SPECIAL EDUCATION TEACHERS SELF-REPORTED USE OF EVIDENCE-BASED PRACTICES FOR STUDENTS WITH AUTISM IN TEXAS PUBLIC SCHOOLS

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Currently there is extensive literature on evidence-based practices (EBP) for students with autism spectrum disorder (ASD). However, there is limited research on whether or not these practices are implemented in the classroom by teachers serving students with ASD. Special education teachers are responsible for the learning outcomes of students across a range of ages and disabilities. This study investigated teachers' self-reported use of EBP and what factors influence implementation. Participants included 129 special education teachers in Texas public schools. Data analysis utilizing descriptive statistics and logistic regression was conducted to determine what factors (i.e., education, employment, teaching experience and training methods) predicted implementation of a particular practice. Although at least 67% of teachers reported using EBPs, teachers' employment and training experiences did not predict the implementation of any particular practice. Information from this study can be used to enhance professional development for teachers serving students with ASD.

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Introduction

Individuals with autism spectrum disorder (ASD) display mild to severe impairment in social communication and social interaction across multiple contexts, along with restricted, repetitive patterns of behavior, interests, or activities (American Psychiatric Association [APA], 2013). Although all individuals with autism share common characteristics, each individual is unique and as different from others with ASD as s/he is from his/her typically developing peers (Jones, 2006; Kimball, 2002; Simpson, 2005). Due to the range of impairment along the autism spectrum, individuals with ASD exhibit a wide array of abilities and challenges (Heflin & Simpson, 1998a; Scheuermann, Webber, Boutot, & Goodwin, 2003). Currently, the prevalence of school-age children with ASD is 1 in 68 students (CDC, 2016). Furthermore, students with ASD are currently the fastest growing population of students receiving special education services (Loiacono & Allen, 2008; Ludlow, Keramidas, & Landers, 2007). Consequently, the impact of autism on families, schools, and communities is profound.

Students with ASD are served in various educational settings in public schools (U.S. Department of Education [USDOE], 2009). In Texas public schools, there are 48,767 students with autism, ages 3-21, receiving special education services (Special Education Ad Hoc Reporting System [SPEARS], 2016). Of those students identified, 18% are served in general education classrooms; 39% are educated in self-contained classrooms for most of the day; 37% are educated in early childhood classrooms; and 6% of students are served in a separate school or residential treatment facility (SPEARS, 2016).

These data highlight the need for teachers serving students with ASD to have knowledge and expertise across the continuum of settings. Teachers serving students with ASD are responsible for the learning outcomes of students across a range of ages and levels of disability (McGee & Morrier, 2005; Barnhill, Sumutka, Polloway, & Lee, 2014). As more children with ASD are served in public schools, it is critical for teachers to have knowledge of effective teaching practices and the skills necessary to implement these practices, in order to improve student outcomes (Bellini, Henry, & Pratt, 2011; Scheuermann, et al., 2003; Schwartz, Sandall, McBride, & Boulware, 2004; Smith, Daunic, & Taylor, 2007).

One of the most pressing challenges for school systems is the increase in both the quantity and quality of personnel needed to provide appropriate services for students with ASD (National Research Council [NRC], 2001). Training and support for teachers serving students with ASD has increased within the last decade (Simpson, 2003) due to public policy and mandates (e.g., NCLB, 2001; IDEA, 2004). Researchers (Hendricks, 2011; Leblanc, Richardson, & Burns, 2009; Morrier, Hess, & Heflin, 2011) have found these efforts have not resulted in teachers acquiring the knowledge and skills to implement effective methods. According to Simpson (2008), teachers of students with ASD must have special education skills and knowledge, along with specialty skills in understanding essential characteristics of students with ASD, including social, communication, behavioral, and cognitive/learning.

Evidence-Based Practices for Students with ASD

With the reauthorization of the Individuals with Disabilities Education Act (IDEA) in 2004, known as the Individuals with Disabilities Education Improvement Act, public

schools are required to implement instructional strategies that have been shown to improve the outcomes for students with disabilities (Browder & Cooper-Duffy, 2003; Odom, Brantlinger, Gersten, Horner, & Harris, 2005; Simpson, 2005; Yell, Shriner, & Katsiyannis, 2006; Zirkel & Rose, 2009). Furthermore, IDEA (2004) emphasized utilizing training methods shown to be effective for increasing teachers' capacity to implement these strategies (Cook, Tankersley, Cook, & Landrum, 2009; Mayton, Menendez, Wheeler, & Zhang, 2010; Odom, Boyd, Hall, & Hume, 2010; Simpson, McKee, Teeter, & Beytien, 2007; Stichter, Crider, Moody, & Kay, 2007).

The most current efforts to establish criteria for determining evidence-based practices include the National Standards Report (National Autism Center [NAC], 2015) and the work of researchers with the National Professional Development Center on ASD [NPDC] (2014). While the NAC researchers identified "treatments" as the unit of analysis, the NPDC researchers define their unit of analysis as focused intervention practices. Focused interventions are individual instructional practices or strategies that teachers and other practitioners use to teach specific targeted skills to students with ASD, such as goals that would appear on IEPs (Odom et al., 2010). To date, the NPDC research team has identified 27 focused interventions (Wong et al., 2015). However, there is little evidence indicating if teachers are knowledgeable of these identified focused interventions or if they are routinely employing these practices in the classroom (Hendricks, 2011; Morrier, Hess and Heflin, 2011).

Although research has demonstrated a link between many strategies and improvements in several areas of functioning for students with ASD (e.g., NRC, 2001; Simpson, 2005; NPDC, 2014; NAC, 2015), the field of autism has been reliant on

unsupported and controversial interventions (Heflin & Simpson, 1998b; Simpson, 2005) that have resulted in wasted time, energy, and resources (Hess, Morrier, Heflin, & Ivey, 2008, Scheuermann et al., 2003). The heterogeneity of learning needs of students with ASD present unique challenges to educators attempting to develop and implement effective instructional programs (Brock, Huber, Carter, Juarez, & Warren, 2014; Iovannone, Dunlap, Huber, & Kincaid, 2003, Lubas, Mitchell, & De Leo, 2016; Marder & deBettencourt, 2015; McGee & Morrier, 2005; Simpson et al., 2007). Consequently, there have been minimal efforts to incorporate research findings into a curricular foundation to be accepted by school systems (Barnhill, Polloway, & Sumutka, 2011; Iovannone et al., 2003; Stichter et al., 2006).

It becomes the responsibility of teachers to direct and coordinate students' learning. Teachers primarily decide the type of instruction their students receive, which subsequently determines the outcomes for their students (Lang et al., 2010; Simpson, 2008; Simpson, Myles, & LaCava, 2008). With the increased number of students with ASD and the mandate for adopting and implementing EBP in the classroom, it is essential for teachers to understand and effectively apply these practices (Bellini et al., 2011; Morrier et al., 2011; Odom, Cox, & Brock, 2013; Suhrheinrich, 2011).

Although, the use of EBP has been shown to improve student outcomes, there is no single practice or intervention that is effective for all students. Consequently, it is important that teachers be judicious when selecting EBP for students. Professional development must be designed to support teachers in selecting and implementing EBP that result in improved student outcomes (Alexander, Ayres, & Smith, 2015; Brock et al., 2014; Marder & de Bettencourt, 2015).

Furthermore, professional development has the potential to provide an immediate form of effective training in EBP and to supplement the training teachers receive through university-based credentialing programs (Barnhill et al., 2014). Although increasing numbers of teacher preparation programs now offer coursework related to ASD, there is concern regarding the scope and extent to which these courses address accurate implementation of EBP (Barnhill et al., 2014; Odom, 2009; Scheuermann et al., 2003).

In an attempt to determine if professional development efforts have resulted in increased implementation of EBP for students with ASD, researchers have investigated statewide practices in some states (e.g., Hendricks, 2011; Brock et al., 2014). Morrier, Hess, and Heflin (2011) surveyed teachers to investigate the use of EBP related to services received by students with ASD in Georgia's public schools. These researchers explored the methods in which teachers were trained to implement the strategies they reported using in their classrooms. Of the 185 teachers surveyed, fewer than 5% reported using EBP for students with ASD in their classrooms. Furthermore, fewer than 15% of the respondents reported learning how to implement strategies used in their classrooms through their university-based preparation program (Morrier et al., 2011).

To date, there are limited studies examining the knowledge, training received, or instructional practices implemented by special education teachers serving students with ASD (Ruble, Dalrymple & McGrew, 2010). Therefore, it is important for researchers to determine whether teachers have knowledge of EBPs, whether they are implementing these practices in their classrooms, and to determine what factors influence the adoption of these practices (Cook, Tankersley, Harjusola-Webb, 2008). This

information is essential to guiding professional development efforts, in order to improve teacher performance and ultimately impact student outcome (Hendricks, 2011).

Purpose of the Study

In Texas last year (2015 – 2016), there were more than 48,000 student with ASD in public school settings. In order to systemize efforts to bridge the gap between research and practice for the teachers and school personnel in Texas, additional research is needed to determine if teachers are routinely using EBP and what training is needed to promote the use of these practices in public schools. Therefore, the purpose of this study is to investigate if special education teachers are using EBP for their students with ASD and what factors influence the implementation of these practices.

Special education teachers were required to indicate what practices they are currently using with their students with ASD and the type of training they received for each EBP. In order to determine training needed to promote the use of these practices in Texas public schools, special education teachers' self-reported reasons for not using a particular practice were also examined.

Based on the purpose of this study, four research questions were examined: (1) Which evidence-based practices are special education teachers implementing with their students with ASD; (2) how often do special education teachers report using evidence-based practices with their students with ASD; (3) what type of training have special education teachers received regarding evidence-based practices for students with ASD; and (4) does special education teachers' experience and training predict the implementation of evidence-based practices for students with ASD?

It was predicted that education levels, years of teaching experience, and type of instructional setting may influence whether or not special education teachers are implementing EBPs with their students with ASD. Additionally, the type of training received for a particular EBP may predict if a practice is routinely implemented with students with ASD.

Method

Participants

This study targeted special education teachers in Texas public schools. Upon approval from the University's IRB, only those teachers directly responsible for implementing an individualized education plan (IEP) to students with ASD in any educational setting were included in this study. The targeted sample included special education teachers employed in a public school district in each of the 20 regions supported by the Texas Educational Agency. Only those special education teachers who currently teach at least one student with ASD and have taught at least one student during the 2013-2014 school year were included in this study. Special education teachers who did not teach at least one student with autism during the 2013-2014 school year were excluded. Other school staff, such as, general education teachers, paraprofessionals and administrators were also excluded from the target sample.

Dependent Variable

The dependent or outcome variable for the study was the self-reported implementation of evidence-based practices for students with autism. Respondents were required to indicate which EBP was currently being used with their student(s) with ASD, and if they were implementing an EBP at least two times per week.

