in the classroom and more effectively provide high quality education to their students when they do so.

Limitations of Current Research

Depth of Data Analysis

Improving professional development will help students, teachers, and the field of special education as a whole. However, a significant amount of research remains to be conducted in effort for a research based method of professional development to be defined. A core feature of future research must be to report data in a manner that will allow for a true meta-analysis to be conducted. The studies included for review in the current study reported aggregate data and did not report data points at the individual level. Data at the individual level is necessary so that the results from many studies can be combined to show true

statistical significance and lend credence to the effectiveness of the professional development techniques which are detailed in the research studies.

Environment where Research was Conducted

Much of the current available research on DTT is conducted in the home setting rather than in the school setting. The home and school environment differ in a wide variety of manners. Future research on training teachers to implement DTT with fidelity must be conducted in the school setting to get a true understanding of what is required for DTT to be implemented with fidelity in such a setting. DTT has been shown to be an effective instructional strategy for students with autism. It is essential that school staff members are able to implement this EBP with fidelity so that students receive the full benefit of the use of DTT in their school based instruction.

Lacking Research on other Evidence Based Practices

DTT is only one of many EBP which have been identified for students with ASD. However, a research base for effective professional development regarding implementing other EBP with fidelity is lacking. A comprehensive, high quality classroom for students with ASD should include the use of not only DTT but many other EBP as well. Teachers need intensive training to implement all EBP effectively so that students with ASD can achieve positive learning outcomes in all domains. Just as researchers have identified EBP for students with ASD, they must also identify effective manners in which to train teachers to implement all

EBP so that students with ASD can truly benefit from the identification and implementation of EBP.

APPENDIX A

DISCRETE TRIAL TRAINING COMPONENTS PER STUDY

Dib, N., & Strumey, P. (2007). Reducing student stereotype by improving teachers' implementation of discrete-trial teaching. *Journal of Applied Behavior Analysis, 40* (2), 339-343.

1. Task Presentation: remain within 1 m of the student, say student's name, initiate eye contact within three seconds and if not obtained put face directly in front of student's and repeat name, present task with appropriate SD, prompt student if task is not begun within three seconds of SD.
2. Prompting for Task Presentation: place hand on student's elbow and direct his arm toward the task, if task not started within three seconds place hand on student's wrist and direct his hand toward the task.
3. Prompting for Problem Behavior: ignore 1st instance of behavior if it is not physically harmful, if behavior continues for five seconds point to the task, if student doesn't return to task place hand on student's elbow and direct his arm toward the task, if task is not started within three seconds place hand on student's wrist and direct his hand toward the task, present verbal praise and reinforcement if student returns to task for 15 seconds without problem behavior.
4. Reinforcement: say praise statement within three seconds of proper task completion, place token on student's token board while making praise statement.

Sarokoff, R. A. & Sturmey, P. (2008). The effects of instructions, rehearsal, modeling, and feedback on acquisition, and generalization of staff use of discrete trail teaching and student correct responses. *Research in Autism Spectrum Disorders*, 2, 125-136.

1. Teacher making eye contact with student for one second contiguous to delivery of verbal instruction.
2. Giving no verbal instruction until child showed the readiness response of being still.
3. Delivering instruction with clear articulation once and matching that instruction for that program,
4. Implementing the predetermined correction procedure within three to five seconds of the verbal direction after failure of the student to respond.
5. Providing appropriate and immediate reinforcement for correct responses.
6. Using behavior specific praise.
7. Recording data after every trial.
8. Varying the duration of the inter-trial interval.

Fetherston, A. M., Sturmey, P. (2014). The effects of behavioral skills training on instructor and learner behavior across responses and skill sets. *Research in Developmental Disabilities*, 35, 541-562.

1. Present instruction once per trial.
2. Provide appropriate consequence within five seconds of the learner's response.
3. Complete task analysis available from author.

Leblanc, M., Ricciardi, J. N., Hospital, H., & Luiselli, J. K. (2005). Improving discrete trial instruction by paraprofessional staff through an abbreviated performance feedback intervention. *Education and Treatment of Children*, 28 (1), 76-82.

1. Arrange environment.
2. Direct student to session.
3. Orient student.
4. Secure student's attention.
5. Present discriminative stimulus.
6. Deliver level of prompting designated in learning program.
7. Reinforce student's accurate response.
8. Correct student's inaccurate response as needed.
9. Pause three to five seconds between trial presentations.
10. Record data following each completed trial.

McKenney, E. L. W. & Bristol, R. M. (2015). Supporting intensive interventions for students with autism spectrum disorder: Performance feedback and discrete trial training. *School Psychology Quarterly*, 30 (1), 8-22.

1. Assessment of student readiness.
2. Provision of clear directives.
3. Accurate prompting and correction procedures.
4. Delivery of reinforcement.
5. Behavior specific praise.
6. Allowing student to access reinforcement when appropriate.
7. Recorded data after each trial or block of trials.

Stahmer, A. C., Rieth, S., Lee, E., Reisinger, E. M., Mandell, D. S., & Connell, J. (2015). Training teachers to use evidence-based practices for autism: Examining procedural implementation fidelity. *Psychology in the Schools, 52* (2), 181-193.

1. Gaining students attention.
2. Choosing appropriate target skill.
3. Using clear and appropriate cues.
4. Using accurate prompting strategies.
5. Providing clear and correct consequences.
6. Using appropriate inter-trial intervals.
7. Utilizing error correction procedures effectively.

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