Survey Development

Special education teachers' implementation of effective strategies identified by the NPDC and deemed essential for students with ASD by parents, teachers and administrators (e.g., Callahan, Henson & Cowan, 2008) were assessed. A survey was created by synthesizing an intervention review compiled by Callahan et al. (2008) and a review of the focused interventions identified by the NPDC (2007). Only those strategies and/or interventions that would be familiar and routinely used by special education teachers (e.g., visual supports) were assessed. Strategies that were unlikely to be routinely used in the classroom (e.g., parent-implemented interventions) were excluded.

The survey titled, Survey of Special Educators' Implementation of Evidence-Based Practices for Students with Autism Spectrum Disorder took approximately 15 to complete and included the following sections:

Section I. This section explained the purpose of the study, the inclusion criteria for participation and the informed consent notification. Participants were required to indicate if they met the inclusion criteria and agreed to participate in the study.

Section II. Data was collected on highest level of education, current teaching assignment, grade level of student(s), the geographic description of the district, and in which TEA region respondents are employed.

Section III. Ten strategies/interventions were selected based how likely they would be routinely used (NPDC, 2009) and on their social validity (Callahan et al., 2008). In order to reduce bias, each strategy/intervention was presented according to how it is defined in the literature, rather than by descriptor terms. For example,

participants were asked about “the use of instructional trials which teach targeted skills within a one-on-one format providing clear and concise instruction and systematic reinforcement for correct responses, rather than *discrete trail training.*

Participants were required to indicate which strategies/interventions they were using and how often. For each strategy, respondents were required to indicate any and all training methods they received for implementing the strategy. Any participants who indicated they did not use a particular practice with their student(s) were prompted to select a reason(s) from a multiple choice response format. Table 1 provides all of the strategies queried and 12 training method options.

Table 1

Teaching Strategies and Training Methods Received for Implementing Each Strategy

Strategy/Intervention	Training Methods
1. Discrete trail training (DTT) 2. Social skills training (SST) 3. Reinforcement 4. Use of shaping, chaining, and fading to teach new skills (Shape/chain/fade) 5. Task analysis (TA) 6. Functional behavior assessment (FBA) 7. Visual supports (VS) 8. Structured teaching (ST) 9. Functional communication training (FCT) 10. Use of motivation	1. Half-day workshop (less than 4 hours) 2. Full-day workshop (more than 4 hours) 3. Multi-day workshop (more than one full day) 4. Online training modules 5. Self-taught (journal articles, book chapters or information from the Internet) 6. Coaching/mentoring including modeling and performance feedback 7. University/college course(s) (1-3 courses) 8. University/college course(s) (4-6 courses) 9. University/college course(s) (more than 6 courses) 10. Training provided by someone in the district 11. Professional conference 12. No training received

Procedures for Field-Testing the Survey

Prior to administering the survey to special education teachers, the survey instrument was emailed to a group of autism specialists across the state and

researchers in the field of ASD. Of the group of autism specialists who received the survey link, six completed the survey and offered feedback. Two distinguished researchers in the field completed the survey and offered feedback. All feedback gathered from this field test was utilized to determine the content validity of the instrument. Subsequently, the survey was modified based on the comments and suggestions to create questions that were clear, easy to understand, and unambiguous for respondents.

Procedure

Multiple strategies were utilized to recruit participants for the study. Emails with the URL to access the survey were sent to Directors of Special Education listed in the Texas Council of Administrators of Special Education (TCASE) directory, along with each member of the Statewide Leadership for Autism Training network. This email explained the purpose of the study, the target population sample, the time needed to complete the survey, and the informed consent. Directors of Special Education were requested to forward the survey URL to all special education teachers in their districts. ESC Autism Specialists were requested to forward the survey URL to the teacher contacts in their regions.

Additionally, the author posted the URL to access the survey, along with information about the purpose of the survey, and the informed consent to social media (e.g., Facebook and Twitter) and the Project Share portal, a global online learning community for K-12 educators across Texas.

The URL and information about the study was also emailed to all members of the Texas Council for Exceptional Children and posted on the organization's Facebook

page and community web page. In order to encourage participation, teachers had the option to enter their name and email address to have the results sent to them and/or to be entered into a drawing for a $25 Visa gift card.

Approximately one week after the first invitation e-mail, a second e-mail was sent to the Directors of Special Education and ESC Autism Specialists and reposted to social media. All contacts were asked to forward the study information and survey link to all their special education teacher contacts. For the next two weeks, a third and fourth email was sent to remind participants to complete and/or forward the survey. A final email was sent as a final reminder to complete and/or forward the survey. Data were collected for a period of 12 weeks and included four specific requests to complete the survey and/or forward to special education teachers in Texas.

Data Analysis

All survey data was exported from *Qualtrics*®, coded and uploaded to IBS SPSS Statistics software. Descriptive statistics were utilized to examine the frequencies, percentages, and mean scores of categorical survey items. To examine factors related to the implementation of EBPs for students with ASD, a logistic regression model was utilized. Logistic regression was performed to predict a categorical or outcome variable from a set of predictor variables (Peng, Lee, & Ingersoll, 2002). The probability that the outcome will occur is 1, and 0 if the outcome does not occur. A logistic regression model was used to examine the relationship between the likelihood special education teachers would implement an EBP and their highest educational degree, classroom setting, student(s) grade level, and years of special education teaching experience.

Results

A total of 190 individuals accessed the survey. Out of the 190 who accessed the survey, 129(68%) respondents met criteria and completed the survey. Represented in the sample were Texas public school districts with student populations of various sizes.

All participants (n = 129) answered all demographic questions, with the exception of 1 respondent who did not indicate in which ESC region s/he is currently teaching. The majority of respondents (approximately 58%; *n* = 74) of respondents earned a Bachelor's degree, and 37% (*n* = 48) have taught students with disabilities for more than 10 years. Nearly half of the respondents (44%; *n* = 57) taught students enrolled in elementary grade levels in a self-contained classroom for students with ASD and other disabilities (39%; *n* = 50). The largest group of respondents (49%; *n* = 63) were employed in a rural district (i.e., in the countryside or a small town with a population of 50,000 or less). Demographic data for all respondents is presented in Table 2.

Table 2

*Demographic Characteristics of Respondents (*N=*129)*

Demographic Characteristics	n
Highest Degree Earned	74 (57.4%)
Bachelor's	51 (38.5%)
Master's	4 (3.1%)
Doctorate	
Classroom Setting	
Self-contained; students with ASD	22 (17.1%)
Self-contained; students with ASD/Other Disabilities	50 (38.8%)
Providing Support in Content Area (e.g., resource)	23 (17.8%)
Consultative Support in General Education	14 (10.9%)
Other (e.g., multiple settings)	20 (15.5%)
Grade Level of Students with ASD	
Pre-Kindergarten/PPCD	17 (13.2%)
Elementary	57 (44.2%)
Middle School	18 (14%)
High School	24 (18.6%)
Other (e.g., ages 18 to 21)	13 (10.1%)

(table continues)

Table 2 (*continued*).

Years of Experience in Special Education	
0-3 years	20 (15.5%)
4-6 years	25 (19.4%)
7-10 years	36 (27.9%)
More than 10 years	48 (37.2%)
District Setting	
Urban (population more than 500,000)	31 (24%)
Suburban (residential area near a major city)	34 (26.4%)
Rural (population of 50,000 or less)	63 (48.8%)

Implementation of Evidence-Based Practices

Section III of the survey examined the self-reported use of 10 strategies/interventions shown to be effective and socially valid for teaching students with ASD. Respondents were asked to report whether or not they were implementing an EBP. Results indicated that a majority of the special education teachers who participated in the study were currently using these practices. In addition to using an EBP, respondents were prompted to indicate if the EBP was used at least two times a week or less than two times a week. These results are summarized in Table 3.

Table 3

Self-Reported Implementation of Evidence-Based Practices for Students with ASD

EBP	Reported Use (%)	Reported Non Use (%)	2 or more times per week (%)	Less than 2 times per week (%)
DTT	85.2	14.8	94.1	5.9
SST	89.1	10.9	88.1	11.9
Reinforcement	96.6	3.4	97.1	2.9
Shaping, chaining and fading	66.4	33.6	91	9.0
Task analysis (TA)	74.1	25.9	84.4	15.6
FBA	92.0	8.0	84.5	15.5
Visual supports	92.0	7.0	97.7	2.3
Structured teaching	96.4	3.6	99.0	1.0
FCT	68.8	31.3	94.0	6.0
Use of motivation	89.2	10.8	94.4	5.6

Note. EBP = evidence-based practices; DTT = discrete trial teaching; FBA = functional behavioral assessment; FCT = functional communication training; SST = social skills training.

For respondents who indicated they were not using a strategy, the next section listed five possible reasons for not using a particular strategy. Participants had the option to select any or all that applied. Although 19 (14.8%) respondents indicated not implementing *discrete trial training* in the past school year, they did not select any reason for not using this strategy. Overall, participants reported lack of training as a reason for not using a particular practice (Table 4).

Table 4

Self-Reported Reasons for Non Use

EPB	Lack of Training (%)	Limited Staff (%)	Lack of time (%)	Limited Resources (%)	Not relevant (%)
DTT	0.0	0.0	0.0	0.0	0.0
SST	8.6	3.9	3.9	5.5	5.5
Reinforcement	0.0	0.8	0.0	0.8	1.5
Shaping, Chaining & Fading	19.5	4.7	2.3	2.3	7.0
TA	13.3	7.8	2.3	3.9	6.3
FBA	5.5	0.8	0.8	0.8	1.6
VS	0.8	0.8	0.8	1.6	3.9
ST	0.0	0.8	0.8	0.8	1.6
FCT	9.4	2.3	0.8	5.5	13.3
Motivation	0.0	2.3	3.1	1.6	5.5

Note. EBP = evidence-based practices; DTT = discrete trial teaching; FBA = functional behavioral assessment; FCT = functional communication training; ST = Structured Teaching; VS = visual supports.

Training Received for Implementing Evidence-Based Practices

Special education teachers were asked to indicate any and all training methods received for implementing each strategy. Not all respondents who indicated they were currently using a strategy indicated what type of training method they received for that practice. Overall, participants who reported using a particular EBP indicated they were self-taught, received training provided by someone in their district and by attending a full-day or multi-day workshop. Less than 5% indicated they did not receive any training for a strategy they were currently using.

Predictors of Implementation

A logistic regression was performed separately for each EBP to ascertain the association of special education teachers' experience (i.e.; years teaching, classroom setting, student grade level(s)) and training (ie., highest degree earned) on the likelihood they were routinely implementing (e.g., at least twice a week) a particular EBP. Table 5 shows the logistic regression models were statistically significant (p = < .05) for *Discrete Trial Training, Social Skills Training, Visuals Supports, Structured Teaching* and *Functional Communication Training.*

Table 5

Summary of Logistic Regression Models Coefficients

	x^2	*df*	Sig.
DTT	26.321	10	.003
SS	24.657	10	.006
VS	23.399	10	.009
ST	27.128	10	.002
FCT	27.844	10	.002

Note. DTT = discrete trial teaching; FCT = functional communication training; SS = social skills training; ST = structured teaching; VS = visual supports.
*p = < .05. **p = < .001.

The variables associated with the use of *Discrete Trial Training* were classroom setting and student grade level. Teachers who were serving students in a self-contained classroom for students with ASD and other disabilities (p = .038) and teachers who were serving students in middle school (p = .045) contributed significantly to the prediction of implementation. Additionally, teachers with 7 to 10 years of teaching experience had 4.406 times higher odds of using this particular practice (as shown in Table 6).

Table 6

Predictors Associated with Using Discrete Trial Training

							95.0%C.I. for Exp(*B*)	
	B	*SE*	Wald	*df*	Sig.	Exp(*B*)	Lower	Upper
Graduate	.441	.771	.385	1	.535	1.554	.386	6.258
Self-contained for multiple disabilities	-1.499	.723	4.300	1	.038	.223	.054	.921
PreK/PPCD	-2.097	1.127	3.465	1	.063	.123	.013	1.118
Elementary	-.279	.982	.081	1	.776	.756	.110	5.186
Middle School	-2.156	1.075	4.025	1	.045	.116	.014	.951
0-3 years teaching	.216	.998	.047	1	.828	1.241	.175	8.785
4-6 years teaching	-1.160	.758	2.344	1	.126	.313	.071	1.384
7-10 years teaching	1.483	1.199	1.530	1	.216	4.406	.420	46.185
Suburban	-.015	1.196	.000	1	.990	.985	.095	10.259
Rural	-1.378	.878	2.465	1	.116	.252	.045	1.408

*p = < .05

The only variable associated with the implementation of *Social Skills Training* was teachers who earned a graduate degree (p = .024). When compared to teachers without a graduate degree, respondents with a master's or doctorate degree were 11.425 times more likely to use this practice. Teachers who were teaching in a rural area were 7.172 more likely to use this practice when compared to teachers who were teaching in a suburban or urban area. In addition, teachers with 7 to 10 years teaching experience were 8.512 times more likely to use this practice compared to other respondents. These results are represented in Table 7.

Table 7

Predictors Associated with Using Social Skills Training

							95.0%C.I. for Exp(*B*)	
	B	*SE*	Wald	*df*	Sig.	Exp(*B*)	Lower	Upper
Graduate	2.435	1.075	5.128	1	.024	11.415	1.387	93.926
Self-contained for multiple disabilities	.689	.973	.502	1	.479	1.992	.296	13.415
PreK/PPCD	-.445	12967.65	.000	1	1.000	.641	.000	
Elementary	-20.084	7293.695	.000	1	.998	.000	.000	
Middle School	-21.300	7293.695	.000	1	.998	.000	.000	
0-3 years teaching	1.534	1.221	1.578	1	.209	4.636	.424	50.729
4-6 years teaching	1.022	1.214	.709	1	.400	2.778	.258	29.974
7-10 years teaching	2.141	1.245	2.958	1	.085	8.512	.742	97.680
Suburban	-.405	1.057	.147	1	.702	.667	.084	5.292
Rural	1.970	1.057	3.041	1	.081	7.172	.783	65.665

*p = < .05

The logistic regression model for *Visual Supports* was statistically significant, $x^2(10) = 23.399$, $p = .009$. However, none of the predictor variables were associated with implementing this practice. The odds ratio indicated that teachers who were teaching students served in a Pre-K/PPCD classroom were 3.482 times more likely to use this practice compared to teachers teaching in other classroom settings. Although the logistic regression model for *Structured Teaching* was statistically significant ($x^2(10) = 27.128$, $p = .002$), none of the predictor variables were associated with implementing this practice.

Special education teachers serving students in rural areas were associated with implementing *Functional Communication Training* ($p = .035$). Respondents with graduate degrees were 1.174 times more likely to use this practices compared to

teachers with a Bachelor's degree. The odds ratio for student grade levels and years of teaching experience were also noteworthy for this practice. Teachers who served students in Pre-K/PPCD (Exp(B) = 1.623) and in elementary (Exp(B) = 1.969) were more likely to use this practice compared to teachers serving students in other grade levels. Additionally, teachers who had 0 to 3 years teaching experience (Exp(B) = 1.786) and teachers who had 7 to 10 years teaching experience (Exp(B) = 4.981) were more likely to use this practice compared to other respondents (see Table 8).

Table 8

Predictors Variables Associated with Using Functional Community Training

							95.0%C.I. for Exp(*B*)	
	B	*SE*	Wald	*df*	Sig.	Exp(*B*)	Lower	Upper
Graduate	.160	.569	.079	1	.778	1.174	.385	3.578
Self-contained for multiple disabilities	-.852	.520	2.683	1	.101	.427	.154	1.182
PreK/PPCD	.484	.867	.312	1	.576	1.623	.297	8.878
Elementary	.678	.645	1.102	1	.294	1.969	.556	6.976
Middle School	-1.337	.927	2.078	1	.149	.263	.043	1.617
0-3 years teaching	.580	.836	.482	1	.488	1.786	.347	9.185
4-6 years teaching	-.784	.624	1.580	1	.209	.456	.134	1.551
7-10 years teaching	1.606	.735	4.774	1	.029	4.981	1.180	21.026
Suburban	-1.074	.811	1.753	1	.185	.342	.070	1.675
Rural	-1.590	.754	4.448	1	.035	.204	.047	.894

*p = < .05

Discussion

The purpose of this study was to investigate special education teachers' self-reported implementation of EBP for students with ASD. This study also examined factors that may influence whether or not a teacher implemented a particular EBP. Teachers are the crucial leaders who direct and coordinate students' learning and who primarily decide the type of instruction their students receive and subsequently, determine the outcomes for their students (Lang et al., 2010; Simpson, 2008). Thus, it is not surprising that data showed most of the teachers reported using EBPs with their students with ASD.

Previous studies have examined teachers' self-reported use of EBPs for students with ASD (e.g., Hendricks, 2011; Morrier et al., 2011). Similar to the current study, Morrier et al. (2011), examined the association of the types of training received, teaching experience and classroom setting to the use of EBPs. These variables did not predict the implementation of EBP for students with ASD. Teachers reported low rates of EBP use in previous studies (i.e., Hendricks, 2011; Morrier et al., 2011), whereas, at least 67% of teaches reported EBP use in the current study. Most teachers in the Hendricks (2011) and Morrier et al. (2011) studies reported not having received training on EBP for students with ASD during their pre-service programs. This is surprising considering Virginia has state-developed competencies for teachers serving student with ASD (Hendricks, 2011).

Given the current findings as compared to previous studies, this study highlights the need for additional research in several key areas. First these results do not address

the quality of implementation of the EBP reported by special education teachers. Second, this study does not assess the extent to which the survey respondents fully understood the steps and components of the EBP they reported using routinely. Knowledge of EBPs, does not ensure that teachers are prepared to accurately implement these practices. Teachers must be able to implement EBPs with fidelity, in order to maximize student achievement. Future research should address these issues. Third, there is a need to extensively examine the impact of student outcomes of EBP currently being implemented in Texas public schools.

Furthermore, it is important to determine if the practices most commonly reported being used (i.e., *Structured Teaching* and *Reinforcement*) have an impact on student learning. It would be helpful to know if the more frequently reported EBPs used had a greater or lesser impact on student outcomes when compared to practices not reported as routinely used (i.e., *Functional Communication Training* and *Shaping, Chaining and* Fading).

Despite the growing body of evidence about which educational practices may be effective with students, the in-school and post-school outcomes for students with ASD continue to be less than optimal (Shattuck et al., 2012). One factor that may contribute to these outcomes is the extent to which EBP are actually implemented in schools. Efforts to identify EBP do not, by themselves, ensure that educators are choosing to and/or are prepared to accurately use these practices (Odom, Cox, & Brock, 2013). The present study provides a preliminary evaluation of special education teacher's self-reported implementation of EBP for students with ASD. The majority of teachers who completed the survey, indicated they routinely implemented EBP across settings and

grade levels. However, the teachers' teaching experience and training did not predict the use of any particular EBP.

The types of training special education teachers received on EBP for students with ASD were also investigated. For those EBP routinely used, teachers were asked to identify the type(s) of training they received. Most teachers reported they were self-taught (i.e., journal articles or information from the Internet), trained by someone in their district, and/or attended a full day or multi-day workshop. However, this conflicts with research about effective teacher training methods, which has consistently demonstrated that stand-alone training without follow-up training and support has only a limited impact on improving accurate implementation of EBP (e.g., Barnhill et al., 2014; Brock et al., 2014).

Furthermore, university coursework was not a predictor of EBP use. Additional research is needed to examine the effectiveness of university programs designed to prepare special education teachers. Due to the heterogeneity and complexity of students with ASD, educators must possess the knowledge and capacity to willingly adopt and implement effective strategies and methods (Callahan, et al., 2008; Lerman, Vorndran, Addition, & Kuhn, 2004) or students with ASD will not learn and may even regress (Scheuermann et al., 2003). Ideally, preparation of teachers would include both didactic information and competency training with performance feedback by a coach/mentor skilled in the use of EBP (Fixsen, Blase, Naoom, & Wallace, 2009; Suhrheinrich, 2011).

Limitations and Implications

There were several limitations in this study and must be considered when interpreting these results. For instance, the methodology employed resulted in limited generalization of findings due to the small sample size. In spite of the small sample size, diversity was evident. At least one teacher from each of the 20 regions across Texas participated in the study. Also demographic data captured districts with varied student population size.

Given that the survey was disseminated electronically, there was a relatively low response rate. While the use of web-based surveys have technical advantages for collecting data (e.g., shorter time frames), researchers have limited control over online survey distribution once the survey is launched. Thus, it is not surprising to have a higher non-response rate and participants declining email invitations to participate. Research utilizing voluntary participation typically yields low response rates (Bartlett, Kotrlik & Higgins, 2001).

Although teachers reported routinely implementing EBP, the accuracy of teachers' reports were not verified to determine if teachers were actually using strategies identified. Furthermore, this study did not investigate if teachers were using EBP with fidelity or the effectiveness of their use.

The results of this study can be interpreted to indicate teachers are resourceful and seek a variety of methods to meet their training needs. Although the format and content of training delivered to teachers of students with ASD need to be carefully evaluated, with data collected to document use. Administrators responsible for professional development opportunities should consider the teachers' self-reported

teaching practices as a strategy to increase engagement of those involved in the training.

In this study, special education teachers in Texas did not report university coursework as a method for preparing them to implement EBP for students with ASD. Studies in other states involving teachers' reports of training received to implement EBP for students with ASD have shown similar results (.e.g., Morrier et al., 2011; Hendricks, 2011). Therefore, in-service professional development for special education teachers is a critical consideration. Although one-to-one coaching with performance feedback has been shown to improve the instructional capacity of teachers and outcomes for students with ASD (Kretlow & Bartholomew, 2010; NAC, 2015; Odom at al., 2013), this type of professional development is rarely available (Bethune & Wood, 2013). The results of this study provide preliminary data that could have implications on how professional development opportunities are provided to special education teachers serving student with ASD. It is crucial that we improve pre- and in-service training efforts to maximize the knowledge and skills of current and future special education teachers given that teacher training can impact student success (Hall, 2015).

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APPENDIX A

SURVEY OF SPECIAL EDUCATION TEACHERS IMPLEMENTATION OF EVIDENCE-BASED PRACTICES FOR STUDENTS WITH ASD

Dear Participant,

We invite you to participate in an investigation to identify factors contributing to the implementation of evidence-based practices for students with autism spectrum disorder (ASD) in Texas public schools. Thank you, in advance, for your willingness to participate in this study. Information collected from this study will assist in guiding future training and technical assistance for special education teachers in the area of autism and evidence-based practices. As a special educator, your input is essential to guide such efforts.

All survey responses will be kept in the strictest confidence, and the information collected will be recorded confidentially. Please read the Informed Consent Notification that explains the purpose, benefits, and possible risks from your participation in this study.

Informed Consent Notification

This study attempts to investigate factors that influence special educators' implementation of evidence-based practices for students with ASD. For the purpose of this study, you will be asked to answer questions about 10 identified practices, including whether or not you are currently using a practice and what type of training you received for implementing a particular practice. If you have not used a practice, you will be asked to identify reasons for not using a particular practice. The questionnaire includes a total of 50 questions and will take approximately 15 minutes to complete. There are no foreseeable risks involved in this study. We expect the results of this survey may identify areas of need for training for special educators serving students with ASD.

Additionally, the results may assist in developing pre-service and in-service training programs for currently and future special educators.

Participation in this research is completely voluntary. If you begin the survey, you have the right to withdraw at any time. The data collected will be stored in the HIPPA-compliant, secured database until after the study is complete and results are disseminated.

Upon completion of the survey, you may request the results of the survey and/or to be entered into a drawing to receive a $25 Visa gift card. If you want to request survey results and/or a chance to win a gift card you will have the option to enter your name and e-mail address. If your name is drawn, you will be contacted via e-mail. If you have any questions about the study, you may contact Angela Cowan at acowan@esc12.net or Dr. Miriam Boesch at Miriam.Boesch@unt.edu.

This research study has been reviewed and approved by the University of North Texas' Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects.

To participate in this survey, you must meet the following criteria: (1) you must currently have a teaching contract for a special education position; and (2) you must have taught at least one student with autism during the past (2012-2013) school year.

I have read and understand the above Informed Consent notification and am willingly participating in this survey.

- ❍ Yes, I will continue (1)
- ❍ No, I choose to exit the survey 0)

If No, I choose to exit the survey is selected, then skip to end of survey

To participate in this survey, you must meet the following criteria: (1) you must currently have a teaching contract for a special education position; and (2) you must have taught at least one student with ASD during the past (2012-2013) school year.

- ❍ Yes, I meet the criteria for participating in this study (1)
- ❍ No, I do not meet the criteria for participating in this study (0)

If No, I do not meet the criteria is selected, then skip to end of survey

What is your highest degree earned?

- ❍ Bachelor's (1)
- ❍ Master's (2)
- ❍ Doctorate (3)

In which setting do you currently teach students with ASD?

- ❍ Self-contained classroom for students with ASD (1)
- ❍ Self-contained classroom for students with ASD and other disabilities (2)
- ❍ Special education classroom providing support in content area (e.g.; resource) (3)
- ❍ Collaborative and consultative teacher in general education classroom(s) (4)
- ❍ Other (5) _____

What is the grade level(s) of your student(s) with ASD?

- ❍ Pre-Kindergarten/PPCD (1)
- ❍ Elementary (2)
- ❍ Middle School (3)

- ❍ High School (4)
- ❍ Other (5) _____

How many years have you been teaching students with disabilities?

- ❍ 0-3 years (1)
- ❍ 4-6 years (2)
- ❍ 7-10 years (3)
- ❍ More than 10 years (4)

Which most accurately describes your current district?

- ❍ Urban (i.e., in a large city with a population of 500,000 - 1,000,000 or more) (1)
- ❍ Suburban (residential area outside a major city) (2)
- ❍ Rural (i.e., in the countryside or very small town with a population of 50,000 or less) (3)

In which of the Education Service Center (ESC) region do you currently teach (please select)?

- ❍ Region 1 - Edinburg (1)
- ❍ Region 2 - Corpus Christi (2)
- ❍ Region 3 - Victoria (3)
- ❍ Region 4 - Houston (4)
- ❍ Region 5 - Beaumont (5)
- ❍ Region 6 - Huntsville (6)
- ❍ Region 7 - Kilgore (7)
- ❍ Region 8 - Mt. Pleasant (8)
- ❍ Region 9 - Wichita Falls (9)
- ❍ Region 10 - Richardson (10)
- ❍ Region 11 - Fort Worth (11)
- ❍ Region 12 - Waco (12)

- ❍ Region 13 - Austin (13)
- ❍ Region 14 - Abilene (14)
- ❍ Region 15 - San Angelo (15)
- ❍ Region 16 - Amarillo (16)
- ❍ Region 17 - Lubbock (17)
- ❍ Region 18 - Midland (18)
- ❍ Region 19 - El Paso (19)
- ❍ Region 20 - San Antonio (20)

The purpose of this section is to gather information regarding the implementation of evidence-based practices for students with ASD. Please indicate whether or not you have used the following practices this past year (since August, 2012). If you are unfamiliar with a practice, click "No, I have not used this practice".

1. The use of instructional trials which teach targeted skills within a structured one-on-one format providing clear and concise instruction and systematic reinforcement for correct responses.

- ❍ Yes, currently (since August, 2012) (1)
- ❍ No, I have not used this practice (0)

If No, I have not used this practice is selected, skip to “please select the reason for not using (check all that apply)”.

Did you use this practice at least 2 times a week?

- ❍ Yes, at least 2 times a week (1)
- ❍ No, less than 2 times a week (0)

Please indicate the type of training method you received for implementing this practice (check all that apply).

- ❑ Half-day workshop (less than 4 hours) (1)
- ❑ Full-day workshop (more than 4 hours) (2)
- ❑ Multi-day working/training (more than one full day) (3)
- ❑ Online training modules (could include AIMS, or online training modules provided by the statewide autism network) (4)
- ❑ Self-taught (could include journal articles or book chapters read by you, or information from the Internet) (5)
- ❑ Coaching/mentoring including modeling and performance feedback (6)
- ❑ University/college course(s) (1-3 courses) (7)
- ❑ University/college courses (4-6 courses) (8)
- ❑ University/college courses (more than 6 courses) (9)
- ❑ Training provided by someone in the district (this could include a lead teacher, specialist, or other staff) (10)
- ❑ Professional conference (11)
- ❑ No training received (12)

If one or more is selected, skip to the next practice.

Please select the reason for not using this practice (check all that apply).

- ❑ I (or my staff) do not know how to implement this practice (1)
- ❑ The number of staff members available is inadequate to implement this practice (2)
- ❑ There is not enough time during the day to implement the practice (3)
- ❑ The required resources (e.g., materials) to implement the practice are limited or unavailable (4)
- ❑ The practice is not appropriate or relevant for my student(s) (5)

2. The use of specialized curricula/strategies to teach social skills.

- ❍ Yes, currently (since August, 2012) (1)

❍ No, I have not used this practice (0)

If No, I have not used this practice is selected, skip to “please select the reason for not using (check all that apply)”.

Did you use this practice at least 2 times a week?

❍ Yes, at least 2 times a week (1)

❍ No, less than 2 times a week (0)

Please indicate the type of training method you received for implementing this practice (check all that apply).

❑ Half-day workshop (less than 4 hours) (1)

❑ Full-day workshop (more than 4 hours) (2)

❑ Multi-day workshop/training (more than one full day) (3)

❑ Online training modules (could include AIMS, or online training modules provided by the statewide autism network) (4)

❑ Self-taught (could include journal articles or book chapters read by you, or information from the Internet) (5)

❑ Coaching/mentoring including modeling and performance feedback (6)

❑ University/college course(s) (1-3 courses) (7)

❑ University/college courses (4-6 courses) (8)

❑ University/college courses (more than 6 courses) (9)

❑ Training provided by someone in the district (this could include a lead teacher, specialist, or other staff) (10)

❑ Professional conference (11)

❑ No training received (12)

If one or more is selected, skip to the next practice.

Please select the reason for not using this practice (check all that apply).

- ❑ I (or my staff) do not know how to implement the practice (1)
- ❑ The number of staff members available is inadequate to implement this practice (2)
- ❑ There is not enough time during the day to implement the practice (3)
- ❑ The required resources (e.g., materials) to implement the practice are limited or unavailable (4)
- ❑ The practice is not appropriate or relevant to my student(s) (5)

3. The effective use of reinforcement, including the use of natural and direct reinforcing consequences.

- ❍ Yes, currently (since August, 2012) (1)
- ❍ No, I have not used this practice (0)

If No, I have not used this practice is selected, skip to, and "please select the reason for not using (check all that apply).

Did you use this practice at least 2 times a week?

- ❍ Yes, at least 2 times a week (1)
- ❍ No, less than 2 times a week (0)

Please indicate the type of training method you received for implementing this practice (check all that apply).

- ❑ Half-day workshop (less than 4 hours) (1)
- ❑ Full-day workshop (more than 4 hours) (2)
- ❑ Multi-day workshop/training (more than one full day) (3)
- ❑ Online training modules (could include AIMS, or online training modules provided by the statewide autism network) (4)
- ❑ Self-taught (could include journal articles or book chapters ready by you, or information

from the Internet) (5)

- ❑ Coaching/mentoring including modeling and performance feedback (6)
- ❑ University/college course(s) (1-3 courses) (7)
- ❑ University/college courses (4-6 courses) (8)
- ❑ University/college courses (more than 6 courses) (9)
- ❑ Training provided by someone in the district (this could include a lead teacher, specialist, or other staff) (10)
- ❑ Professional conference (11)
- ❑ No training received (12)

If one or more is selected, skip to next practice.

Please select the reason for not using this practice (check all that apply).

- ❑ I (or my staff) do not know how to implement the practice (1)
- ❑ The number of staff members available is inadequate to implement this practice (2)
- ❑ There is not enough time during the day to implement the practice (3)
- ❑ The required resources (e.g., materials) to implement the practice are limited or unavailable (4)
- ❑ The practice is not appropriate or relevant for my student(s) (5)

4. The systematic use of shaping, chaining and fading to teach new skills.

- ❍ Yes, currently (since August, 2012) (1)
- ❍ No, I have not used this practice (0)

If No, I have not used this practice is selected, skip to "please select the reason for not using (check all that apply)".

Did you use this practice at least 2 times a week?

- ❍ Yes, at least 2 times a week (1)
- ❍ No, less than 2 times a week (0)

Please indicate the type of training method you received for implementing this practice (check all that apply).

- ❑ Half-day workshop (less than 4 hours) (1)
- ❑ Full-day workshop (more than 4 hours) (2)
- ❑ Multi-day workshop/training (more than one full-day) (3)
- ❑ Online training modules (could include AIMS, or online training modules provided by the statewide autism network) (4)
- ❑ Self-taught (could include journal articles or book chapters ready by you, or information from the Internet) (5)
- ❑ Coaching/mentoring including modeling and performance feedback (6)
- ❑ University/college course(s) (1-3 courses) (7)
- ❑ University/college courses (4-6 courses) (8)
- ❑ University/college courses (more than 6 courses) (9)
- ❑ Training provided by someone in the district (this could include a lead teacher, specialist, or other staff) (10)
- ❑ Professional conference (11)
- ❑ No training received (12)

If one or more is selected, skip to next practice.

Please select the reason for not using this practice (check all that apply).

- ❑ I (or my staff) do not know how to implement the practice (1)
- ❑ The number of staff members available is inadequate to implement the practice (2)
- ❑ There is not enough time during the day to implement the practice (3)
- ❑ The required resources (e.g., materials) to implement the practice are limited or unavailable (4)

- ❑ The practice is not appropriate or relevant for my student(s) (5)

5. The use of detailed task analysis in order to systematically teach new skills and sequences of behavior.

- ❍ Yes, currently (since August, 2012) (1)
- ❍ No, I have not used this practice (0)

If No, I have not used this practice is selected, skip to "please select the reason for not using (check all that apply)".

Did you use this practice at least 2 times a week?

- ❍ Yes, at least 2 times a week (1)
- ❍ No, less than 2 times a week (0)

Please indicate the type of training method you received for implementing this practice (check all that apply).

- ❑ Half-day workshop (less than 4 hours) (1)
- ❑ Full-day workshop (more than 4 hours) (2)
- ❑ Multi-day workshop/training (more than one full day) (3)
- ❑ Online training modules (could include AIMS, or online training modules provided by the statewide autism network) (4)
- ❑ Self-taught (could include journal articles or book chapters ready by you, or information from the Internet) (5)
- ❑ Coaching/mentoring including modeling and performance feedback (6)
- ❑ University/college course(s) (1-3 courses) (7)
- ❑ University/college courses (4-6 courses) (8)
- ❑ University/college courses (more than 6 courses) (9)
- ❑ Training provided by someone in the district (this could include a lead teacher, specialist, or other staff) (10)

- ❑ Professional conference (11)
- ❑ No training received (12)

If one or more is selected, skip to next practice.

Please select the reason for not using this practice (check all that apply).

- ❑ I (or my staff) do not know how to implement the practice (1)
- ❑ The number of staff members available is inadequate to implement the practice (2)
- ❑ There is not enough time during the day to implement the practice (3)
- ❑ The required resources (e.g., materials) to implement the practice are limited or unavailable (4)
- ❑ The practice is not appropriate or relevant for my student(s) (5)

6. The use of describing an interfering behavior and determining the underlying purpose of the behavior in order to develop an intervention plan to address the behavior.

- ❍ Yes, currently (since August, 2012) (1)
- ❍ No, I have not used this practice (0

If No, I have not used this practice is selected, skip to "please select the reason for not using (check all that apply)".

Did you use this practice at least 2 times a week?

- ❍ Yes, at least 2 times a week (1)
- ❍ No, less than 2 times a week (0)

Please indicate the type of training method you received for implementing this practice (check all that apply).

- ❑ Half-day workshop (less than 4 hours) (1)
- ❑ Full-day workshop (more than 4 hours) (2)

- ❑ Multi-day workshop/training (more than one full day) (3)
- ❑ Online training modules (could include AIMS, or online training modules provided by the statewide autism network) (4)
- ❑ Self-taught (could include journal articles or book chapters ready by you, or information from the Internet) (5)
- ❑ Coaching/mentoring including modeling and performance feedback (6)
- ❑ University/college course(s) (1-3 courses) (7)
- ❑ University/college courses (4-6 courses) (8)
- ❑ University/college courses (more than 6 courses) (9)
- ❑ Training provided by someone in the district (this could include a lead teacher, specialist, or other staff) (10)
- ❑ Professional conference (11)
- ❑ No training received (12)

If one or more is selected, skip to next practice

- ❑ I (or my staff) do not know how to implement the practice (1)
- ❑ The number of staff members available is inadequate to implement the practice (2)
- ❑ There is not enough time during the day to implement the practice (3)
- ❑ The required resources (e.g., materials) to implement the practice are limited or unavailable (4)
- ❑ The practice is not appropriate or relevant for my student(s) (5)

7. The use of visual activity schedules, visual supports and other visual systems to prompt or remind students to organize work and materials and/or engage in appropriate behaviors and/or activities.

- ❍ Yes, currently (since August, 2012) (1)
- ❍ No, I have not used this practice (0)

If No, I have not used this practice is selected, skip to "please select the reason for not using (check all that apply)".

Did you use this practice at least 2 times a week?

- ❍ Yes, at least 2 times a week (1)
- ❍ No, less than 2 times a week (0)

Please indicate the type of training method you received for implementing this practice (check all that apply).

- ❑ Half-day workshop (less than 4 hours) (1)
- ❑ Full-day workshop (more than 4 hours) (2)
- ❑ Multi-day workshop/training (more than one full day) (3)
- ❑ Online training modules (could include AIMS, or online training modules provided by the statewide autism network) (4)
- ❑ Self-taught (could include journal articles or book chapters ready by you, or information from the Internet) (5)
- ❑ Coaching/mentoring including modeling and performance feedback (6)
- ❑ University/college course(s) (1-3 courses) (7)
- ❑ University/college courses (4-6 courses) (8)
- ❑ University/college courses (more than 6 courses) (9)
- ❑ Training provided by someone in the district (this could include a lead teacher, specialist, or other staff) (10)
- ❑ Professional conference (11)
- ❑ No training received (12)

If one or more is selected, skip to next practice.

Please select the reason for not using this practice (check all that apply).

- ❑ I (or my staff) do not know how to implement the practice (1)

- ❑ The number of staff members available is inadequate to implement the practice (2)
- ❑ There is not enough time during the day to implement the practice (3)
- ❑ The required resources (e.g., materials) to implement the practice are limited or unavailable (4)
- ❑ The practice is not appropriate or relevant to my student(s) (5)

8. Provide a structured classroom environment and consistent, predictable routines (including structured approaches to task representation, and clear guidelines for expectations of appropriate behavior).

- ❍ Yes, currently (since August, 2012) (1)
- ❍ No, I have not used this practice (0)

If No, I have not used this practice is selected, skip to "please select the reason for not using (check all that apply)".

Did you use this practice at least 2 times a week?

- ❍ Yes, at least 2 times a week (1)
- ❍ No, less than 2 times a week (0)

Please indicate the type of training method you received for implementing this practice (check all that apply).

- ❑ Half-day workshop (less than 4 hours) (1)
- ❑ Full-day workshop (more than 4 hours) (2)
- ❑ Multi-day workshop/training (more than one full day) (3)
- ❑ Online training modules (could include AIMS, or online training modules provided by the statewide autism network) (4)
- ❑ Self-taught (could include journal articles or book chapters ready by you, or information from the Internet) (5)
- ❑ Coaching/mentoring including modeling and performance feedback (6)

- ❑ University/college course(s) (1-3 courses) (7)
- ❑ University/college courses (4-6 courses) (8)
- ❑ University/college courses (more than 6 courses) (9)
- ❑ Training provided by someone in the district (this could include a lead teacher, specialist, or other staff) (10)
- ❑ Professional conference (11)
- ❑ No training received (12)

If one or more is selected, skip to next practice.

Please select the reason for not using this practice (check all that apply).

- ❑ I (or my staff) do not know how to implement the practice (1)
- ❑ The number of staff members available is inadequate to implement the practice (2)
- ❑ There is not enough time during the day to implement the practice (3)
- ❑ The required resources (e.g., materials) to implement the practice are limited or unavailable (4)
- ❑ The practice is not appropriate or relevant for my student(s) (5)

9. The use of specialized curricula and strategies to teach communication skills (e.g.; functional communication training).

- ❍ Yes, currently (since August, 2012) (1)
- ❍ No, I have not used this practice (0)

If No, I have not used this practice is selected, skip to "please select the reason for not using (check all that apply)".

Did you use this practice at least 2 times a week?

- ❍ Yes, at least 2 times a week (1)
- ❍ No, less than 2 times a week (0)

Please indicate the type of training method you received for implementing this practice (check all that apply).

- ❑ Half-day workshop (less than 4 hours) (1)
- ❑ Full-day workshop (more than 4 hours) (2)
- ❑ Multi-day workshop/training (more than one full day) (3)
- ❑ Online training modules (could include AIMS, or online training modules provided by the statewide autism network) (4)
- ❑ Self-taught (could include journal articles or book chapters ready by you, or information from the Internet) (5)
- ❑ Coaching/mentoring including modeling and performance feedback (6)
- ❑ University/college course(s) (1-3 courses) (7)
- ❑ University/college courses (4-6 courses) (8)
- ❑ University/college courses (more than 6 courses) (9)
- ❑ Training provided by someone in the district (this could include a lead teacher, specialist, or other staff) (10)
- ❑ Professional conference (11)
- ❑ No training received (12)

If one or more is selected, skip to next practice

Please select the reason for not using this practice (check all that apply).

- ❑ I (or my staff) do not know how to implement the practice (1)
- ❑ The number of staff members available is inadequate to implement the practice (2)
- ❑ There is not enough time during the day to implement the practice (3)
- ❑ The required resources (e.g., materials) to implement the practice are limited or unavailable (4)
- ❑ The practice is not appropriate or relevant for my student(s) (5)

10. The use of motivation/incentive programs based on positive reinforcement including point and token systems, and formal reinforcement assessments.

- ❍ Yes, currently (since August, 2012) (1)
- ❍ No, I have not used this practice (0)

If No, I have not used this practice is selected, skip to "please select the reason for not using (check all that apply)".

Did you use this practice at least 2 times a week?

- ❍ Yes, at least 2 times a week (1)
- ❍ No, less than 2 times a week (0)

Please indicate the type of training method you received for implementing this practice (check all that apply).

- ❑ Half-day workshop (less than 4 hours) (1)
- ❑ Full-day workshop (more than 4 hours) (2)
- ❑ Multi-day workshop/training (more than one full day) (3)
- ❑ Online training modules (could include AIMS, or online training modules provided by the statewide autism network) (4)
- ❑ Self-taught (could include journal articles or book chapters ready by you, or information from the Internet) (5)
- ❑ Coaching/mentoring including modeling and performance feedback (6)
- ❑ University/college course(s) (1-3 courses) (7)
- ❑ University/college courses (4-6 courses) (8)
- ❑ University/college courses (more than 6 courses) (9)
- ❑ Training provided by someone in the district (this could include a lead teacher, specialist, or other staff) (10)

- ❑ Professional conference (11)
- ❑ No training received (12)

If one or more is selected, skip to next practice

Please select the reason for not using this practice (check all that apply).

- ❑ I (or my staff) do not know how to implement the practice (1)
- ❑ The number of staff members available is inadequate to implement the practice (2)
- ❑ There is not enough time during the day to implement the practice (3)
- ❑ The required resources (e.g., materials) to implement the practice are limited or unavailable (4)
- ❑ The practice is not appropriate or relevant for my student(s) (5)

Thank you for completing the survey! Would you like to receive the results of the survey and/or to be entered into a drawing for a $25 Visa gift?

- ❍ No, thank you (1)
- ❍ Yes (0)
- ❍ Please enter your name and e-mail address (2) _____

APPENDIX B

IMPLEMENTATION OF EVIDENCE-BASED PRACTICES BY SPECIAL EDUCATION TEACHERS SERVING STUDENTS WITH AUTISM SPECTRUM DISORDER: A REVIEW OF THE LITERATURE

National policies, such as the No Child Left Behind Act (NCLB, 2001) and the Individuals with Disabilities Education Improvement Act (IDEA, 2004) require that special education teachers select and implement scientifically proven practices in their classrooms for all students. The increase in students with autism spectrum disorder (ASD) in public schools has resulted in efforts to reshape public policy guiding the education and treatment of students with ASD (Baker, 2004; Feinberg & Vacca, 2000). National discussions have focused on the strategies and standards for effectively preparing personnel to work with students with ASD (Scheuermann, Webber, Boutot, & Goodwin, 2003, Simpson, 2008), and interventions and educational strategies that demonstrate the most potential (Iovannone, Dunlap, Huber, & Kincaid, 2003; National Autism Center [NAC], 2009; Simpson, 2008).

A number of states have reported changes in policies regarding educational programming for students with ASD as a result of increased litigation to resolve methodological disputes (Etscheidt, 2003; Feinberg & Vacca, 2000; Mandlawitz, 2002; Zirkel & Gischlar, 2006). Subsequently, researchers have focused on identifying treatments and interventions that improve student outcomes (National Research Council [NCR], 2001; Schreibman, 2005). These efforts have resulted in an expanding body of literature describing a variety of instructional methods found to be effective for educating students with ASD (Callahan, Henson, & Cowan, 2008; Eikeseth, 2009; Hall, 2009; Iovannone, et al., 2003, Simpson, 2005; NAC, 2009).

Evidence-Based Practices for Learners with ASD

According to Odom, Boyd, Hall, and Hume (2010), providing a definition for the term e*vidence-based practice* (EBP) and establishing criteria for the amount of evidence needed to qualify as an EBP are two necessary steps for identifying practices (p. 276). An *evidence-based practice* (EBP) can be identified when a sufficient quantity of high-quality research studies demonstrate experimental control and results in improved student outcomes (Collins & Salzberg, 2005; Cook, Tankersley, & Landrum, 2009; Hall, 2009; Odom, Brantlinger, Gersten, Horner, & Horner, 2005; Odom, Collet-Klingenberg, Rogers, & Hatton, 2010; Reichow, Volkmar, & Cicchetti, 2008; Simpson, 2008).

In 2001, the National Research Council (NCR) identified critical component areas for developing effective programing for student with ASD. The NCR highlighted the following needs for basic conditions in all classrooms and programs serving students with ASD: (a) early entry into an intervention program; (b) active engagement in an intensive instructional program for a minimum of 25 hours per week, year round with no more than a 2-3 week break; (c) use of planned and repeated teaching opportunities (i.e. repeated opportunities for acquiring and practicing new skills); and (d) adult attention in one-on-one or very small group instruction to meet individualized goals and objectives. The NCR (2001) also reported the need for choosing and implementing effective approaches for personnel preparation, beyond a single training effort, to provide a continuum of services across time for students with ASD.

Simpson (2005) reviewed and evaluated the efficacy of 33 commonly used interventions and treatments for children and youth with autism. These methods were organized into five categories: (1) interpersonal relationship; (2) skill based;

(3) cognitive; (4) physiological/biological/neurological; and (5) other. Based on these factors, the 33 methods were classified as *scientifically based practices*, *promising practices*, practices *with limited supporting information*, and *not recommended*. Compared to the findings of similar studies, this research does not support adopting a specific intervention, but rather that interventions must be individualized based on the need of the individual and implemented with precision and fidelity (Dempsey & Foreman, 2001; Earles-Vollrath, Cook, Robbins, & Ben-Arieh, 2005; Green, 1996; Heflin & Simpson, 1998b; Humphrey & Parkinson, 2006; Mayton, Menendez, Wheeler, & Zhang, 2010; Smith, Daunic, & Taylor, 2007).

In 2009, the National Autism Center (NAC) announced the completion of its multi-year National Standards Project. This project served to support parents and professionals in the education and treatment of students with ASD. A summary of findings from this report offers four primary considerations when determining interventions for students with ASD. First, serious consideration should be given to e*stablished treatments* because there is sufficient evidence that the treatment produced beneficial effects. A second consideration is, once a treatment has been selected, professionals have the responsibility to collect data to determine the efficacy of the treatment. The third consideration is the values and preferences of key stakeholders, including the individual with autism. Lastly, treatment providers should have the training, adequate resources, and ongoing feedback to implement the treatment with fidelity (NAC, 2009).

More recently, the Office of Special Education Programs in the U.S. Department of Education funded the National Professional Development Center on ASD (NPDC) to

promote the use of EBP in programs for children and youth with ASD and their families, beginning with identifying interventions proven to be effective (Odom, Hume, Boyd, & Stabel, 2012). In order for the NDPC researchers to accept evidence about a practice from a particular study, the practice had to be supported by: (a) two high quality experimental or quasi-experimental design studies conducted by two different research groups, or (b) five high quality single case design studies conducted by three different research groups and involving a total of 20 participants across studies, or (c) there is a combination of research designs that must include at least one high quality experimental/quasi-experimental design, three high quality single case designs, and be conducted by more than one researcher or research group (Wong et al., 2015).

To date, the NPDC research team has identified 27 focused interventions that met the evidenced-based criteria. These EBPs are categorized into 12 outcome areas. Focused interventions are individual instructional practices or strategies that teachers and other practitioners use to teach specific targeted skills to children with ASD (Odom et al., 2010). These practices may take place in classrooms, clinics, homes or communities and are based on explicit teacher behaviors that can be described and measured (e.g. prompting, reinforcement, visual supports). As practices supported by research continue to be identified, an effective service delivery system must ensure that school personnel have the capacity to implement and sustain the efficacy of treatments (NAC, 2009).

Teachers serving students with ASD require a foundation of basic general and special education skills along with autism-specific knowledge and knowledge of evidence-based treatments and interventions (Simpson, 2008). Although we know what

is effective in terms of teaching and learning based on the research findings, there is an assumption that teachers are not using these findings in the classroom for students with autism (Mayton et al., 2010). There is a significant body of research indicating that teachers are more likely to adopt and sustain research-based practices when those practices and the professional development provided are presented to meet specific classroom teacher needs (Boardman, Arguelles, Vaughn, Hughes`, & Klinger, 2005; Boudah, Logan, & Greenwood, 2001; Leblanc, Ricciardi, & Luiselli, 2005; Lerman, Tetreault, Hovanetz, Strobel, & Garro, 2008; Lerman, Vorndran, Addison, & Kuhn, 2004; Ryan, Hemmes, Strumey, Jacobs, & Grommet, 2008; Sarokoff & Sturmey, 2008). The purpose of this review is to examine the reported prevalence of the implementation of EBP for students with ASD by special education teachers.

Method

This review focuses on studies examining the use of EPBs by special education teachers. In locating relevant studies and reports, journal articles were searched utilizing a university ESCO-host database (e.g., Academic Search Complete, Professional Development Collection, Psychology and Behavioral Sciences Collection, PsycARTICLES, PsycINFO). Specific key words used in the search included: *evidence-based practices, autism spectrum disorders, ASD and teaching strategies, ASD and interventions and treatment, ASD and special educators, reported implementation, program evaluation, and teacher skills and autism.* Other articles were found through ancestral searches (i.e., cross-referencing citations from previously identified articles and studies).

Inclusion-Exclusion Criteria

In order for a study to be included in this review, it had to meet all components of the following inclusion criteria: (1) the study's primary focus was the implementation of EBPs for students with ASD in a public school setting; (2) survey studies targeting special education teachers with school-aged students with ASD; (3) studies published in a peer-reviewed journal; and (4) the study was published between January, 2003 and August, 2015.

Studies were excluded if they focused on investigating (1) the effects of teacher training on implementing EBPs (e.g., McMillam); (2) training provided to other school personnel on implementing EBPs (e.g., Leblanc, Ricciardi, & Luiselli, 2005); or (3) parents' reported use of EBPs (e.g., Green et al., 2006). A list of excluded studies is available upon request from the first author.

Reliability

The reliability of article inclusion was calculated. The second author independently reviewed a randomly selected 30% of the articles retrieved, applied the selection criteria, and marked articles for inclusion or exclusion in the review. A point-by-point method of dividing the number of agreements by the number of agreements plus disagreements resulted in an inclusion reliability coefficient of 100%.

Results

A search of the literature identified 39 studies related to the implementation of EBP for students with ASD. Of those studies, three studies, involving 917 participants were included in this review. Participants were special education teachers serving students with ASD. All of these studies used a quantitative, non-experimental design.

For each study, a web-based survey was utilized to answer the research questions. Table 1 provides a list of the studies examining the implementation of EBPs by special education teachers.

Reported Prevalence of EBP in Educating and Treating Students with ASD

In 2008, Hess, Morrier, Heflin, and Ivey surveyed 185 special education teachers in Georgia's public schools to identify the strategies used in educating students with ASD. The strategies included in the survey were a list of identified evidence-based practices (e.g., Simpson, 2005). The results of the survey indicated that less than one third of Georgia public school teachers surveyed reported using interventions that had been rated by Simpson (2005) as evidence-based strategies (e.g., discrete trail training and pivotal response training) or promising practices (e.g., sensory integration and Social Stories™) for students with ASD. Furthermore, less than 10% of the interventions routinely used by these teachers were cited in the literature as being researched based (e.g., facilitated communication).

A follow-up study, using the Autism Treatment Survey (ATS), investigated the use of EBPs, teacher characteristics, and diversity issues related to services students with autism receive in Georgia's public schools (Morrier, Hess, & Heflin, 2011). These researchers also explored the type of training teachers received to implement the strategies they reported using in their classrooms. Fewer than 5% of the participants reported using EBPs for students with autism in their classrooms. Further results from this study indicated that teachers receive training to implement the strategies used from a variety of sources. However, fewer than 20% of the respondents reported learning

how to implement strategies used in their classrooms through their university-based teacher preparation program (Morrier et al., 2011).

Hendricks (2011) also developed a survey to investigate factors related to the self-reported knowledge and implementation of EBPs for students with ASD. The web-based survey was accessed and completed by 498 special education teachers serving students with ASD in a sample of schools in Virginia. The results of this study indicated that participants reported a low to intermediate mean level of knowledge and implementation of EBPs for students with ASD. Based on these results, the author recommends that professional development initiatives are designed and implemented that ensure special education teachers are adequately prepared and possess the knowledge and skills needed to improve outcomes for students with ASD (Hendricks, 2011).

Based on this limited review, special education teachers report limited use of strategies and interventions identified as being scientifically based (Hendricks, 2011; Hess et al., 2008, Morrier et al., 2011) and use methods that are unsupported or not recommended (Hess et al., 2008). One of the studies required teachers to report the type of training they received in the implementation of strategies used for students with ASD. Most of the teachers reported that they were trained through attendance at full- or half-day didactic workshop (Morrier et al., 2011).

Didactic presentations offer information and rationales behind strategies use, but little hands-on practice that is needed to learn how to apply these strategies to meet the needs of the heterogeneous population of students with ASD (Barnhill et al., 2014; Brock et al., 2014; McGee and Morrier, 2005).

Table 1 Studies of Reported Prevalence of EBPs Teaching Students with ASD

Author(s)	Participants	Design	Dependent variable(s)	Independent Variable	Outcome
Hess, Morrier, Heflin, & Ivy (2008)	185 special education teachers	Web-based survey' Autism Treatment Survey (ATS)	Types of treatments and interventions being utilized by teachers with students with ASD	Demographic characteristics of teachers; classroom setting; and grade level of students with ASD	Less than 10% reported EBP; 5% reported using strategies that are not recommended (e.g. facilitated communication)
Hendricks (2011)	498 special education teachers	Web-based survey	Self-reported autism knowledge; Self-reported implementation of practices	Teacher related characteristics; Environmental related characteristics; Student related characteristics (e.g., number of students)	Participants reported low to intermediate levels of knowledge of autism and EBPs and low to intermediate levels of implementation
Morrier, Hess, & Heflin (2011)	234 teachers with students with ASD	Web-based survey; Autism Treatment Survey (ATS)	Use of and nonuse of evidence-based practices	Certification level; classroom setting; years of experience teaching students with ASD	Individual factors hypothesize to influence use were not statistically significant

Discussion and Future Research

The purpose of this study was to review the existing literature regarding the implementation of EBPs for students with ASD by special education teachers. In all studies, participants reported limited use of EBPs with their students with autism. Currently, no single approach or strategy is proven to be most effective for all learners with ASD or even across time for the same individual with ASD (Dempsey & Foreman, 2001; Heflin and Simpson, 1998a; Humphrey & Parkinson, 2006; Simpson, 2008; Steuernagel, 2005; Yell, Katsiyannis, Drasgow, & Herbst, 2003). However, there is an

expanding body of evidence, which support the use of many specific interventions and comprehensive programs (e.g., behavioral teaching strategies and positive behavior support) (Boutot & Hume, 2011; Heflin & Simpson, 1998a; Iovannone et al., 2003; NAC, 2009; NCR, 2001; Odom et al., 2010; Odom et al., 2012; Volkmar, Lord, Bailey, Schultz, & Klin, 2004).

Within the last few years, there has been increased support and training provided to teachers serving students with autism, yet very little is known about the results of these efforts (Müller, 2006). Not only is more training required, but more importantly, quality training that results in teachers acquiring the skills needed to effectively serve this population of students (Leblanc, Richardson, & Burns, 2009; Lerman et al., 2004; NCR, 2001; Simpson, 2008). To date, there are few states with licensure in the area of autism; therefore, there is not a set of guidelines mandating teacher qualities and requirements (Müller, 2006). Professionals working with students with ASD need specialized knowledge and skills sets, but the trend toward cross-categorical and non-categorical teacher preparation doesn't produce highly qualified teachers for this population (Simpson, Mundschenk, & Heflin, 2011).

Furthermore, nationally accepted professional standards to guide effective practices for teachers of students with autism did not exist until 2009. It was at this time that the Council for Exceptional Children (CEC) created standards that reflect the knowledge, dispositions, and performances deemed essential for a well-prepared special educator. While the development of these standards is an important step for guiding practice, without mandating teacher qualities and requirements, educators' knowledge of these standards remains unclear (Hendricks, 2011). One of the most

significant challenges in the field of autism is the preparation of teachers needed to effectively serve students (Simpson, 2004).

Students with ASD present unique challenges to educators attempting to develop and implement effective instructional programs (Earles-Vollrath et al., 2008; Iovannone et al., 2003; McGee & Morrier, 2005; Simpson et al., 2011). Research is needed to evaluate the format and content of training delivered to special education teachers serving students with ASD. In addition to training, research should examine the factors influencing whether or not special education teachers are routinely using EBPs to teache their students with ASD. This information is critical to assist state policy makers, education agencies, and institutes of higher education (IHE) in developing teacher qualifications and professional development initiatives that will ensure current and future special education teachers are effectively prepared to teach students with ASD.

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APPENDIX C

BARRIERS TO IMPLEMENTING EVIDENCE-BASED PRACTICES FOR TEACHING STUDENTS WITH AUTISM SPECTRUM DISORDERS

Controversy surrounding the role of scientifically-based research in education can be linked to debate originating from the 1890s essay written by Royce, titled “Is There a Science of Education?” (Lagemann, 2000). The question posed in this essay was, in part, a result of growing interest in improving our nation’s schools. The term *evidence-based practice* originated in the field of medicine as early as the 1970s (Fischer & Orme, 2009; Mayton, Menendez, Wheeler, & Zhang; 2010; Mesibov & Shea, 2011; Odom, Collet-Klingenberg, Rogers, & Hatton, 2010) and has become an integral part of medicine, nursing, social work, psychology, public health, counseling, and other health and human service professions. According to Fischer and Orme (2009), EBP represents both an ideology and a method. The *ideology* comes from the ethical practice that clients deserve to be provided with the most effective treatments possible. The *method* of EBP is the way practitioners research and implement those treatments (p. 451).

In education, national policies require that educators select and implement scientifically proven practices in their classrooms; therefore, EBP refers to practices that have been shown to be effective by credible research (Odom, Brantlinger, Gersten, Horner, Thompson, & Harris, 2005). An EBP can be identified when a sufficient quantity of high-quality research studies demonstrating experimental control have been conducted and indicate that student outcomes are improved as a result of using the practice (Cook, Tankersley, Cook, & Landrum, 2008). According to Odom et al. (2010), providing a definition for the term evidence-based practice and establishing criteria for

the amount of evidence needed to qualify as an EBP are two necessary steps for identifying practices (p. 276). Although a universally accepted definition of EBP does not exist, evidence from at least two randomized clinical trials conducted by separate researchers usually meets the criteria of EBP (Reichow, Volkmar, & Cicchetti, 2008).

In 2002, The Institute for Education Science funded the What Works Clearinghouse (WWC) to summarize evidence about educational practices or interventions that have evidence or efficacy (Cook, Tankersley, & Landrum, 2009; Mesibov & Shea, 2011; Odom et al., 2005; Odom et al., 2010). The WWC has made progress on identifying practices in general education but there is little information about practices for children and youth with ASD. As of January, 2016 interventions for students with autism are not included on this website. One reason for the omission of autism-specific interventions is because the WWC does not include single-case research studies as an acceptable form of empirical evidence (Mesibov & Shea, 2011; Odom et al., 2010).

The use of EBPs, or those practices that have been proven to work, are particularly imperative in special education. As Dammann and Vaughn (2001) suggested, whereas many students without disabilities make adequate progress under a variety of instructional conditions, students with disabilities require the most effective teaching methods to be successful. Furthermore, educators must be able to identify practices that are evidence-based and implement these practices with fidelity (Cook et al., 2009; Smith, Daunic, & Taylor, 2007).

In 2005, Boardman, Arguelles, Vaughn, Hughes, and Klingner, conducted a review of literature to identify studies that examined special education teachers'

knowledge and perceptions of research-based practices. According to Boardman et al., "common findings in these studies were the need for effective professional development with opportunities for practice and feedback, and the need for involving teachers in the creation of implementation techniques so that the research can be changed into practice around attitudes, beliefs, and contextual factors (time constraints, administrative support, materials) of a school or district" (p. 169).

To address the need for an evaluation of treatments for young children with autism, the National Research Council (NCR) formed the Committee on Educational Interventions for Children with Autism (2001). This committee's review of the empirical evidence on intervention did not yield any single practice but rather included general recommendations for practice (Odom et al., 2010; Reichow et al., 2008). The following priority areas of need for ASD programming were highlighted:

1. Functional spontaneous communication should be the primary focus of early education;
2. Social interaction should be delivered throughout the day in various settings, using specific activities and interventions planned to meet age-appropriate, individualized social goals;
3. Play skills instruction should focus on play with peers, with additional instruction in the appropriate use of toys and other materials;
4. Cognitive development carried out in context in which the skills are expected to be used with generalization and maintenance in natural contexts;
5. Proactive approached to behavior problems; and

6. Functional skills should be taught when appropriate to the skills and needs of the student.

There have also been national initiatives to review the research literature and identify the quality of research examining individual practices and comprehensive treatment programs (e.g. National Autism Center; 2015).

In 2007, the Office of Special Education Programs in the U.S. Department of Education funded the National Professional Development Center on ASD (NPDC) to promote the use of EBP in programs for children and youth with ASD and their families, and an initial activity of this center has been to identify EBPs (Odom et al., 2010). To date, the NPDC research team has identified 27 focused interventions (Wong et al., 2014). According to Odom and colleagues (2010), focused interventions are individual instructional practices or strategies that teachers and other practitioners use to teach specific targeted skills to children with ASD. These practices may take place in classrooms, clinics, homes or communities and are based on explicit teacher behaviors that can be described and measured (e.g. prompting, reinforcement, visual supports).

Research-to-Practice Gap in Special Education

The special education field has had a rich history of research-based methods in the education and treatment of individuals with disabilities (Odom et al., 2005). Despite this rich history as a field, special education is challenged with a significant gap between research and effective practice (Boudah, Logan, & Greenwood, 2001; Iovannone, Dunlap, Huber, & Kincaid, 2003; Kaufman, 1996; NCR, 2001; Simpson, 2004). This gap is also evident in the education and treatment of learners with ASD (Ruble, Dalrymple, & McGrew, 2010). Although we know what is effective in terms of teaching

and learning based on the research findings, teachers are not utilizing these findings in the classroom for students with autism (Mayton et al., 2010). Factors identified in the literature contributing to gap between research to practice include the chronic teacher shortage (Katsiyannis, Zhang, & Conroy, 2003), the lack of effectively trained school personnel (Boudah et al., 2001; Ruef et al., 2009; Simpson, 2004), and the domination of theory-based (e.g. “constructivism” or “holism”) versus research-based programming in education (Jennet, Harris, & Mesibov, 2003; Polsgrove, 2003; Simpson, McKee, Teeter, & Beytien, 2007).

Other factors identified in the literature accounting for the limited use of evidence-based practices in special education classrooms, as well as general education classrooms, is the professional development offered and the lack of program fidelity (Kutash, Duchnowski & Lynn, 2009). Current professional development for teachers has been characterized as “one-shot” and lacking in the systematic follow-up necessary to sustain newly presented instructional strategies. Additionally, when the use of evidence-based practices is introduced to teachers and implementation is expected, there is little evaluation of the degree to which the intervention is being implemented with fidelity (Hulleman & Cordray, 2009; Kennedy, 1999; Kutash et al., 2009).

Numerous studies indicate that few EBPs are implemented with adequate fidelity due to a lack of administrative support, inadequate follow-up (e.g., Cook, Tankersley, & Harjusola-Webb, 2008), a lack of collaboration with teachers at the school level (e.g., Duchnowski, Kutash, Sheffield, & Vaughn, 2006), and a general lack of time.
The federal government became directly involved in the research-to-practice debate with the enacted No Child Left Behind Act (NCLB) of 2001. This legislation emphasized

the inclusion of evidence-based practices in all public school classrooms. The NCLB Act (2001) employs the phrase *scientifically based research* more than 100 times as the standard for education decision making and practice. Moreover, the recently reauthorized Individuals with Disabilities Education Act (IDEA, 2004) mandates that special education should maintain high academic achievement standards and clear performance goals for children with disabilities consistent with standards and expectations for all students in the educational system, and provide for appropriate and effective strategies and methods to ensure that all children with disabilities have the opportunity to achieve those standards and goals. (pt. D, 4a, Lines 1-8).

Factors Contributing the Research to Practice Gap

The majority of the research addressing the research to practice gap in special education focuses on issues of implementation (Abbott, Walton, Tapia, & Greenwood, 1999; Burn & Ysseldyke, 2009; Klingner, J. K., Ahwee, S., Pilonieta, P., & Menendez, R., 2003; Malouf & Schiller, 1995; Mayton et al., 2010; Snell, 2003) and sustainability (Boardman et al., 2005; Boudah, et al., 2001; Carnine, 1997; Reuf et al., 2009). Additional factors affecting the implementation of EPB in special education are the need for effective professional development with opportunities for practice and feedback (Abbott et al., 1999), and the need for involving teachers in the development of techniques so that the practice can reflect the attitudes, beliefs, and contextual factors of a school or district (Burns & Ysseldyke, 2009; Carnine, 1997; Lang et al., 2010; Malouf & Schiller, 1995; Snell, 2003).

In exploring the factors related to the lack of impact of research on practice in special education, Greenwood and Abbott (2001), identified major themes that include:

(a) the separateness of research and practice communities; (b) teachers and administrators perception of limited relevance of educational research to practice; (c) the failure of research to produce many innovations that are usable in real classrooms; and (d) the lack of ongoing opportunities for practitioners and researchers to collaborate and to engage in professional development. Furthermore, researchers fail to account for the contextual factors in a school setting, such as insufficient time and resources, externally imposed curriculums, and student variability (Greenwood & Abbott, 2001).

Abbot and colleagues (1999) discuss four factors responsible for the failure of bridging research knowledge successfully into the classroom. First, the traditional professional development model organized around brief workshops has not led directly to classroom implementation. A second reason for failure is the traditional top-down educational research model with researchers targeting the problems and planning the solutions. This has not led to teachers implementing research findings with fidelity, and subsequently has not produced improved student outcomes. Another reason for failure is the lack of new research knowledge linked to effective professional development systems where criterion for success is measurable change in classroom practice and students outcomes. The fourth reason identified is that research intended to make change in classroom practice often fails to receive input from teachers, or the individuals who will use the results (Abbott et al., 1999).

Classroom teachers are the consumers of new research knowledge, therefore practices viewed as having social validity are more likely to be started, adhered to, and recommended to others (Kazdin, 1980; Strain, Barton & Dunlap, 2012). Callahan, Henson, and Cowan (2008), identified autism intervention components with reported

effectiveness for school settings and examined the social validity of these components. These components were categorized into five functional areas, based on the acronym "I.D.E.A.L.". The authors designed a mail survey to investigate the opinions of teachers, administrators, and parents about the relative importance of these identified essential components when developing school-based programs for students with autism spectrum disorder (ASD).

The I.D.E.A.L. categories and their associated number of survey questions included: Individualized Programming; Data Collection; Empirically-Demonstrated Strategies and Interventions; Active Collaboration; and Long-Term Outcomes. The survey questions required respondents to rate specific autism intervention components to indicate their opinion about the importance of each component. The items were ranked on a scale ranging from one (*not at all important*) to seven (*absolutely important*).

Overall, the results indicated a very high level of social validity across teachers, administrators, and parents for almost all of the components on the survey. The mean rating for all interventions was 6.27, indicating that the majority of evidence-based practices listed was considered as *very important* to *absolutely important*. More than 80% of the intervention items received mean ratings between 6 and 7 (Callahan et al., 2008). The results of this study indicate an agreement among stakeholders regarding the social significance and benefit of identified practices for students with autism. Establishing social validity for evidence-based practices is critical to aligning research outcomes with teacher acceptance (Snell, 2003).

In a more recent study, Jones (2009) explored this gap through the perception of beginning teachers. Jones interviewed 10 novice special educators, each with less than 3 full years of teaching experience, serving students with high incidence disabilities across all grade levels. Overall, few employed more than one or two evidence-based practices. When practices were employed, they were typically used for only a short period of time; and fidelity of implementation remained an issue across the majority of teachers (Jones, 2009).

Teaching Training

Professional development activities designed to build knowledge and skills specific to autism have become more prevalent in recent years (Baker, 2004). In cooperation with the U.S. Department of Education's Office of Special Education Programs (OSEP), Müller (2006) surveyed state education agencies to determine approaches to personnel preparation in autism, and found states have increased training efforts since 1996. Barnhill, Polloway, and Sumutka (2011) reported 184 institutions of higher education (IHE) programs from 43 states offering personnel preparation in autism. However, these programs were highly variable with difference found in the type and number of courses offered. Furthermore, programs specific to autism were generally only offered autism at the graduate level. These authors suggest the degree of variation among the IHEs is a direction reflection of the fact that a relatively small number of states offer a licensure program in autism. Certification/endorsements are determined in each state by a licensing agency, and IHEs can only offer the certification/endorsements allowed by their state (Barnhill et al., 2011).

Given the lack of autism-specific coursework among IHEs, local education agencies (LEA) must ensure that personnel are trained in the use of effective methods for both teaching and managing behaviors of students with ASD (Bellini, Henry, & Pratt, 2011). LEAs provide professional development in the form of external workshops or in-service training events. Although the potential impact of professional development workshops is widely acknowledged (Smith & Gillespie, 2007), the typical didatic in-service training is not considered effective in sustaining implementation of effective practices (Duchnowski et al., 2006; Greenwood & Abbott, 2001) as these events are not systematically measuring outcomes of these trainings relevant to participant knowledge and behaviors (Hirsch & Killion, 2009). The body of evidence supporting effective professional development practices is emerging.

There is a significant body of research indicating that teachers are more likely to adopt and sustain research-based practices when those practices and the professional development provided are presented to meet specific classroom teacher needs (Abbott et al., 1999; Boardman et al., 2005; Boudah et al., 2001; Leblanc, Ricciardi, & Luiselli, 2005; Lerman, Vorndran, Addison, & Kuhn, 2004; Lerman, Tetreault, Hovanetz, Strobel, & Garro, 2008; Ryan, Hemmes, Strumey, Jacobs, & Grommet, 2008; Sarokoff & Sturmey, 2004; Sarokoff & Sturmey, 2008). Furthermore, a focus on student outcomes has been proven to be central to bridging the research-to-practice gap (Desimone, 2009; Greenwood & Maheady, 2001; Hirsch & Killion, 2009).

Lerman, Vorndran, Addison and Kuhn (2004) conducted a brief summer training program for public school teachers of children with autism. Initial training in the areas of reinforcer identification, direct teaching, and incidental teaching was provided across

five days via lectures, discussion, and role play. The results of this training indicated that all participating teachers mastered many specific skills in a brief period of time and these skills were maintained over time. A follow-up training was provided to further evaluate the outcomes of a brief, intensive teacher-training model for teachers of students with ASD and yielded similar results (Lerman et al., 2008). In this follow-up study, nine certified special education teachers participated in an intensive five-day summer training program. All teachers mastered specific skills in the areas of preference assessment and direct teaching. These skills were maintained and generalized to the classroom up to six months after training.

Sarokoff and Sturmey (2004) implemented a four-step behavioral skills training (BST) package consisting of instruction, feedback, rehearsal, and modeling to teach teachers to correctly implement discrete trail teaching (DTT) with a young child with autism. During baseline, teachers performed fewer than 50% of the components of DTT accurately. After training, the percentage of correct teaching for each teacher was 97% or higher. Brienes and Sturmey (2007) replicated this study by demonstrating that the BST package was effective and efficient in teaching DTT to three support staff. These researchers also demonstrated reduced stereotypy in students with autism using the BST package (Brienes & Sturmey, 2007).

In a follow-up study, Sarokoff and Sturmey (2008) demonstrated that the BST was effective in producing an increase in all staff members' performance of DTT in a short period of time. Additionally, all staff rated the training package as highly acceptable with a mean score of 6.6 on a 7-point scale. These findings all demonstrate the efficacy of a behavioral training package consisting of instruction, feedback,

rehearsal, and modeling for training staff to implement and sustain the use of an EBP for teaching students with ASD. Effective preparation of teachers to implement EBP for learners with ASD requires professional development that not only results in the necessary skills needed to implement EBPs, but is also considered socially valid by all whom are involved in the training.

Whether or not a practice is adopted and implemented depends largely on the social context (e.g., LEA or campus). As Freeman (2002) summarizes, "social forces consistently trump unvarnished effectiveness" in how interventions are selected and used (p. 1539). Researchers have proposed applying the diffusion of innovation theory to further understand the dissemination and implementation of EBPs for students with ASD (e.g., Dingfelder & Mandell, 2011; Fixsen, Blase, Metz, & Van Dyke, 2013). This theory provides a framework for understanding how and why practices are adopted (Greenhalgh, Robert, MacFarlane, Bate, & Kyriakidou, 2004). Diffusion is a process consisting of four stages: dissemination, adoption, implementation and maintenance (Rohrbach, Graham, & Hansen, 1993).

The research on the education and treatment of students with ASD has focused on establishing evidenced for interventions. However, in the absence of planning and support, school- or district-wide use of EBPs will not sustain over time (Lord et al., 2005). Researchers should plan for sustainability by examining implementation and determining what supports are needed for an intervention to continue after the study ends. Although there is a growing body of evidence for improving the learning outcomes of students with ASD, this knowledge has yet to affect many of the students with need it most. By making the dissemination, adoption, implementation and maintenance a

research priority, we can increase the probability that every student with ASD with benefit from research (Dingfelder & Mandell, 2011).

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